

April 25, 1967

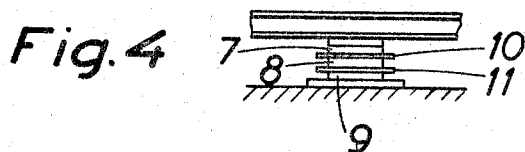
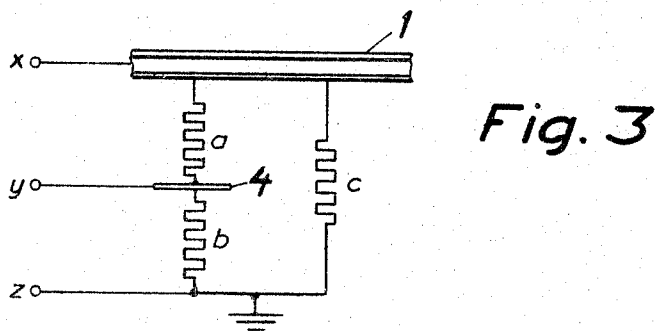
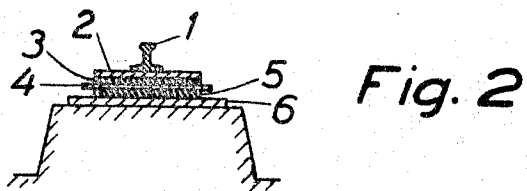
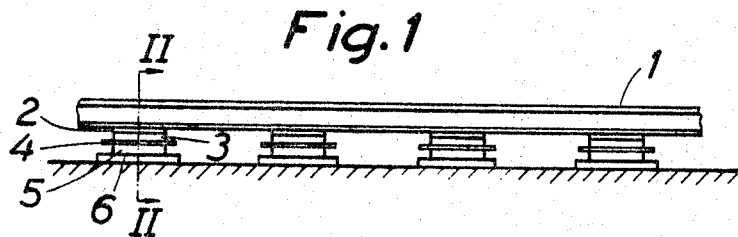
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ELECTRICALLY INSULATING SUPPORTING MEANS FOR A RAILWAY RAIL

Filed Sept. 25, 1964

3 Sheets-Sheet 1



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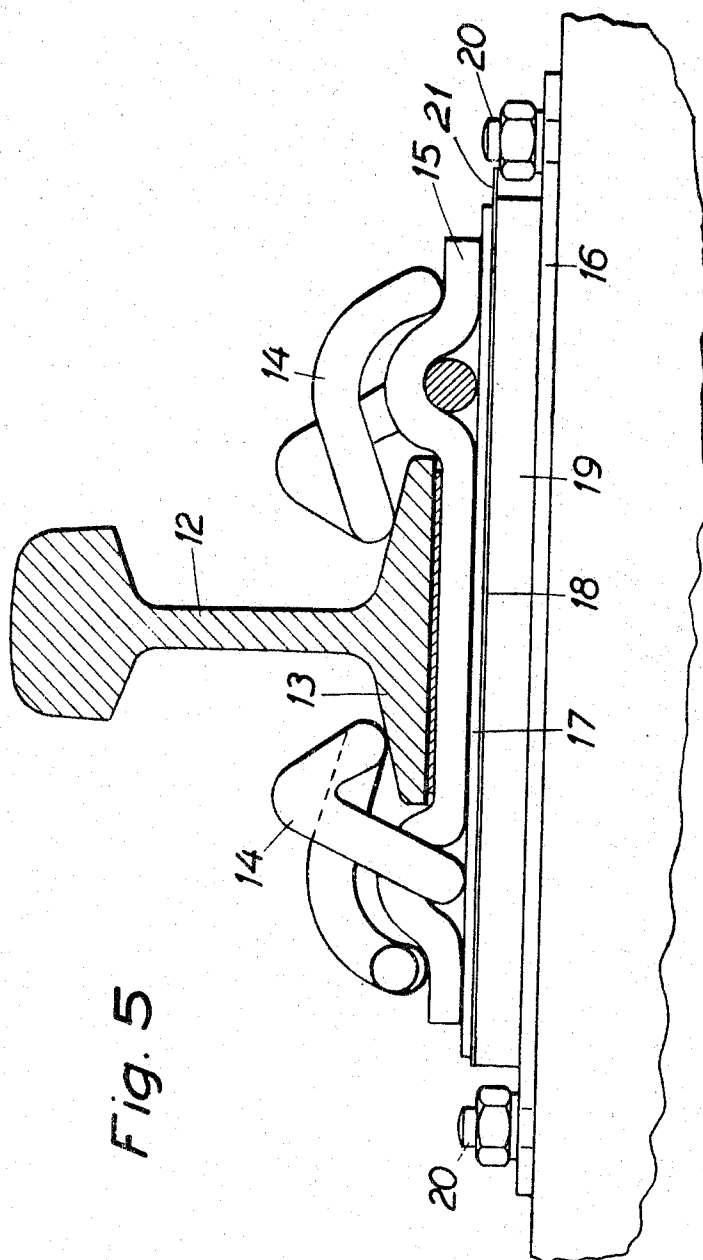
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ELECTRICALLY INSULATING SUPPORTING MEANS FOR A RAILWAY RAIL

