United States Patent [19]

Toyama et al.

[11] **3,870,231**

[45] **Mar. 11, 1975**

[54] **RAIL FASTENING DEVICE**

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[22] Filed: **July 17, 1974**

[21] Appl. No.: **489,355**

[52] **U.S. Cl.** **238/324,** 238/349, 238/353, 238/354, 238/362

[51] **Int. Cl.** **E01b 9/66**

[58] **Field of Search** 238/349, 217, 281, 282, 238/283, 288, 321, 324, 333, 334, 351, 353, 354, 361, 362, 363, 364, 365

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[57] **ABSTRACT**

A rail fastening device that is designed to tightly hold a rail on a prestressed-concrete tie by fastening an elastic fastening member bridged between a flange portion of the rail and a stepped portion formed on the tie, by screwing a fastening bolt into a female receptacle buried in the tie. Where the elastic fastening member and the inclined stepped portion of the tie are pressed together, a wedge-like member, which as an inclination conforming to that of the stepped portion, is interposed so as to prevent displacement of the elastic fastening member due to vibration and the like and so as to permit inching adjustment of the installation location of the rail fastening device.

5 Claims, 5 Drawing Figures

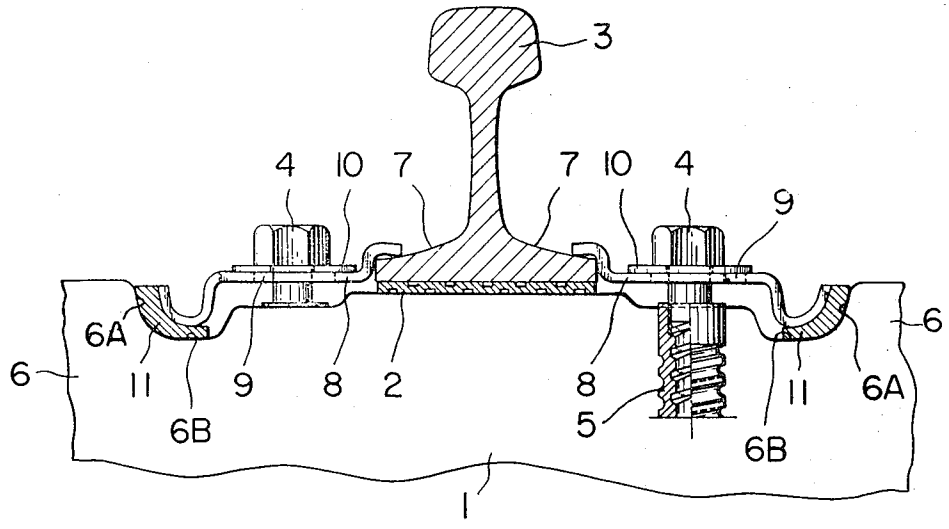


Fig. 1

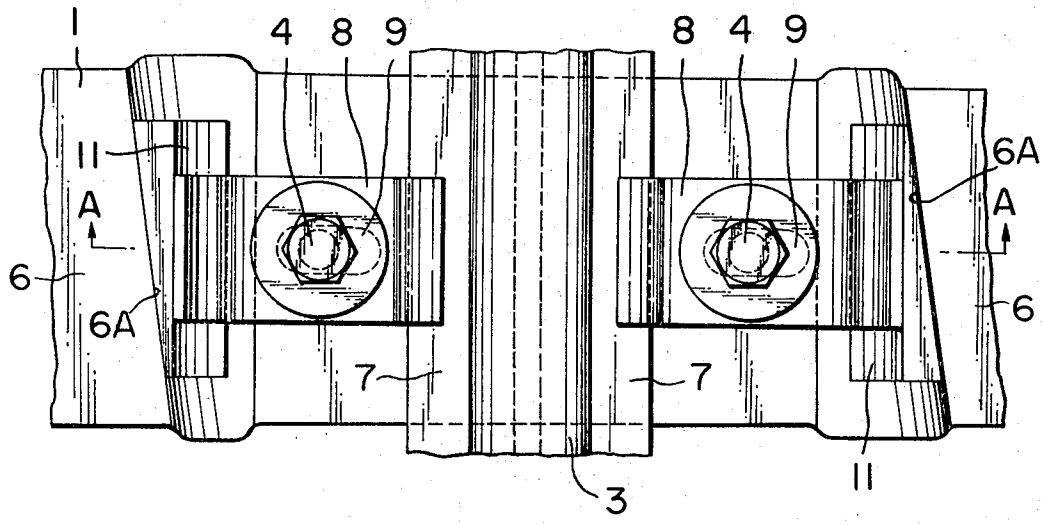

1
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8
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6
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3
11

