Jan. 6, 1959 H. A. TOULMIN, JR 2,867,384

METHOD AND ARTICLE OF MANUFACTURE FOR SUPPORTING RAILS

Filed Oct. 1, 1954 4 Sheets-Sheet 1

Fig. 1.

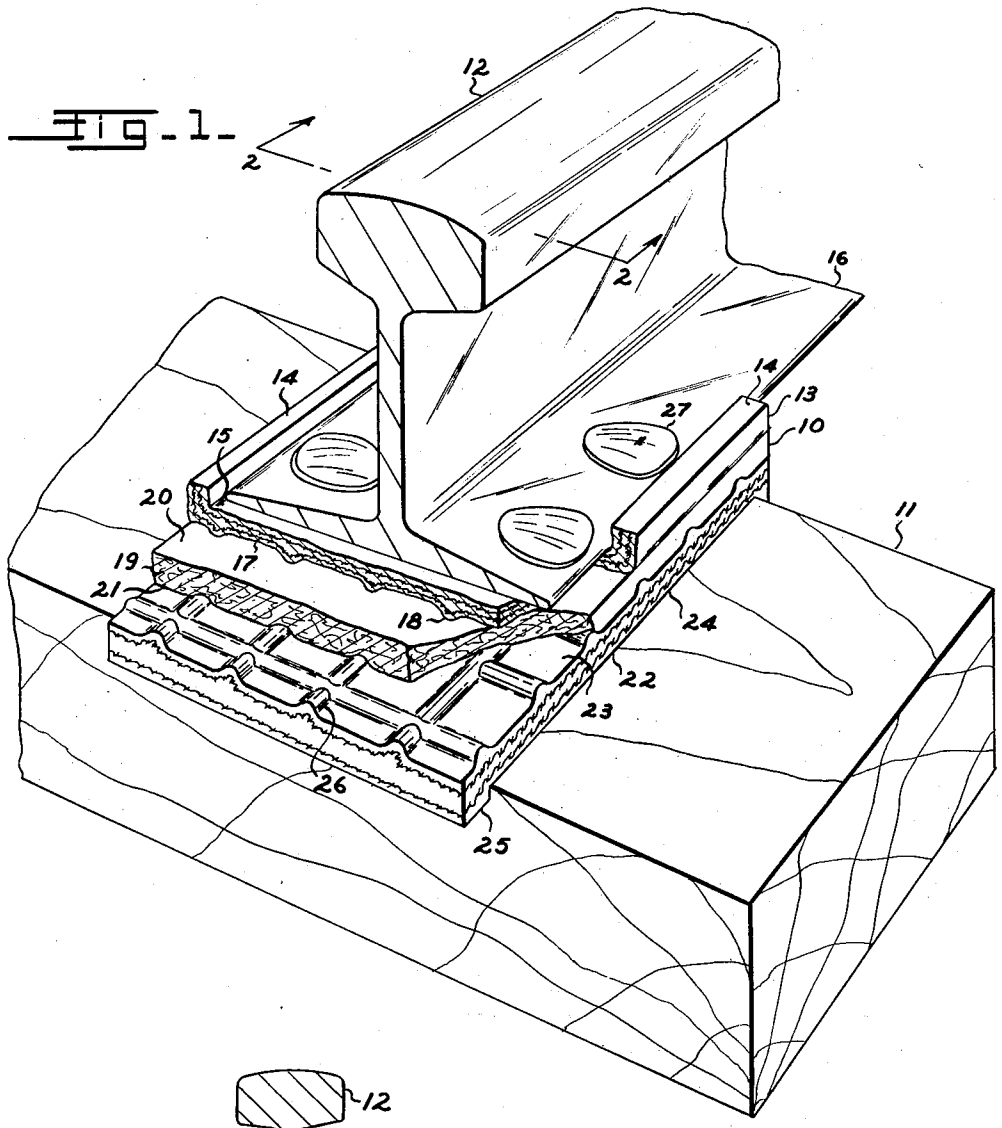
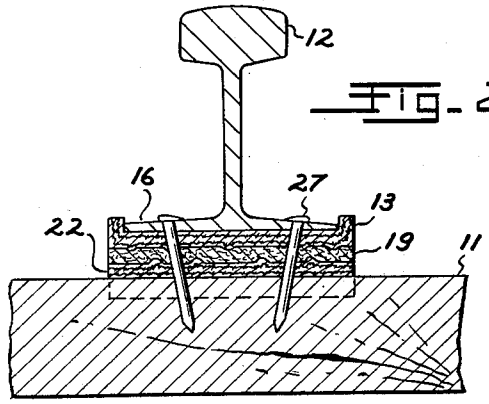



Fig. 2.




