Nov. 4, 1969 H. GASSNER 3,476,317

RAIL FASTENERS

Filed Oct. 30, 1967 4 Sheets-Sheet 1

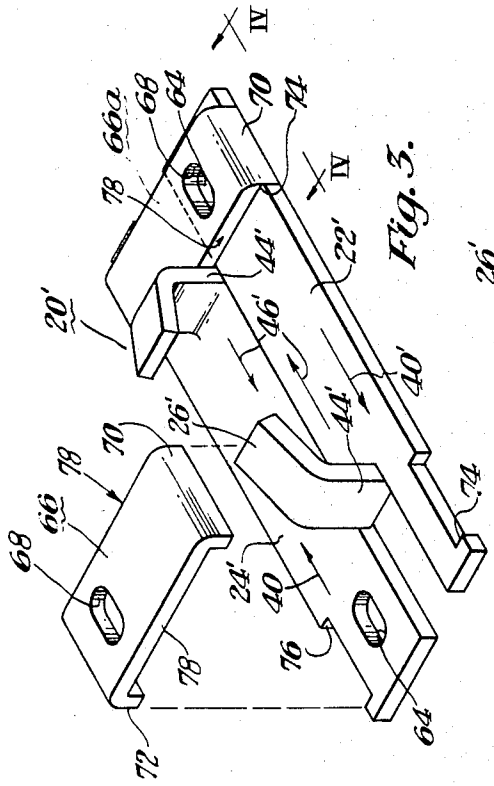


Fig. 3.

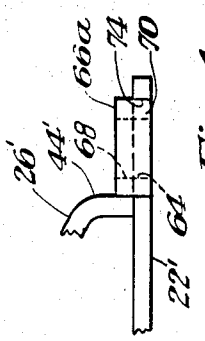


Fig. 4.

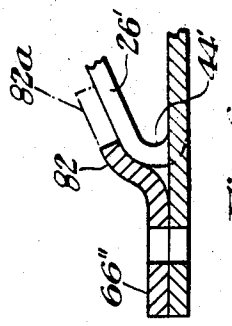


Fig. 6.

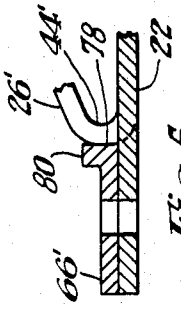


Fig. 5.

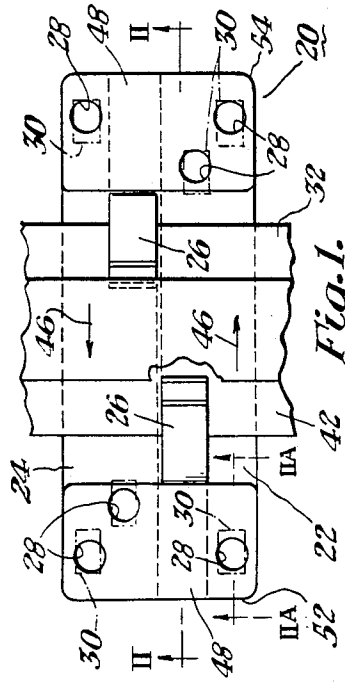


Fig. 1.

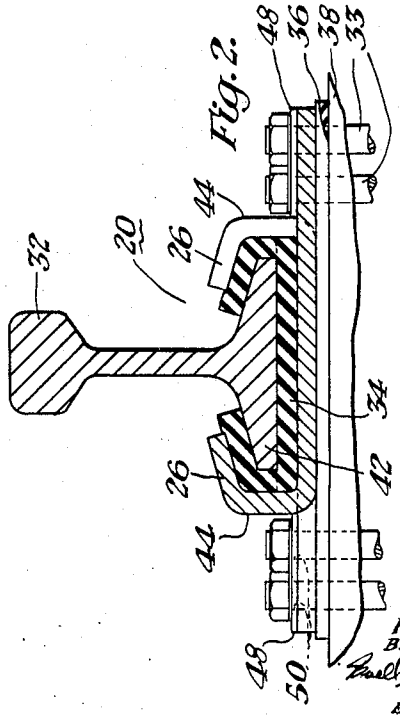


Fig. 2.