Fig. 2

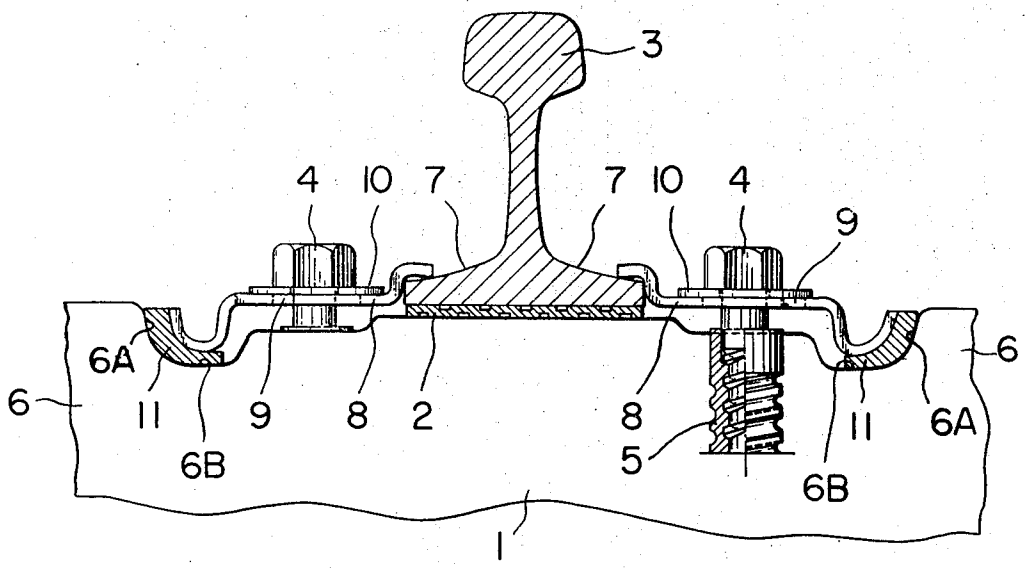

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6A
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6B
1

Fig. 3

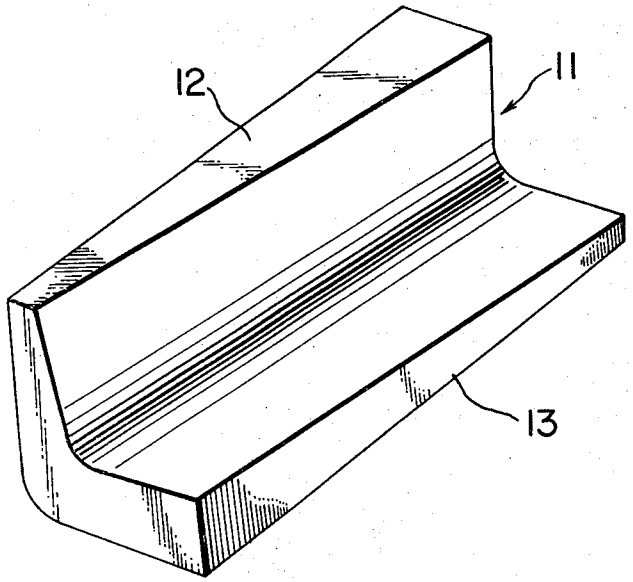


Fig. 4

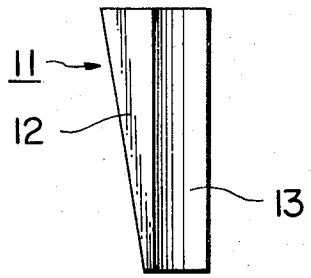
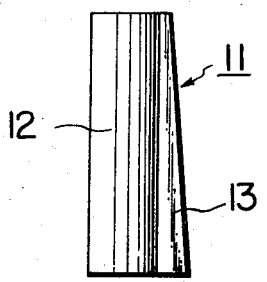


Fig. 5



RAIL FASTENING DEVICE

FIELD OF THE INVENTION

The present invention relates to a rail fastening device that can be adjustably installed.