INVENTOR
HARRY A. TOULMIN JR.
BY Toulmin & Toulmin
ATTORNEYS

Jan. 6, 1959 H. A. TOULMIN, JR 2,867,384

METHOD AND ARTICLE OF MANUFACTURE FOR SUPPORTING RAILS

Filed Oct. 1, 1954 4 Sheets-Sheet 2

Fig. 3.

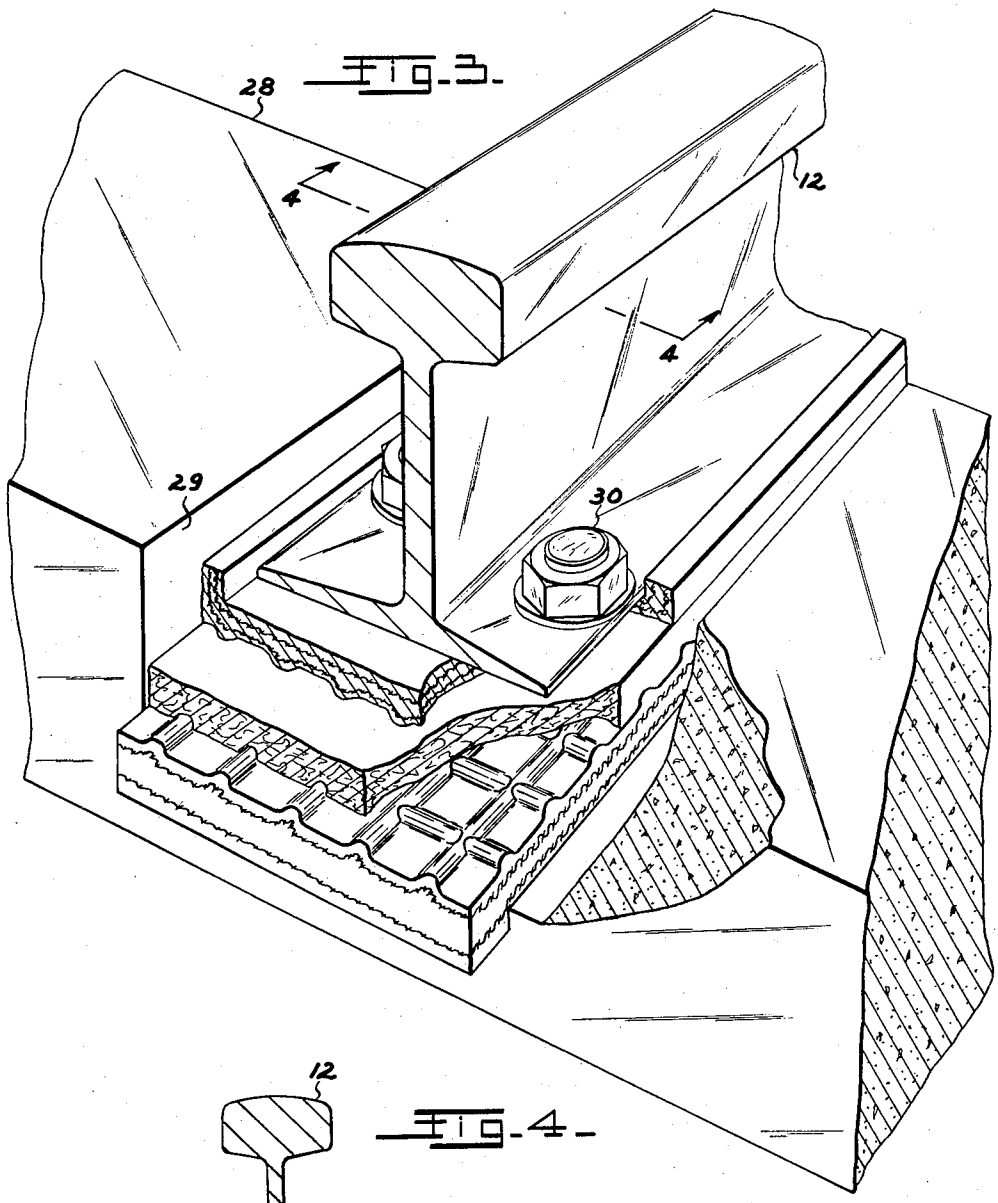
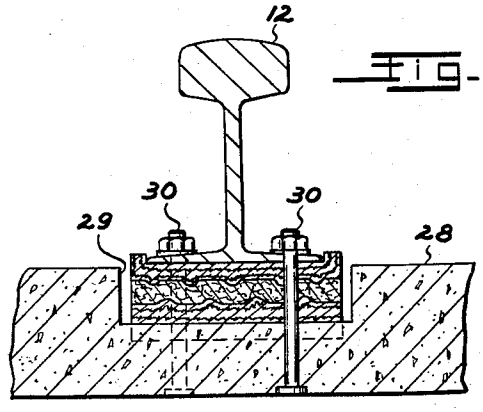



