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RAIL AND TIE ASSEMBLY AND METHOD OF MAKING

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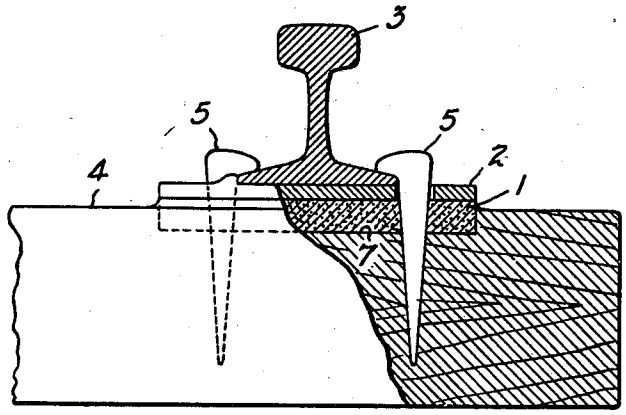


Fig. 1

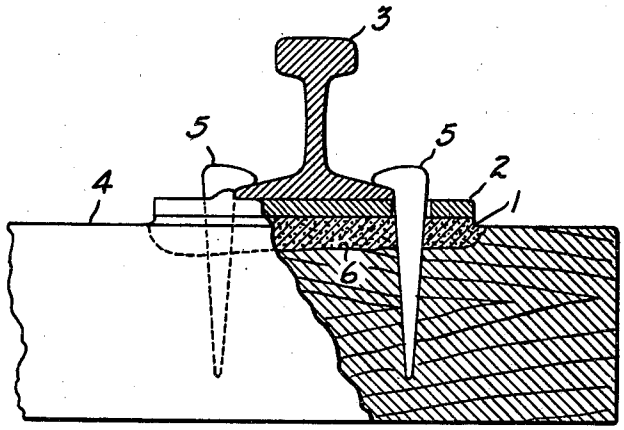


Fig. 2

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RAIL AND TIE ASSEMBLY AND METHOD OF MAKING

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15 Claims. (Cl. 238—283)

My invention relates to a method of securing rails to ties, more particularly it relates to a means of bedding the tie plate placed intermediately between the base of a road rail and the crossties of the railway for supporting the rails on the crossties.

In the early days of railway construction the supply of crossties was abundant and they were inexpensive, and therefore the relatively short life of the crossties in use was a matter of relatively small importance. Labor was also low priced and the operations involved in replacing ties were therefore not so costly. However, to minimize the cutting of the rail ties by the narrow rail base, a piece of metal was laid between the base of the rail and the tie as a protective device, said pieces being called tie plates, bearing plates or wear plates. Since the first use of tie plates the cost of railway ties, together with the cost of replacement, has increased enormously, so that at the present time great consideration is being given the subject of increasing the life of railway ties.

One objection to the tie plate as now commonly constructed lies in the likelihood of becoming more or less loosened from its seat upon the tie, and when this occurs, moisture will creep beneath the plate and cause the tie to rot and will otherwise hastens the wear and deterioration of the tie. Another objection is that under traffic the tie plate tends to cut into the tie, thus permitting the rail to become loosened and impairing the track. Furthermore, it is a fact generally conceded by those skilled in the art of railway construction that an entirely rigid construction, in which the rail base rests directly on the tie plate which in turn rests directly on the tie, is not an ideal construction as the effect of shock is considerably intensified as compared with that resulting when a less rigid material is interposed between the tie plate and the tie as provided by my invention.

An object of my invention is, therefore, to provide an improved means of securing the tie plate to the tie.

Another object of my invention is to provide a grouting material between the tie and the tie plate which will cushion the shocks which result from the travel of heavy locomotives and cars over the rails.

Another object of my invention is to provide an improved grouting material the use of which will increase the useful life of the railway ties upon which it is used.

Another object of my invention is to provide an economical means of repairing the damage done to the ties by the tie plates under heavy traffic.