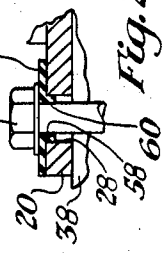


Fig. 2A.

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RAIL FASTENERS

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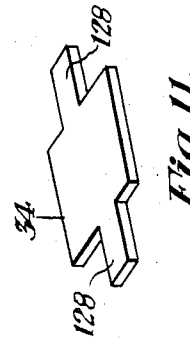


Fig. 11.

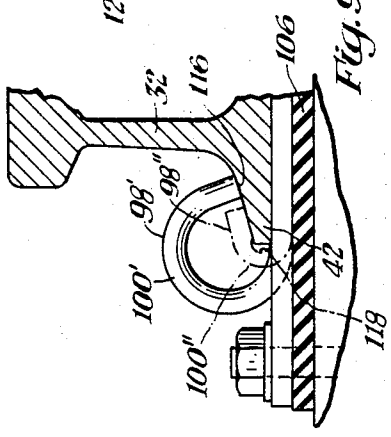


Fig. 9.

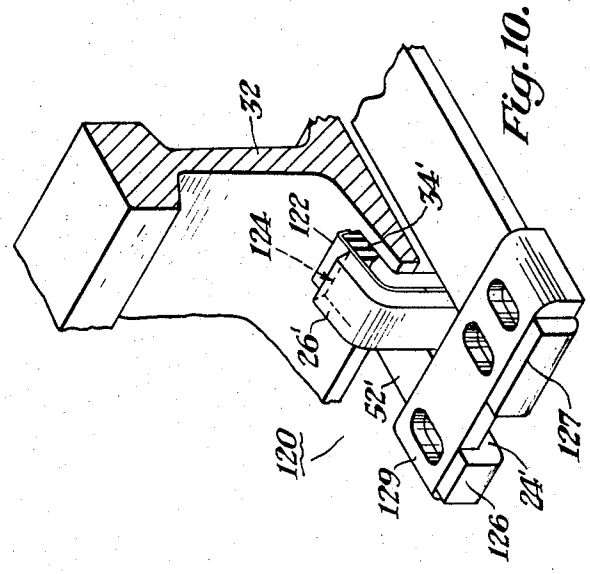


Fig. 10.

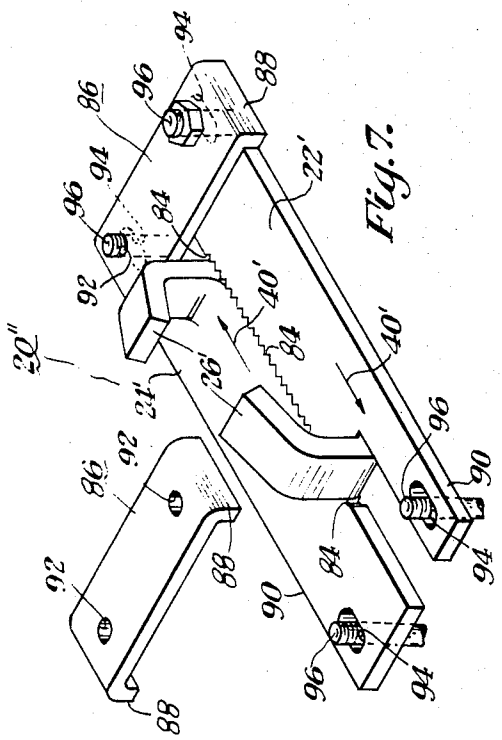


Fig. 7.

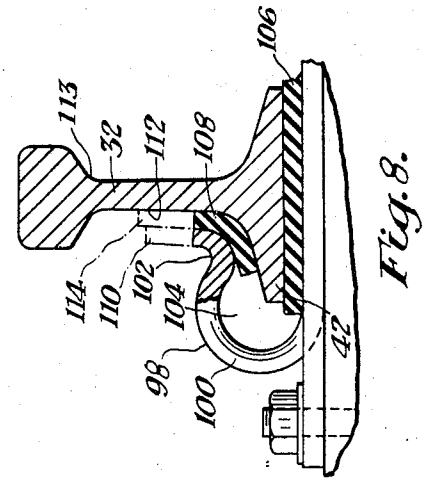


Fig. 8.