Fig. 4.




INVENTOR
HARRY A. TOULMIN JR.
BY Toulmin & Toulmin
ATTORNEYS

Jan. 6, 1959 H. A. TOULMIN, JR 2,867,384

METHOD AND ARTICLE OF MANUFACTURE FOR SUPPORTING RAILS

Filed Oct. 1, 1954 4 Sheets-Sheet 3

Fig. 5.

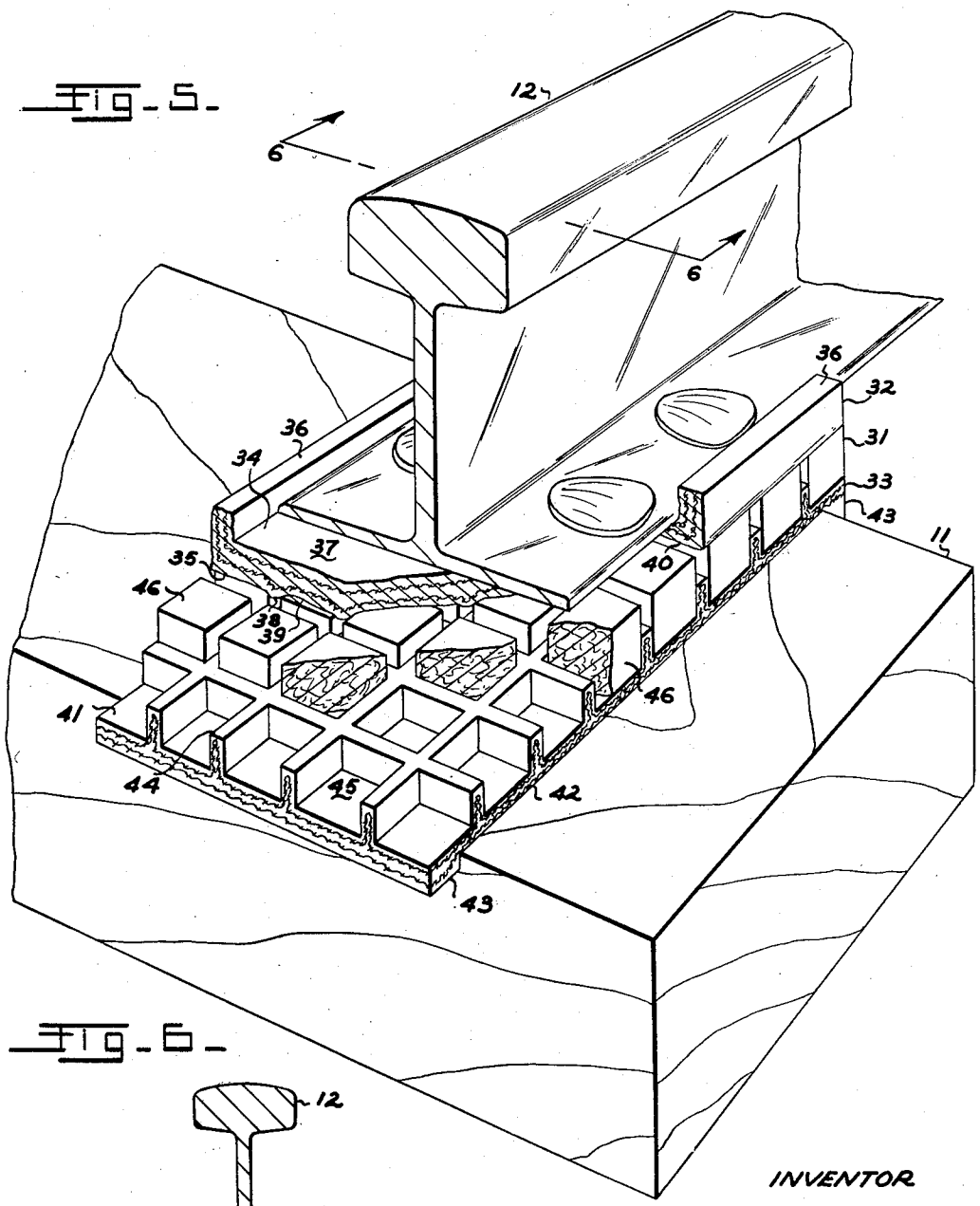
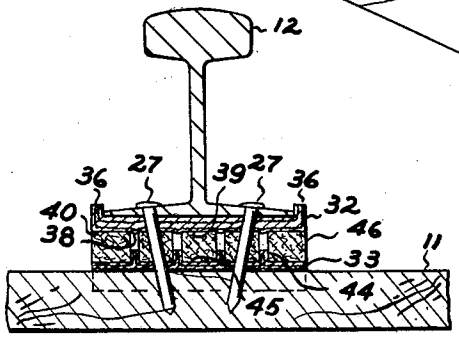