Other objects will be apparent from the following description of the method and products as illustrated by the accompanying drawing, where:

Figure 1 is an elevational view of a railroad tie having a rail mounted thereon in accordance with the invention; and

Fig. 2 is an elevational view of a rail on a tie which had been damaged by the relative movement of the rail and the tie, and has been repaired by the method of this invention.

According to this invention, a comminuted solid or a mixture of a comminuted solid and other ingredients, some of which are capable of reacting chemically to produce solids having an increased volume, are inserted by appropriate means between the tie plate and the tie. The composition should be of a nature such that a water-resistant, non-plastic mass is produced by a reaction occurring at atmospheric temperatures. It is also desirable that the composition when set have considerable strength and form a bond with both the tie and the tie plate to lend rigidity to the structure.

Referring more particularly to the drawing, a layer of comminuted solids having the above characteristics is disposed between the tie plate **2**, which may be of conventional design and which carries the rail **3**, and the tie **4**. A recess **7** with a depth equal to the thickness of the composition may, if desired, be cut in the top of the tie in order that the tie plate may be fastened level with the top surface **8** of the tie. The composition may, if desired, be placed on top of the tie without cutting a recess therein. The spikes **5**, or other suitable fastening means, are used in conventional manner to fasten the rail **3** and the tie plate securely to the tie **4**.

When, as illustrated in Fig. 2, the tie **4** has previously been damaged by wear of the rail or by other means, the groove or cavity **6** may be filled with the composition **1**, and the tie plate **2** thus elevated to the desired elevation with respect to the body of the tie. In making the repair it is not necessary to remove the tie, and it is only necessary to remove spikes from one rail at a time. The rail should preferably be raised sufficiently from the tie to remove the tie plate and the walls and bottom of the recess or cavity **6** should be cleaned out and wetted with water and filled with the grouting material of this invention. The tie plate is then again

placed in position under the rails and the spikes may be reinserted in the places from which they were removed.

In filling the cavity 6 some of the composition also enters the original holes left by the spikes, and the spikes can be reinserted in the same location, making it unnecessary to relocate them as in the former practice. Splitting of the ties is thus avoided. It is also unnecessary in carrying out the present invention to cut out the tie or square up the groove in the tie as heretofore practiced. The original level of the rail with respect to the tie may be maintained and the tamping of the road bed to elevate the grooved tie is unnecessary.

The grouting composition should preferably contain a comminuted material of an oxidizable nature which will oxidize in air at normal temperatures, and thus increase in volume and become compacted. Particularly satisfactory compositions contain a substantial proportion of comminuted iron.

The comminuted solid, such as granulated iron, should preferably have a particle size range of from about ¼ inch to particles which pass through a 50 mesh screen; but it is possible and in some cases desirable to have some particles in excess of ¼ inch or so as the larger particles help to bind the smaller particles together. Particles having a size less than 50 mesh need not be excluded and the packing properties of the composition may even be increased when such fine particles are present.

The surface of the iron when exposed to air oxidizes, and by using comminuted iron or other oxidizable material the exposed surface is increased and the oxidation is much more extensive and rapid. The volume of the material is increased by such oxidation and when the solids are confined as above described, the finely divided, oxidizable material becomes compacted into a solid mass which adheres to both the tie plate and the tie. The mass absorbs a considerable portion of the shocks and greatly lessens tendencies for wear of the tie.

While comminuted iron, or other oxidizable solid, may be used alone for tie plate bonding, the oxidation of such a material may be accelerated by incorporating an electrolyte, such for example as calcium chloride, sodium chloride, ammonium chloride or other salt or compound which has ionizing properties, in the composition so that the oxidation will be increased when the composition comes in contact with water. The proportion of such electrolyte need not be large, usually amounting to from about 1% to about 5% of the metallic portion of the grouting composition.