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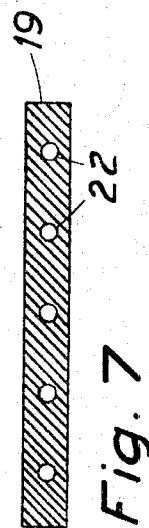
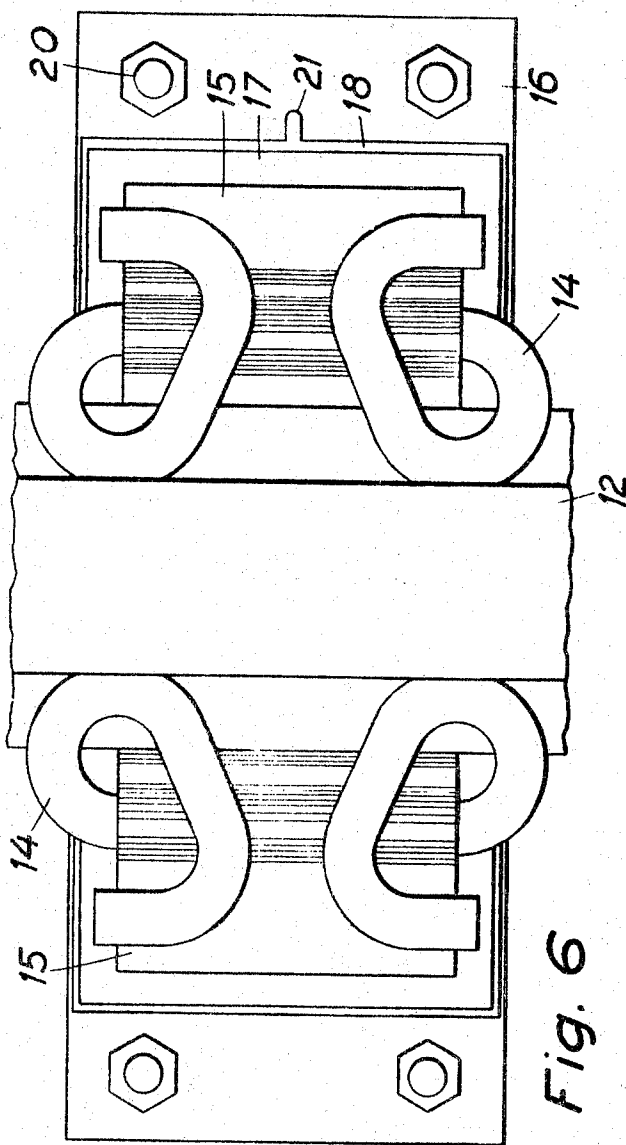
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ELECTRICALLY INSULATING SUPPORTING MEANS FOR A RAILWAY RAIL

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10,486/63

2 Claims. (Cl. 238—283)

In the track circuit signalling systems, the rails are utilized as conductors for the signal current, the signal voltage being applied between one rail and the earth or the other rail. Consequently, at least one rail has to be adequately insulated for the signal voltage. This problem demands particular attention for rails supported, not by the usual wooden sleepers, but by some more conducting type of support, for instance by ferro-concrete or steel sleepers, or by a ferro-concrete bedding adapted to support the rail without sleepers. In such cases it will frequently be necessary to provide intermediate, electrically insulating supporting means for the rail, said supporting means being disposed either directly under the rail or, preferably, under a supporting plate or rail chair on which the rail is resting. In practice, the electrical insulation provided by the insulating means will gradually deteriorate, owing to conducting deposits (of dust, moisture etc.) on the exposed surfaces of the insulators. Said deposits and the rate of deterioration of the insulation caused by them will vary considerably with local conditions along the track. A decrease of the insulation level of a given length of rail may be caused by deposits at a small number of supporting points or at one single supporting point. It is, therefore, desirable that the insulation resistance at any individual supporting point can be measured or checked. Hitherto, however, this has not been possible, the leakage paths at all of the supporting points of the rail being connected in parallel by the rail.

The principal object of this invention is to provide improved electrically insulating supporting means for a railway rail which permit checking of the insulation of any individual supporting unit. Other objects include the provision, in a rail supporting unit, of improved combined cushioning and electrically insulating means.

According to a principal feature of the invention, the rail supporting units or blocks are each provided with at least two insulating and mechanical load carrying members disposed in series relation with regard to the rail voltage, and an intermediate electrically conducting member adapted to provide a tapping point between the series connected insulation resistances of said insulating members. By this device the insulation resistance of the supporting means is divided into two (or more) parts which are available to measurement.