Fig. 6.




INVENTOR

HARRY A. TOULMIN JR.

BY Toulmin & Toulmin

ATTORNEYS

Jan. 6, 1959 H. A. TOULMIN, JR 2,867,384

METHOD AND ARTICLE OF MANUFACTURE FOR SUPPORTING RAILS

Filed Oct. 1, 1954 4 Sheets-Sheet 4

Fig. 7.

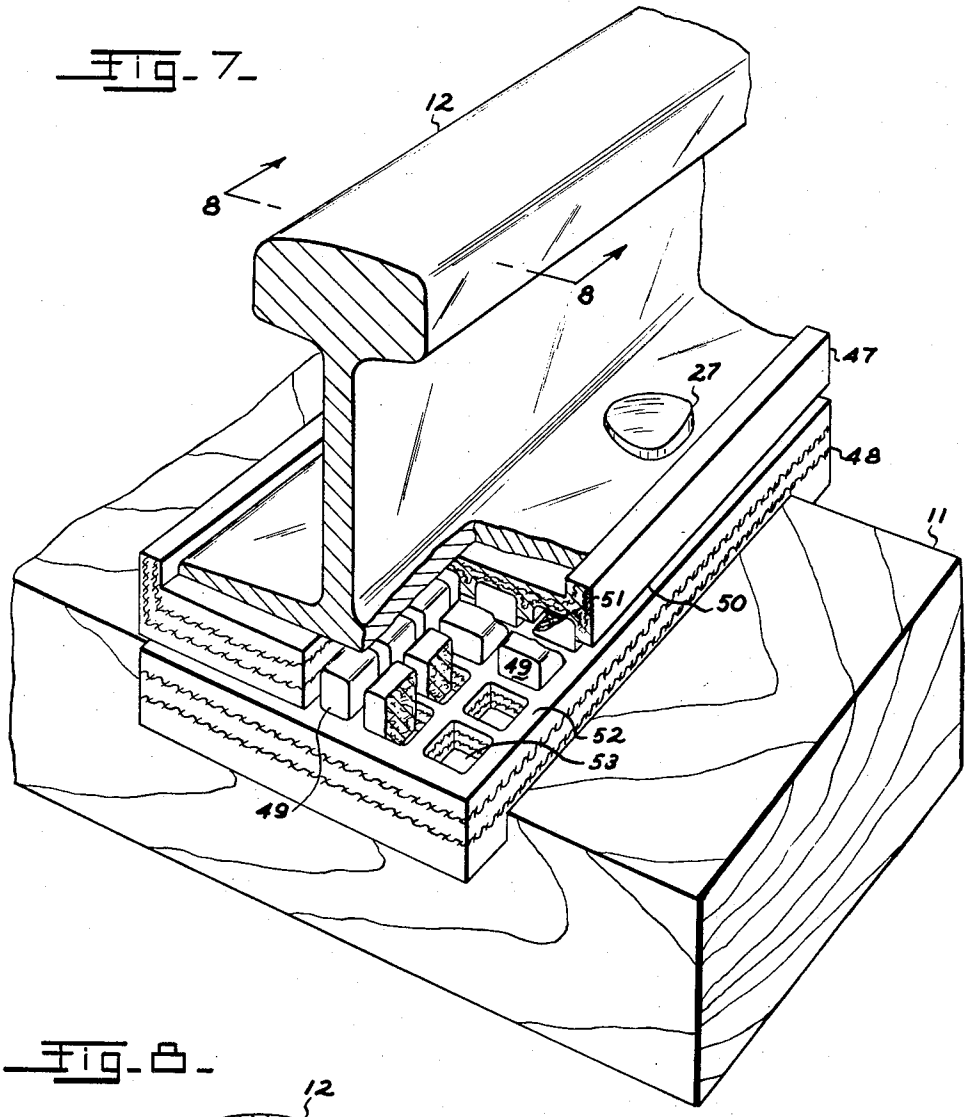
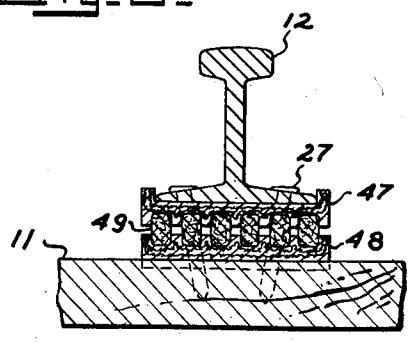