It has also been found that insoluble materials which may be substantially inert under such conditions, hasten the oxidation probably by tending to hold the metal particles apart, thereby increasing the surface exposed to oxidizing reagents. Such materials may for example be sulphur, barium sulphate, fly ash, etc. They also increase the packing properties of the composition. The proportion of such finely divided, relatively inert material is preferredly small, being about 0.5 to 5% of the metallic content. The optimum proportion will vary with the size and grading of the oxidizable material, the rate of oxidation required and other factors, being larger when the fines present in the oxidizable material are less, and when the required rate of oxidation is higher.

The following examples illustrate compositions found to be very desirable and effective between railroad rails or tie plates and the ties, forming bonds to both the metal and the wood.

Example 1

	Pounds
Ground iron	100
Ammonium chloride	1
Sulphur	½

The composition when moistened with water and disposed between the tie plates and the ties was found to increase the life of the tie and to possess sufficient resilience to absorb some of the shock.

Example 2

	Pounds
Ground iron	100
Ammonium chloride	1¼
Sulphur	2½

This composition oxidizes more rapidly than that of Example 1.

When a mass of metal in more or less comminuted form is caused to oxidize, at least two important effects are produced. Since the metal oxide has a greater volume than the metal itself, the oxide expands tending to fill the interstices of the granular mass, thereby decreasing porosity and increasing imperviousness, and with further oxidation the entire mass tends to expand. Another important effect is that the oxides formed tend to grow together, thereby cementing together the particles of the granular mass which in this manner acquires a certain strength and coherence.

It will be apparent that other materials may be added to this grouting mixture within the scope of my invention, such as cement, waterproofing powders or liquids, plasticizing agents, etc. But I do not find that a composition with a large proportion of cement is desirable for the application of my invention since it imparts a greater degree of rigidity than is desirable.

Although the composition of this invention is preferably used between the tie and a tie plate, a layer of it may be placed directly between the tie and the rail and the tie plate omitted. In such a case the thickness of the layer is preferably at least ½ inch or so.

Furthermore, it is to be understood that the particular form of product shown and described, and the particular procedure set forth, are presented for purposes of explanation and illustration and that various modifications of said product and procedure can be made without departing from my invention as defined in the appended claims.

What I claim is:

1. In a method of assembling rails to ties, wherein the rail is held to the tie by suitable metal fasteners, the step which comprises disposing between the tie and the tie plate comminuted solids capable of reacting chemically to produce a water-resistant non-plastic mass of increased volume, spiking the rail and tie plate over the composition and to the tie, and allowing the composition to react to produce a solid mass of increased volume, whereby a tight water-resistant assembly which compensates for wear is produced.

2. In a method of repairing railroad road beds having wooden ties worn by the rail, the steps which comprise raising the rail sufficiently from the tie to remove the tie plate, disposing comminuted solids capable of oxidizing in air and

producing a water-resistant coherent non-plastic mass of increased volume in the cavity worn by the rail, placing the tie plate on said comminuted solids, and fastening the rail without removing the tie from the road bed.

3. In a method of assembling rails to ties, wherein the rail is held to the tie by suitable metal fasteners, the step which comprises disposing between the tie and the tie plate comminuted oxidizable material, spiking the rail and tie plate over the composition and to the tie, and allowing the composition to oxidize to increase in volume, whereby a tight water-resistant assembly which compensates for wear is produced.

4. In a method of repairing railroad road beds having wooden ties worn by the rail, the steps which comprise raising the rail sufficiently from the tie to remove the tie plate, disposing comminuted solids capable of oxidizing in air and producing a water-resistant coherent non-plastic mass of increased volume in the cavity worn by the rail, placing the tie plate on said comminuted solids, and fastening the rail.

5. In a method of assembling rails to ties, wherein the rail is held to the tie by suitable metal fasteners, the step which comprises disposing comminuted iron between the tie and tie plate, spiking the rail and tie plate over the iron and to the tie, and allowing the comminuted iron to oxidize and increase in volume, whereby a tight water-resistant assembly which compensates for wear is produced.

