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Smith et al.

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[54] ADJUSTABLE RAIL FASTENER WITH MELTABLE FILLER

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[52] **U.S. Cl.**.....**238/281,** 238/282, 238/283, 238/310

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

[58] **Field of Search**.....238/1, 83, 84, 110, 114, 264, 238/265, 281, 283, 163, 310, 282

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[57] **ABSTRACT**

An easily adjustable and readjustable rail support includes two annularly spaced pot-like members that are separated by a readily meltable solid filler material. The outer member is embedded in a concrete or other rigid roadbed. The rim of the inner member supports a channel element which clamps the rail.

10 Claims, 3 Drawing Figures

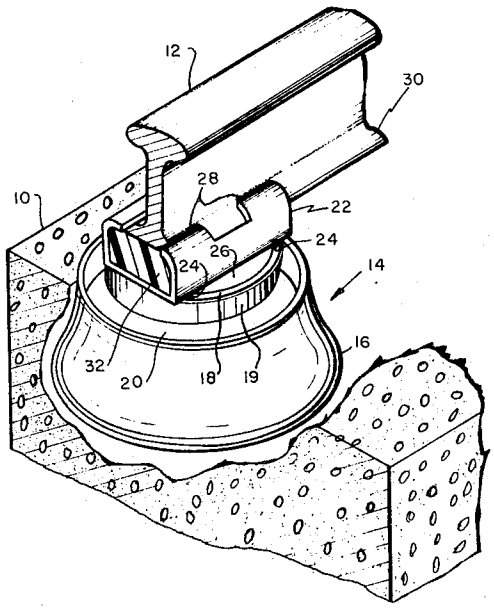
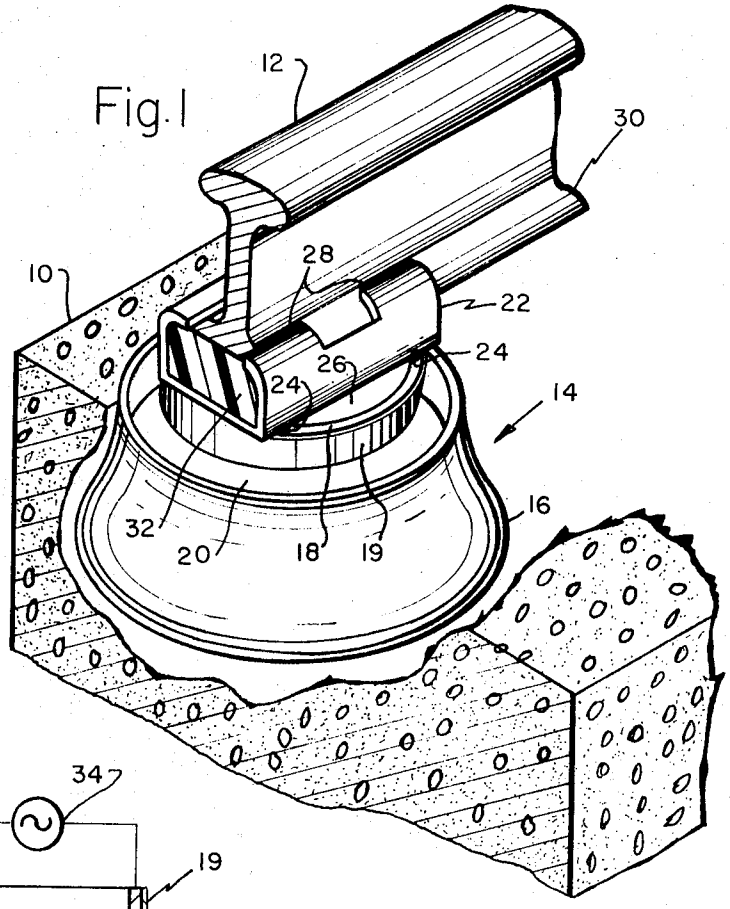


Fig. 1



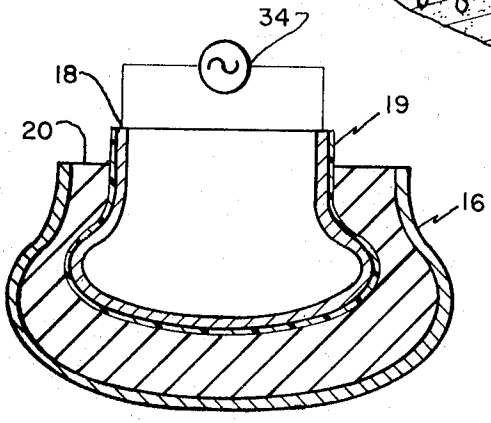
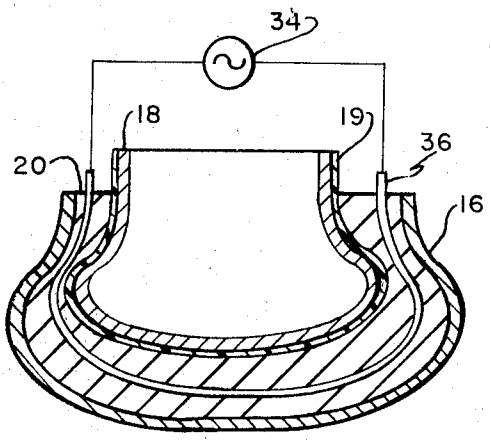