BACKGROUND OF THE INVENTION

Rails are being subjected to greater and greater transversal pressure and vibration, as a result of continual increase in the speed of trains and electric trains. As a consequence, the fastening device of the rails are often broken or removed which gives rise to deviation in rail gauge.

An object of this invention is to provide a rail fastening device that it not moved by the transversal pressure and vibration produced when trains and the like pass over the rails.

Another object of this invention is to provide a rail fastening device that is so constituted as to absorb the manufacturing tolerances of the individual parts thereof.

Still another object of this invention is to provide a rail fastening device that permits not only adjustment of the installation location but also readjustment of the clearance produced during use.

SUMMARY OF THE INVENTION

The rail fastening device is designed to tightly hold a rail on a prestressed concrete tie by fastening an elastic fastening member bridged between a flange portion of the rail and a stepped portion formed on the tie. The stepped portion is formed with a configuration such that its vertical side surface progressively approaches the rail and its upper horizontal surface progressively inclines downwardly in the direction in which said vertical surface progressively inclines. The fastening member is secured by screwing a fastening bolt into a female receptacle buried in the tie. A wedge-like member having an inclination conforming to that of said stepped portion is interposed where said elastic fastening member and said inclined stepped portion are pressed together. Because of this arrangement, loosening and jolting of the elastic fastening member is prevented since the horizontal and vertical inclined surfaces react in opposite directions when transversal pressure and vibration are imposed thereon. Furthermore, the elastic fastening member is capable of absorbing manufacturing tolerances of the individual parts and permits readjustment after a certain period of use, because it can be installed at any place of the inclined surface.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan of a rail fastening device according to this invention.

FIG. 2 is a cross-sectional view of the same device taken along the line A—A of FIG. 1.

FIG. 3 is a perspective view of a wedge member shown in FIG. 1.

FIG. 4 is a plan of the wedge member shown in FIG. 3.

FIG. 5 is a front view of the wedge member shown in FIG. 3.

DETAILED DESCRIPTION

In the first place, the structure of the rail fastening device will be described with reference to FIGS. 1 and 2.

There is laid a thick pad 2 on a prestressed concrete tie 1 for purposes of electrical insulation and shock absorbion. An elongated rail 3 is placed on said pad 2, and female receptacles 5 made of electrical insulating material are buried on both sides thereof to allow screwing of rail fastening bolts 4 into the prestressed concrete tie. The prestressed concrete tie 1 is provided thereon with stepped portions 6 extending in the direction the rail 3 runs, with the rail 3 lying therebetween. The stepped portion 6 has a substantially vertical side surface 6A which progressively approaches the rail and a substantially horizontal upwardly facing surface 6B which progressively inclines downwardly in the direction in which the vertical surface 6A progressively inclines. The vertical and horizontal surfaces of these stepped portions 6 are so formed that one of them inclines differently from the other. Also, one of the stepped portions is disposed in the opposite direction to the other, that is, in a symmetrical manner with respect to the rail 3. Elastic fastening members 8 are placed over flange portions 7 on the right and left of the rail 3 and the stepped portions 6 formed on the tie. Each elastic fastening member 8 is a platelike spring member of elastic material, and is provided with an elongated opening 9 extending in the longitudinal direction in which it is laid over said flange and stepped portions. Opening 9 is approximately at the center of member 8 so that the rail 3 may be firmly held on the prestressed concrete tie 1 by screwing the bolt 4, which is loosely passed through said opening 9, into the buried receptacle 5 through a washer 10.

Where the elastic fastening member 8 and the stepped portion 6 formed in said prestressed concrete tie 1 contact, a wedge-like member 11 of electric insulating material is interposed therebetween so as to prevent their loosening and permit inching adjustment of the rail gauge.

Now the structure of the wedge-like member 11 will be described in detail with reference to FIGS. 3 to 5.