Fig. 8.




INVENTOR
HARRY A. TOULMIN JR.
BY Toulmin & Toulmin
ATTORNEYS

United States Patent Office 2,867,384 Patented Jan. 6, 1959



2,867,384

# METHOD AND ARTICLE OF MANUFACTURE FOR SUPPORTING RAILS

Harry A. Toulmin, Jr., Dayton, Ohio, assignor to The Commonwealth Engineering Company of Ohio, Dayton, Ohio, a corporation of Ohio

Application October 1, 1954, Serial No. 459,785

6 Claims. (Cl. 238—283)

The present invention relates to a rail tie plate assembly, more particularly to a non-metallic resilient structure which supports and secures a rail to a cross tie.

In conventional practice tracks comprise rails which are supported upon cross ties. The usual manner in which this is done comprises placing a flat metallic member, referred to as a tie plate, upon a wooden cross tie and securing it in place. The flanged portion of the steel rails is then placed on the rail seat of the tie plate and secured in place by means of spikes engaging the flange of the rail. It has been found to be desirable to firmly anchor the tie plate to the cross tie in order to prevent any destructive abrasive action because of the plate movement.

The bottom of the tie plate is either smooth or slightly corrugated. Use of teeth or other sharp projections on the bottom of the tie plate in order to secure the tie plate to the cross tie has been found to be undesirable since the projections cut the wood fibers of the cross tie and hasten the decay of the wood. Consequently, variations in the base of the tie from a flat base plate are designed to seat the tie plate securely while avoiding any injury to the wood fibers of the cross tie.

The tie plate itself is rectangular in shape and has a width which is limited to the width of the cross tie. A pair of parallel shoulders are usually placed on the top of the plate to define a rail seat. The parallel shoulders restrain lateral motion of the rail ends since these shoulders are immediately adjacent the rail ends. These shoulders are such as to be low enough to permit spike heads to engage the top of the flange yet sufficiently high to afford a firm side bearing for the flange.

It has been previously proposed to use composition pads under the steel tie plates in order to reduce maintenance costs. These tie pads were also intended to reduce plate cutting and other mechanical wear of ties, to cushion against impact and to deaden sound.

The present invention discloses a structure and method for supporting the rail upon a cross tie. This structure essentially comprises a non-metallic tie plate assembly. The tie plate assembly comprises a non-metallic tie plate which is suitably mounted to one face of non-metallic pad member. A tie saddle or tie engageable member is bonded to the opposing face of the pad member. The tie saddle may be constructed so as to be closely received upon the wooden cross tie. The rail itself is secured to the cross tie by the use of conventional spikes which pass through the tie plate assembly.

The tie plate and tie saddle may be constructed of laminated fabrics which have been treated with suitable resins. The resilient mat interposed between the tie plate and tie saddle may be a fibrous glass mat impregnated with resin.

Several modifications of the tie plate assembly are disclosed. In addition, an embodiment of the invention is disclosed showing how a rail may be secured to a cross tie other than wood, employing the tie plate assembly disclosed as this invention. These other types of cross ties are usually steel or concrete.



It is therefore the principal object of this invention to provide an improved rail tie assembly.

It is another object of this invention to provide a strong and resilient supporting connection between a rail and a cross tie.