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RAIL FASTENERS

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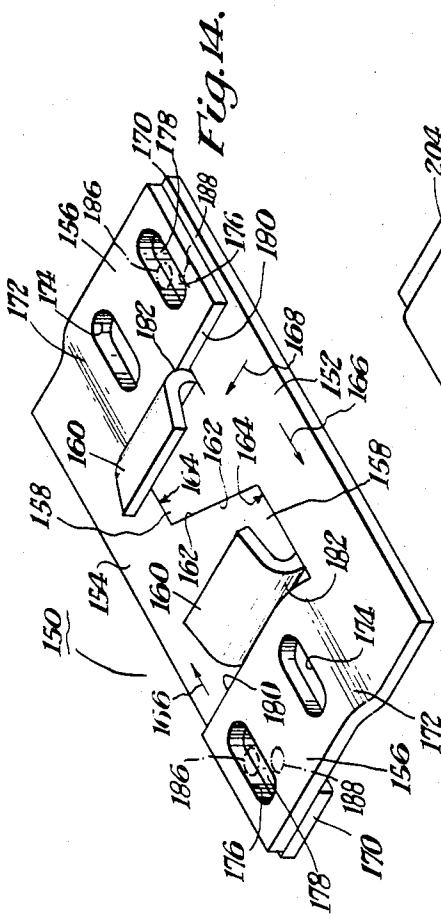


Fig. 14.

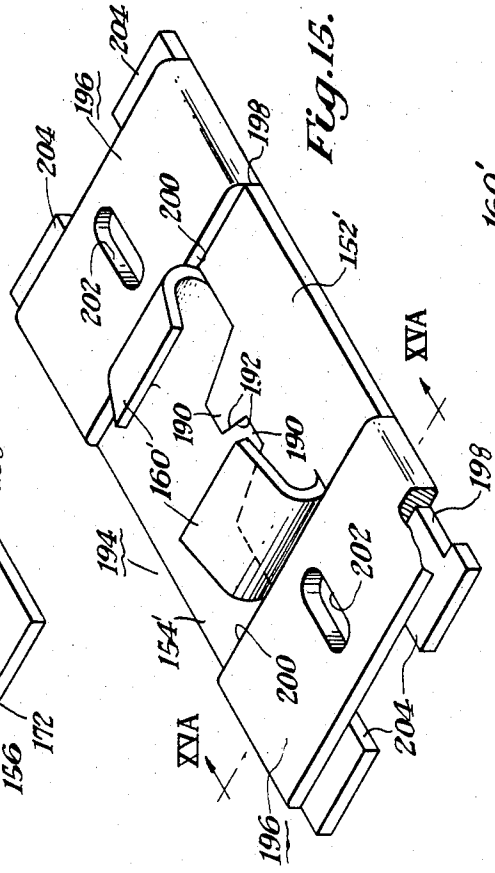


Fig. 15.

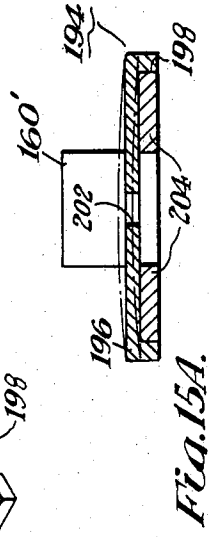


Fig. 15A.