The L-shaped wedge-like member 11 has a vertically extending portion 12 which is tapered along its horizontally extending length so that its exterior surface where it contacts the stepped portion 6 comforms with the inclination of the vertical surface 6A of the stepped portion 6. Member 11 also has a horizontally extending portion 13 which is tapered along its length so that its exterior surface (i.e., lower surface) where it contacts the stepped portion 6 conforms with the inclination of the horizontal surface 6B of the stepped portion 6. That is, the vertically extending portion 12 becomes thinner from its top end to its bottom end as viewed in FIG. 4, while the horizontally extending portion 13 becomes thicker in the same direction as viewed in FIG. 5. The angle of inclinations formed on said vertically and horizontally extending portions 12 and 13 may be suitably designed.

According to this invention which comprises the provision of inclinations on the stepped portions 6 of the prestressed concrete tie and on the wedge-like members 11, any great manufacture tolerances that might appear when said prestressed concrete tie 1, rail 3, elastic fastening member 8 and other parts are arranged in

place can readily be absorbed by changing the installation position of said wedge-like member **11**. The changing of the installation position of the wedge-like member **11** also permits inching adjustment of the gauge of the rail **3**. Because the elongated opening **9**, as provided in the elastic fastening member **8**, has a long-extended, ellipse form, there occurs no inconvenience in screwing the bolt **4** into the buried receptacle **5** even if the elastic fastening member **8** moves along the direction in which it lies, thereby allowing smooth execution of the above-described adjustment.

Furthermore, the wedge-like member **11** when once installed, which might otherwise be displaced by the transversal pressure or vibration produced when the train passes, does not experience any displacement nor jolting, since not only the vertically extending portion **12** but also the horizontally extending portion **13** thereof is inclined so that the movement of the wedge-like member **11** in the direction of one inclination is prevented by the other inclination. This prevents the wedge-like member **11** from slipping out of place during a long period of use.

Also, the elastic fastening member **8** can achieve elastic fastening by itself, without requiring any other spring or the like, because it is a platelike spring member made of elastic material, such as spring steel.

In addition, various currents for signalling and controlling purposes passing through the rail **3** are kept noise-free, because the rail **3** is electrically insulated from the prestressed concrete tie **1** by such electrical insulating materials as the pad **2**, buried receptacle **5**, and wedge-like member **11**.

Since the stepped portions **6**, elastic fastening members **8** and wedge-like member **11** are symmetrically arranged with respect to a point on the rail **3**, influences of the transversal pressure and vibration working on them are equalized on both sides of the rail **3**, thereby making their power to hold said rail **3** uniform.

Still another advantage of this invention is that chipping, breaking or wearing of the prestressed concrete tie which may be brought about by the vibration of the rail **3** can be prevented, since the pad **2** is made of shock-absorbing material.

Finally, it must be noted that this invention is applicable not only to prestressed concrete ties but also to wood ties.

What is claimed is:

1. In a rail fastening device coacting between a flange portion of a rail placed on a concrete tie and a stepped portion inclined with respect to said rail and formed on said concrete tie, the fastening device including a fastening member bridged between said stepped and flange portions, whereby the rail is firmly held on the concrete tie by fastening said fastening member with bolts, the improvement comprising a wedge-like member interposed between said fastening member and said stepped portion, said stepped portion being formed into a configuration so as to have a substantially vertical side surface which progressively approaches the rail and a substantially horizontal upper surface which progressively inclines downwardly in the direction in which said vertical side surface progressively approaches the rail, said wedge-like member being associated with said stepped portion and having vertically and horizontally extending portions which are shaped to respectively conform with said vertical and horizontal surfaces.

2. A rail fastening device in accordance with claim **1**, in which the fastening member comprises a platelike spring member.

3. A rail fastening device in accordance with claim **2**, in which a pad of shock-absorbing material is interposed between the concrete tie and the rail.

4. A rail fastening device in accordance with claim **3**, in which a buried receptacle is provided in the tie for receiving the bolt, and in which each of the pad, the buried receptacle and the wedge-like member is made of electric-insulating material.

5. A rail fastening device in accordance with claim **1** in which the stepped portions, fastening members, and wedge-like members are symmetrically arranged on opposite sides of the rail with respect to a point on the rail.

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