It is a further object of this invention to provide an inexpensive and simple non-metallic structure for supporting a rail upon a cross tie.

It is an additional object of this invention to provide rail supporting members made of resinous laminates.

It is still another object of this invention to provide a rail supporting structure wherein a resilient pad is interposed between the supporting plates.

It is a still further object of this invention to provide a method for supporting rails upon cross ties using non-metallic materials.

It is still an additional object of this invention to provide a method for supporting rails upon ties involving the use of resinous laminates for supporting plates and a fibrous glass resilient member interposed between said plates.

Other objects and advantages of this invention will become readily apparent upon reference to the following description when taken in conjunction with the accompanying drawings, **wherein:**

Fig. 1 is a perspective view of the tie plate assembly of this invention with portions thereof removed;

Fig. 2 is a sectional view taken along the lines **2—2** of Fig. 1;

Fig. 3 is a perspective view showing the tie plate assembly when used to secure a rail to a concrete cross tie with portions of the tie plate assembly removed;

Fig. 4 is a sectional view taken along the lines **4—4** of Fig. 3;

Fig. 5 is a perspective view of a modication of the tie plate assembly disclosed in this invention with portions thereof removed;

Fig. 6 is a sectional view taken along the lines **6—6** of Fig. 5;

Fig. 7 is a perspective view showing still another modification of the tie plate assembly with portions thereof removed; and

Fig. 8 is a sectional view taken along the lines **8—8** of Fig. 7.

Returning now to the drawings, more particularly to Fig. 1 wherein like reference characters indicate the same parts throughout the various views, **10** indicates generally a tie plate assembly constructed in accordance with this invention. The tie plate assembly **10** is positioned upon a wooden cross tie **11** and a conventional steel rail **12** is supported upon the tie plate assembly **10**.

The tie plate assembly **10** comprises a tie plate **13** which has a pair of parallel shoulders **14** which define a rail seat **15**. The steel rail **12** is of the conventional I-beam type and has a flange **16** which is closely received within the rail seat **15**.

The tie plate **13** has a bottom surface **17** upon which there is formed a grid pattern of thrust ribs **18**. The thrust ribs **18** are preferably integral with the tie plate **13**.

Positioned directly beneath the tie plate **13** is a resilient pad **19** which has an upper face **20** and a lower face **21**. The pad **19** is non-metallic and may be formed of a fibrous glass mat which is impregnated with resin. The upper face **20** of the mat **19** is fused or bonded in a suitable manner to the bottom face **17** of the tie plate **13**.

Positioned directly beneath the mat **19** is a tie saddle **22** which rests upon the wooden cross tie **11**. There are depending flanges **25** upon either end of the tie saddle **22**. These flanges **25** are immediately adjacent the edges of the wooden cross tie **11** in order to closely receive the

wooden cross tie 11 therebetween. These depending flanges 25 prevent any creeping movement of the tie saddle transversely upon the cross tie 11.

Upon the upper face 23 of the tie saddle 22 a plurality of projecting ribs 26 are formed into a grid pattern. This grid pattern is similar to the grid pattern formed upon the tie plate 13. The upper surface 23 of the tie saddle 22 is bonded or fused in a suitable manner to the mat 19. By imbedding the ribbed patterns on both the tie plate and the tie saddle into the mat, it can be seen that the ribs serve to eliminate any movement of either the tie plate or the tie saddle relative to the mat. Elimination of this movement is desirable as the destructive effect of abrasive action is thereby removed.

Suitable openings, as indicated in Fig. 2, may be provided in both the tie plate assembly and the flange of the steel rail to receive a number of railroad spikes 27 in order to secure the rail to the wooden cross tie. If desired, the holes in the tie plate assembly may be so positioned that the heads of the spikes engage the edges of the flange of the steel rail.

Both the tie plate and the tie saddle may be composed of the same material. This material consists of a laminated fabric, such as cotton, which is impregnated with a suitable silicon resin. By impregnating the laminated fabric under high pressures and high temperatures, a material is obtained from which a satisfactory tie plate may be manufactured. If desired, a cloth made of glass fibers may also be used in making the tie plate and the tie saddle. It is preferable to use the glass cloth as the strength of glass is known to be considerably greater than the fibers of ordinary cloth.

Also, if desired, both the tie plate and the tie saddle may be made by densely packed glass fibers which are molded under high pressures while impregnated with suitable silicon resins. This process also will result in a tie plate and a tie saddle which will be very satisfactory for use in the tie plate assembly of this invention.