Fig. 2

Fig. 3



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ADJUSTABLE RAIL FASTENER WITH MELTABLE FILLER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the construction of railway tracks, and more particularly to an adjustable support means for positioning a rail both vertically and laterally on a roadbed.

2. Description of the Prior Art

High speed trains presently under consideration will be designated to operate at speeds of 200 miles per hour. At such speeds, the dynamics of wheel to rail dictate a smoothness of track not heretofore required or achieved. To achieve such a high degree of smoothness in the track, it has been proposed to mount the rails on a concrete roadbed instead of using the conventional tie on ballast designs, and to position the rails by means of adjustable fasteners. These fasteners will be placed at approximately 30-inch intervals and must be capable of limiting any waviness in the rail to an amplitude of about 0.0078 inches in the 30-inch span. It is necessary that the rail fasteners be capable of adjusting the rail both vertically and laterally within fine tolerances. It is highly desirable that the rail fastener provide easy access from above for an automated adjusting machine which rolls along the rails.

SUMMARY OF THE INVENTION

In accordance with the invention, a readily adjustable rail fastener is provided that permits both vertical and lateral adjustment of the rail within fine tolerances. The fastener comprises an outer pot that is embedded in a roadbed of concrete or other rigid material. An inner pot is annularly spaced within the outer pot and the annular space between the two pots is filled with readily meltable solid filler material.

The rim of the inner pot supports a channel element having a length dimension parallel to the track that is greater than the diameter of the rim. The lateral dimension of the channel element is less than the diameter of the rim so that access spaces are formed in the top of the inner pot. The channel element has upwardly curved fingers for clamping the rail.

In laying the track, the rail, channel element, and inner pot are secured together and suspended within the outer pot in the appropriate vertical and lateral positions while molten filler material is poured into the outer pot and allowed to harden. To readjust the position of the rail, hot fluid may be directed into the inner pot through the access spaces to melt the filler material and loosen the inner pot, whereupon, while the filler material is still soft, the rail may be repositioned in its proper location.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an isometric view, partly in section, of an adjustable rail fastener constructed according to the invention;

FIG. 2 is a sectional view of a portion of the rail fastener illustrating the use of a structural member as an electrical heater element; and

FIG. 3 is a sectional view of a portion of the rail fastener illustrating the use of an additional member as an electrical heater element.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 – 3, there is shown a concrete roadbed **10**, and above the surface of the roadbed **10**, a rail **12** is supported by a support structure **14**. The support structure **14** is placed at about 30-inch intervals along the length of the track which may comprise one rail **12** of a monorail system or two rails **12** of a dual rail system. For ease in illustration, only one rail **12** is shown.

The support structure **14** includes an outer pot **16** of rigid material such as cold rolled steel embedded in the concrete roadbed **10**. Within the outer pot **16** and annularly spaced therefrom is disposed an inner pot **18** of smaller diameter than the outer pot **16** but of generally similar configuration and material. The inner pot **18** is preferably provided with an exterior coating of resilient plastic **19**, such as polyvinyl chloride.

The annular space between the two pots **16** and **18** is filled with a rigid filler material **20**. Both pots **16** and **18** are bulbous in shape and preferably of circular cross-section, with slightly bulging sidewalls to lock them firmly in place in the roadbed **16** and in the filler material **20**.

The filler material **20** is preferably a low melting point metal, such as an alloy consisting essentially of lead, antimony and tin, commonly known as type metal and having a melting point of about 190° F. The melting point of such a metal is sufficiently high to render it structurally hard and rigid at the highest encountered atmospheric temperatures, and yet is sufficiently low to render it liquid by the application of a small amount of heat. Alternatively, the filler material **20** may be an epoxy or other plastic material that can be softened or rendered liquid by the application of a chemical solvent.

The plastic **19** serves as a vibration damper, as a stress distributor to the filler material **20**, and as corrosion-proofing for the inner pot **18**.