6. In a method of assembling rails to ties, wherein the rail is held to the tie by suitable metal fasteners, the step which comprises disposing comminuted oxidizable metal and electrolyte between the tie and the tie plate, spiking the rail and tie plate over the iron and to the tie, and allowing the comminuted iron to oxidize and increase in volume, whereby a tight water-resistant assembly which compensates for wear is produced.

7. In a method of assembling rails to ties, wherein the rail is held to the tie by suitable metal fasteners, the step which comprises disposing comminuted iron and an electrolyte between the tie and the tie plate, spiking the rail and tie plate over the iron and to the tie, and allowing the comminuted iron to oxidize and increase in volume, whereby a tight water-resistant assembly which compensates for wear is produced.

8. In a method of assembling rails to ties, wherein the rail is held to the tie by suitable metal fasteners, the step which comprises disposing comminuted oxidizable metal and a finely divided insoluble solid between the tie and the tie plate, spiking the rail and tie plate over the composition and to the tie, and allowing the composition to oxidize to increase in volume, whereby a tight water-resistant assembly which compensates for wear is produced.

9. In a method of assembling rails to ties, wherein the rail is held to the tie by suitable metal fasteners, the step which comprises disposing comminuted iron and a finely divided insoluble solid between the tie and the tie plate, spiking the rail and tie plate over the iron and to the tie, and allowing the comminuted iron to oxidize and increase in volume, whereby a tight water-resistant assembly which compensates for wear is produced.

10. In a method of assembling rails to ties, wherein the rail is held to the tie by suitable metal fasteners, the step which comprises disposing comminuted iron, an electrolyte, and a finely divided insoluble solid between the tie and the tie plate, spiking the rail and tie plate over the iron and to the tie, and allowing the comminuted iron to oxidize and increase in volume, whereby a tight water-resistant assembly which compensates for wear is produced.

11. In a method of assembling rails to ties, wherein the rail is held to the tie by suitable metal fasteners, the step which comprises disposing comminuted iron, ammonium chloride and sulphur between the tie and the tie plate, spiking the rail and tie plate over the iron and to the tie, and allowing the comminuted iron to oxidize and increase in volume, whereby a tight water-resistant assembly which compensates for wear is produced.

12. In a method of assembling rails to ties, wherein the rail is held to the tie by suitable metal fasteners, the step which comprises disposing comminuted iron, ammonium chloride and sulphur between the tie and the rail, spiking the rail and tie plate over the iron and to the tie, and allowing the comminuted iron to oxidize and increase in volume, whereby a tight water-resistant assembly which compensates for wear is produced.

13. In a method of assembling rails to ties, wherein the rails and tie plates are held to the ties by suitable metal fasteners, the step which comprises disposing in a cavity in the tie beneath and adjacent the tie plate a composition containing comminuted, oxidizable material which oxidizes to produce a coherent mass of increased volume, spiking the rail and tie plate over the composition and to the tie, and allowing the composition to oxidize to increase in volume, whereby a tight water-resistant assembly which compensates for wear by an increase in volume is produced.

14. In a method of assembling rails to ties, wherein the rails and tie plates are held to the ties by suitable metal fasteners, the step which comprises disposing in a cavity in the tie beneath and adjacent the tie plate a composition containing comminuted iron and capable of forming a non-plastic coherent mass of increased volume, spiking the rail and tie plate over the iron and to the tie, and allowing the comminuted iron to oxidize and increase in volume, whereby a tight water-resistant assembly which compensates for wear is produced.

15. In a method of assembling rails to ties, wherein the rails and tie plates are held to the ties by suitable metal fasteners, the step which comprises disposing in a cavity in the tie beneath and adjacent the tie plate a composition containing comminuted iron and electrolyte and capable of forming a non-plastic coherent mass of increased volume, spiking the rail and tie plate over the composition and to the tie, and allowing the composition to oxidize to increase in volume, whereby a tight water-resistant assembly which compensates for wear by an increase in volume is produced.

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