Proceeding to Fig. 3 there is illustrated therein the structure employed when securing a rail to a concrete tie. This same structure may be employed when securing the rail to a steel tie. It is pointed out that both steel and concrete ties have very little natural resiliency when compared with wooden ties. Consequently, it is extremely important that there be some form of resilient material interposed between the rail and the non-wooden tie in order to absorb the shocks due to impact upon the rail. This invention is especially suited for this purpose. Concrete and steel ties are used most frequently in bridge construction or at intersections of railroad tracks and highways.

In Fig. 3 there is illustrated a concrete cross tie 28 which has a transverse slot 29 in the upper surface thereof. The slot 29 is of sufficient dimension to accommodate the tie plate assembly 10 as illustrated in Fig. 1. The rail is then secured to the concrete cross tie by means of suitable bolts 30, which are passed through the spike holes in the flange of the rail and through the tie plate assembly.

In Fig. 4, which is a sectional view of the structure illustrated in Fig. 3, it can be seen that the flange of the steel rail is substantially flush with the upper surface of the concrete cross tie 28. It is to be understood that this relationship is not at all limiting but may be desirable in certain applications.

In Fig. 5 there is illustrated a modification of the tie plate assembly disclosed in Fig. 1. This modification is illustrated as being used to secure a steel rail to a wooden cross tie.

In the modification as illustrated in Fig. 5, the steel rail 12 is supported upon the wooden cross tie 11 by means of a tie plate assembly 31. The tie plate assembly 31 is similar to the tie plate assembly 10 in that it comprises both a tie plate 32 and a tie saddle 33.

The tie plate 32 has an upper surface 34 and a bottom surface 35. On the upper surface 34 there is a pair of parallel shoulders 36 which define a rail seat 37. Thus far, the construction of this tie plate 32 is similar to the tie plate 13 as illustrated in Fig. 1.

However, on the bottom surface 35 of the tie plate 32 there is arranged a grid pattern of slightly raised projections 38, which projections intersect each other to form a plurality of recesses 39, the inner ones of which have four sides, and the outer ones of which have at least one side open. These recesses 39 are shown to be substantially square in section. However, it is to be understood that any other desired shape may be employed.

The tie saddle 33 has a top surface 41 and a bottom surface 42. There are dependent flanges 43 on the bottom ends of the bottom surface 42 in order to receive closely the wooden cross tie 11 therebetween. On the top surface 41 of the tie saddle there is positioned a grid pattern of raised projections 44 which is similar to the grid pattern on the bottom face of the tie plate to form a plurality of recesses 45, with the outer rows of recesses having at least one side open. As in the case of the tie plate projections, the projections 44 are integral with the surface of the tie saddle.

The grid patterns on both the tie plate and the tie saddle are so positioned so that when the tie plate and the tie saddle are positioned together to form the tie plate assembly, the recesses on the tie plate will be aligned with the recesses 45 on the tie saddle. When the tie plate and tie saddle are assembled, a resilient mat 46 is partially received within each one of a pair of aligned recesses. These mats 46 may be made of fibrous glass blocks which are impregnated with a suitable resin. An examination of Fig. 6 will serve to clarify the relationship of each of the pads 46 with the cooperating surface of the tie plate and the tie saddle.

When the tie plate assembly illustrated in Fig. 5 is formed, the pads 46 are suitably bonded or fused within the recesses of the tie plate and the tie saddle. The rail 12 is then secured to the cross tie by means of railroad spikes 27 passing through spike openings in both the flange and the steel rail of the tie assembly in a manner similar to that disclosed and described in connection with the construction shown in Fig. 1.

Proceeding now to Fig. 7 there is illustrated another modification of the tie plate assembly of this invention. This modification is somewhat similar to the modification described in Fig. 5 except that none of the recesses in either the tie plate or the tie saddle have sides open to the edge of either the tie plate or tie saddle respectively.

The modification in Fig. 7 essentially comprises a tie plate 47, a tie saddle 48, and a plurality of resilient pads 49 interposed therebetween. The upper surface of the tie plate has a parallel shoulder construction similar to that described in connection with Fig. 5. The tie plate furthermore has a bottom surface 50 which has therein a grid pattern of recesses 51. The recesses 51 are shown to be square in section but may be of any shape desired. It is noted that none of the recesses open to the edge of the tie plate.