A hollow channel element **22**, having a cross-section resembling the letter C, is fixed securely to the top of the rim of the inner pot **18**, as by welds **24**. For securing purposes, the length of the channel element **22** is slightly greater than the diameter of the rim of the inner pot **18**. However, the width of the channel element **22** is a little less than the diameter of the inner pot **18** so as to leave openings **26** on either side of the channel element **22** for access to the interior of the inner pot **18**.

The channel element **22** securely supports the rail **12**, and for this purpose it is formed with upwardly curved fingers **28** that grip the rail **12** along its bottom flanges **30**. For cushioning the rail **12** against shock and vibration effects, a resilient pad **32** is preferably inserted between the bottom surface of the rail **12** and the inside bottom surface of the channel element **22**. The resilient pad **32** may comprise a hard rubber or plastic material and would act in concert with the plastic **19** to provide damping and uniform stress distribution between rail forces and the fastener device.

In laying the track, a rail laying machine may be placed on the last rail sections previously laid. The machine will support the rail **12** in the exact position desired and attach the rail **12** to the support structure comprising the inner pot **18**, channel element **22**, and resilient pad **32**. The machine will then inject or pour melted filler material **20** in the space between the pots **16** and **18** and, if desired, cool the molten filler material by directing coolant gas or air into the inner pot **18** through one of the openings **26**, with the gas or air exiting out of the other opening **26**.

To readjust or remove a rail, the machine will inject hot fluid or gas into the inner pot **18**. The heat conducted through the inner pot **18** will melt the filler material **20** and the latter can then be easily blown or sucked out of the outer pot **16**. Being free, the rail **12** can then be relocated and potted by flowing fresh liquid filler material **20** into the space between the pots **16** and **18** in the manner described above.

In the case of a filler material **20** that is thermally softenable, it may be preferable to employ electrical resistance heating to liquify it. As shown in FIG. **2**, the inner pot **18** may be employed as a resistance heater by connecting a low voltage, high current source **34** across spaced points on the rim of the pot **18**. The resilient plastic coating **19** may serve as an electrical insulator to prevent the filler material **20** from short circuiting the current source **34**.

Alternatively, a separate heating element **36**, shown in FIG. **3**, may be embedded in the filler material **20**. The heating element **36** could serve as a structural reinforcing means for the surrounding matrix of filler material **20** during normal use of the rail support. Whenever it is desired to reposition the rail, current may be supplied from the current source **34** to the heating element **36**, whereby the surrounding filler material will be melted. The heating element **36** may be one of the kind including a resistive wire supported within and insulated from a surrounding sheath.

We claim:

1. An adjustable rail fastener, comprising:
   a. a pair of upwardly concave rigid members of bulbous shape nested together one within the other with their walls separated to define an annular space therebetween;
   b. each of said members including an upper rim portion defining a circular opening therein and a lower bulbous portion of maximum diameter greater than the corresponding rim diameter;
   c. a readily meltable solid material filling said annular space;
   d. the maximum diameter of the inner member being less than the inside rim diameter of the outer member;
   e. the outer one of said members being adapted to be embedded in a rigid roadbed; and
   f. means attached to the inner one of said members for fastening a rail along a portion of its length.

2. The invention according to claim 1, and further including an electrical heater element embedded in said readily meltable solid material and arranged for connection to an electrical current source for heating and melting said solid material.

3. The invention according to claim 1, wherein said readily meltable solid material is chemically softenable.

4. The invention according to claim 1, wherein at least one of said members is electrically conductive and arranged for connection to an electrical current source for heating and melting said solid material.

5. The invention according to claim 1, wherein said fastening means attached to said inner member is so dimensional as to provide openings communicating with the interior of said inner member through which fluid can be introduced for thermal exchange with said solid material.

6. An adjustable rail fastener, comprising:
   a. an outer pot adapted to be embedded in a roadbed;
   b. an inner pot within said outer pot and having its outer wall surface spaced from the inner wall surface of said outer pot;
   c. a readily meltable solid material filling the space between said pots;
   d. a channel element fastened to the rim of said inner pot;
   e. said channel element having a length greater than the diameter of said rim and a width less than the diameter of said rim, whereby openings are provided between the rim of said inner pot and said channel element; and
   f. said channel element also having oppositely disposed, upwardly curved fingers for gripping the opposing, lower flanges of a rail supported within said channel element.

7. The invention according to claim 6, wherein said readily meltable solid material is thermally softenable at a relatively low temperature above normal atmospheric temperatures.

8. The invention according to claim 6, wherein said readily meltable solid material is chemically softenable.

9. The invention according to claim 6, and further including a resilient pad within said channel element for supporting said rail.

10. The invention according to claim 6, wherein said pots are bulbous in shape.

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