To facilitate connecting the conducting intermediate member to the required measuring or resistance checking apparatus, the rim of said member should at least at one side extend somewhat beyond the insulating members or, preferably, be provided with one or more connecting lugs or the like.

Preferably the conducting intermediate member consists of a massive (unperforated) sheet or foil, which completely precludes the possibility of any leakage path occurring across the insulating members without being intercepted by the intermediate member. It is, however, possible to employ an intermediate member having openings or perforations. As an extreme case, the intermediate member may consist of a frame extending around the circumference of the insulating members.

Preferably the insulating members and the intermediate member or members are bonded to each other to form a

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unit, for instance by means of a thermo-setting adhesive or, if the insulating members consist of a vulcanisable material, by vulcanisation. Said unit preferably also comprises a rail supporting plate bonded to one insulating member and a base plate bonded to the other insulating member.

In a preferred embodiment of the invention, at least one of the insulating members consists of an elastic material, for instance natural or artificial rubber, whereby the supporting means according to the invention in addition to its insulating function also provides, or contributes to, the required elasticity of the rail supporting system.

In the accompanying drawings illustrating the invention,

FIG. 1 is a schematic view of a rail supported by a number of supporting means according to the invention,

FIG. 2 is a section along II—II in FIG. 1,

FIG. 3 is an equivalent electric circuit for explaining the function of the device according to the invention,

FIG. 4 is a schematic elevation of another embodiment of the invention,

FIGS. 5 and 6 show a practical embodiment of the invention in elevation and horizontal view, respectively, and

FIG. 7 is a view of a cross-section parallel to the rail through the rubber pad forming part of the device shown in FIGS. 5 and 6.

In the embodiment schematically shown in FIGS. 1 and 2, the rail supporting means include a rail supporting plate 2 and a base plate 6 separated by electrically insulating means which according to the invention comprise a first insulating layer 3, an electrically conducting intermediate member 4, and a second insulating layer 5. This device provides the possibility of ascertaining the actual insulation resistance of any individual supporting means. This fact is clearly illustrated by the equivalent circuit of FIG. 3, in which a represents the insulation resistance between the rail supporting plate 2 and the intermediate member 4, b represents the insulation resistance between the intermediate member and the base plate 6, and c represents the total resulting insulation resistance of all of the other rail supporting means. According to well-known theory, the resistance a and b and, consequently, their sum $a+b$ can be determined from results of resistance measurements carried out between the points $x-y$, $y-z$, and $z-x$. The measurements can be made in any suitable manner. In one method mentioned by way of example only a constant voltage E_0 is applied between the points x and z and the voltages between the points x and y and the points y and z , respectively, are determined by means of a voltmeter having a suitable internal resistance R , the insulation resistance of the supporting means being obtainable from a formula containing E_0 , E_1 , E_2 and R .

The embodiment shown in FIG. 4 differs from the embodiment of FIGS. 1 and 2 in that the insulating supporting means comprises three insulating layers 7, 8, 9 and two conducting intermediate members 10, 11. This device provides the additional possibility of providing a common wire permanently connected to one intermediate member, for instance the lower intermediate member 11, of each of a number of insulating supporting means, so that the state of the insulation of said group of supporting means can be ascertained with the aid of said common wire. It is also possible within the invention to provide four or more insulating layers separated by conducting members.

In the embodiments illustrated in FIGS. 1-2 and 4, the insulating layers are preferably bonded to the intermediate member or members as well as to the rail supporting plate and the base plate so as to form a single unit or block.

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In the practical embodiment illustrated in FIGS. 5-6, a fibreboard pad 13 is interposed between the rail 12 and the steel plate 15. Spring clips 14 serve to hold the rail on the supporting plate 15. The insulating means provided between the rail supporting plate 15 and the base plate 16 comprise a rubber plate 17, a steel sheet 18 and a rubber pad 19. All of the members 15 to 19, inclusive, are vulcanized on to each other to form a coherent unit or block. The base plate is anchored in a ferro-concrete bedding by means of bolts 20. The steel sheet 18, which forms the intermediate conducting member according to the invention, is provided at one edge with a connecting lug 21.

The rubber plate 17 and the rubber pad 19 preferably consist of an artificial rubber which is resistant to oil and aging. As shown in FIG. 7, the rubber pad 19 is provided with a row of cylindrical holes 22 extending at right angles to the rail and serving to impart the desired degree of elasticity or resiliency to the rubber pad.

I claim:

1. A rail supporting unit comprising a rail supporting plate, means for attaching the rail to said plate, a base plate attached to a track substructure, and a resilient and electrically insulating block interposed between said supporting plate and said base plate, said block compris-

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ing at least three superimposed members including two sheets of insulating material, at least one of which is natural or artificial rubber, and an electrically conducting intermediate member separating said sheets, the edge of said intermediate member being exposed throughout its perimeter, said plates and said at least three interposed members being bonded to each other to form a coherent unit.

2. A rail supporting unit as claimed in claim 1, said electrically conducting intermediate member having at least one connecting lug.

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