The tie saddle 48 is similarly constructed to the tie saddle described in connection with Fig. 5 and has a top surface 52 which has therein a grid pattern of recesses 53. The recesses 53 are of the same size and shape as the recesses 51 in the tie plate 47. Consequently, when the tie plate 47 and tie saddle 48 are positioned for assembly, the recesses 51 and 53 will be in alignment with each other. A plurality of resilient pads 49, as pointed out above, are so positioned between the tie plate and the tie saddle that a portion of each pad is received within each of a cooperating pair of recesses 51 and 53. This relationship is clearly illustrated in Fig. 8. The pads 49 are then suitably bonded or fused within their respective recesses so as to form an integral tie plate assembly unit. The pads 49 may be

of any suitable resilient material but, as described in connection with Fig. 5, it is desired that they be made of fibrous glass blocks which are impregnated with a resin. In this manner pads of high pressure strength are obtained which have a desirable degree of resiliency.

As described above the steel rail **12** is secured to the cross tie **11** by means of railroad spikes **27** which pass through spike holes in the flange of the steel rail and in the tie plate assembly itself.

Thus it can be seen that the present invention discloses a novel article of manufacture and method of supporting rails upon cross ties by employing non-metallic materials. The tie plate assembly of this invention will result in smoother travel along the rails because this tie plate assembly will readily absorb all impacts upon the rails. In addition, this tie plate assembly is both inexpensive and simple to manufacture. Consequently, the use of this resilient tie plate assembly would serve to reduce maintenance cost of tracks. By employing this invention in the various applications as described above, it can be seen that the high grade steels previously necessary to make these tie plates can be released for other purposes.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions, and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. In a tie plate assembly for interposition between a rail and cross-tie, a non-metallic tie plate engaging said rail, a non-metallic tie saddle positionable upon said cross-tie, and a non-metallic compressible pad susceptible to permanent deformation between said tie-plate and tie saddle, said pad being bonded to the opposed faces of said tie-plate and tie-saddle to form a non-metallic tie assembly therewith.

2. In a tie plate assembly for interposition between a rail and a cross-tie, a non-metallic tie saddle positionable upon said cross-tie, and a compressible pad of glass fibers having a resinous binder and susceptible to permanent deformation positioned between said tie plate and tie saddle, said pad being bonded to the opposed faces of said tie plate and tie saddle to form a non-metallic tie assembly therewith.

3. In a tie plate assembly for interposition between a rail and a cross-tie, a non-metallic tie plate engaging said rail, a non-metallic tie saddle positionable upon said cross tie, and a non-metallic pad between said tie-plate and tie saddle, said tie plate, tie saddle and pad being compressible and formed of glass fibers having a resinous binder and being susceptible to permanent deformation.

4. In a tie plate assembly for interposition between a rail and a cross-tie, a non-metallic tie plate engaging said rail, a non-metallic tie saddle positionable upon said cross tie, a non-metallic compressible pad susceptible to permanent deformation between said pad plate and tie saddle, projecting ribs forming a grid pattern on one face of said tie saddle and embedded in said mat to eliminate relative movement between the tie saddle and the mat whereby the destructive effect of abrasive action is removed, said pad being bonded to the opposed faces of said tie-plate and tie saddle to form a non-metallic tie assembly therewith.

5. In a tie plate assembly for interposition between a rail and a cross-tie as claimed in claim 4 with said projecting ribs being on both said tie saddle and tie plate.

6. In a tie plate assembly a multiple plate structure including a tie plate, a tie saddle and a pad therebetween with each being compressible and susceptible to permanent deformation and formed of glass fibers having a resin binder with the fibers on engaging faces of said plate, saddle, and pad, interlocking to prevent relative movement between said elements whereby the destructive effect of abrasive action is removed.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 388,240 | Ashcroft | Aug. 21, 1888 |
| 1,190,154 | Haas | July 4, 1916 |
| 1,780,396 | Kirkbride | Nov. 4, 1930 |
| 2,124,235 | Cunradi | July 19, 1938 |
| 2,291,611 | Dooling | Aug. 4, 1942 |
| 2,337,497 | Reddick | Dec. 21, 1943 |
| 2,397,023 | Lloyd | Mar. 19, 1946 |
| 2,421,602 | Dooling | June 3, 1947 |
| 2,553,010 | Saul | May 15, 1951 |
| 2,600,843 | Bush | June 17, 1952 |
| 2,609,991 | Jones | Sept. 9, 1952 |
| 2,656,116 | Protzeller | Oct. 20, 1953 |