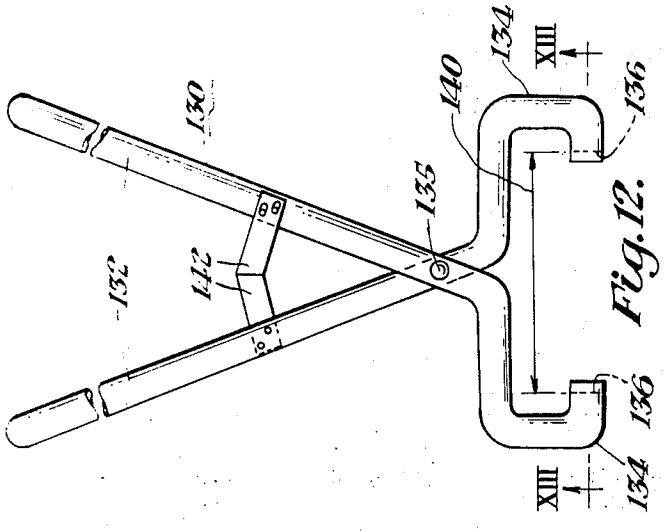


Fig. 12.

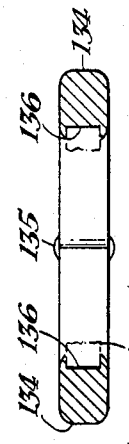


Fig. 13.

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RAIL FASTENERS

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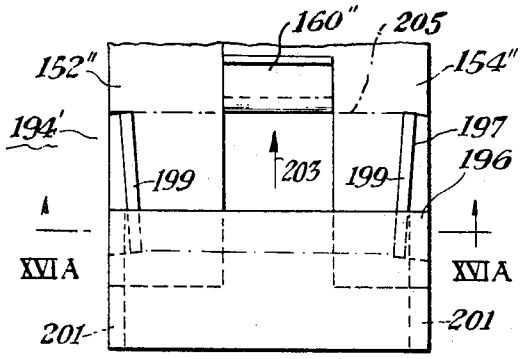


Fig. 16.

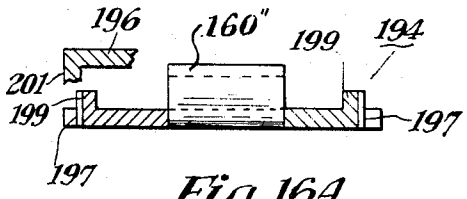


Fig. 16A.

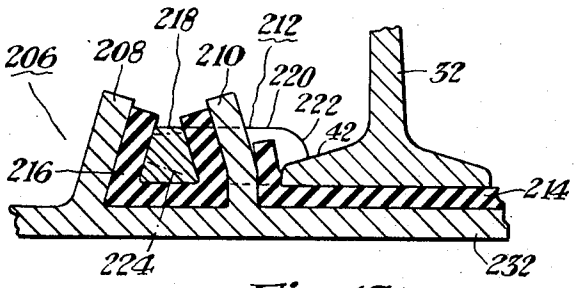


Fig. 17.

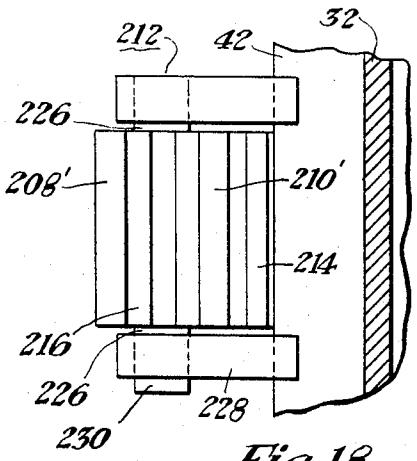


Fig. 18.

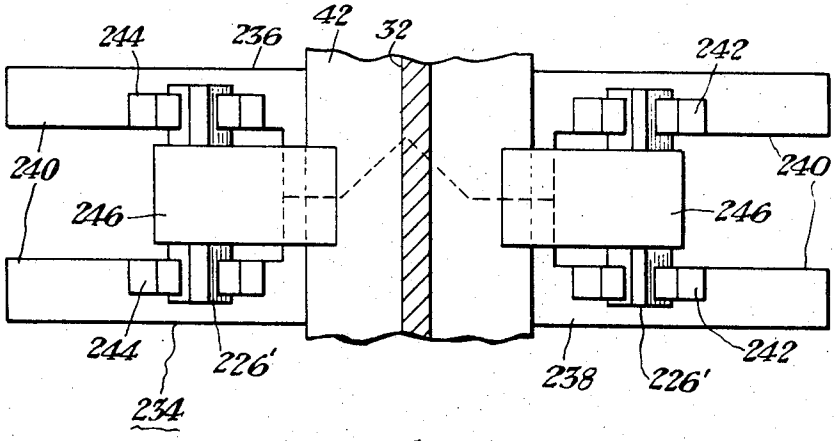


Fig. 19.

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Patented Nov. 4, 1969

3,476,317

RAIL FASTENERS

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Int. Cl. E01b 3/48, 9/32
U.S. Cl. 238—290 12 Claims

ABSTRACT OF THE DISCLOSURE

A bipartite rail fastener is disclosed, wherein each of the fastener components is provided with a rail engaging tab or lug. When the components are properly positioned, the tabs are apposed so that the tabs are moved toward one another to clamp properly the rail therebetween when the fastener components are displaced along their longitudinal dimensions. Various forms of retaining plates or members are provided for common securance or integral fabrication thereof with the fastener components, as desired, to prevent displacement of the fastener components and their tabs while in use. The fasteners provide resilient rail mounting, rail isolation, and sound and other energy absorption. The rail fasteners are provided with means for both laterally and vertically adjusting the rails secured thereby to correct gauge irregularities and to provide undistorted rail surfaces. Quiet vehicle operation can thus be attained despite the engagement of steel wheels with steel rails.

The present invention relates to improved rail fasteners and more particularly to rail fasteners which can be employed on grade, underground and aerial road beds.

In the construction of modern railroad beds, particularly for high-speed railway vehicles, it is essential that the fasteners for the rails exhibit superior sound, vibration, electrical, and securance characteristics. It is also essential that the fasteners be of relatively simple construction and fabricated for installation by a minimum of labor and with simple hand tools. Desirably, the rail fasteners are readily adaptable for mounting on any type of road bed or rail ties without substantial modication. In particular, there is an increasing demand for rail fasteners of the character described which can be readily installed upon concrete road beds or on other road beds employing concrete ties. Railways road beds of this character are increasingly utilized in connection with subway or aerial transit systems.

With the increasing electrification of rail transit systems and the use of computerized railway vehicles, it is essential that the rails and/or rail fasteners be properly and electrically isolated from the concrete ties or road bed or other structures which may be at ground potential. It is also essential that the rail fasteners or their engagement with either the rails or the ties or both be sufficiently resilient to permit maximum absorption of sound and vibration, while maintaining the required securance characteristic. To provide the necessarily smooth road bed, in the case of high-speed railway vehicles and the use of welded or continuous rails, the rail fasteners must be capable of both vertical and horizontal adjustment to permit lateral and vertical alignment of the rails relative to one another and to the road bed. By attaining a uniform railway gauge and proper rail alignment a moving railway vehicle is subjected to a minimum of vibration and sway. In addition to these specialized functions the railway fasteners must of course anchor the rails against unwanted longitudinal and lateral movements.

It is well known that undistorted rail surfaces and properly secured and aligned rails can be productive of quiet vehicle operation although the rails are engaged by steel wheels. This can be accomplished through the use of rail

fasteners capable of proper alignment and of maximum vibrational absorption. The rail fasteners must also be capable of securing the rail with minimal tolerances, both in the initial installation and in subsequent longitudinal and lateral displacements of the rails when in use.

It is desirable to provide rail fasteners of the character described and of simplified construction which can be installed preferably by one or two workmen and with the use of simple hand tools. In the case of concrete installations, the rail fasteners preferably are arranged for securance to the road bed or to concrete ties by means of anchor bolts per-cast therein.

Among the many rail fasteners which have been used or proposed previously, none has been able to meet all of the aforementioned requirements insofar as I am aware. In particular, none of the prior rail fasteners is capable of affording electrical isolation, sound and energy absorption, horizontal and vertical alignment, and longitudinal and lateral securance with a minimum of tolerances. There are many prior fasteners that perform some of these essential functions and therefore are unquestionably useful for securing rails to conventional or grade type roadbeds. However, such fasteners are unsuitable for concrete bearing surfaces and particularly aerial or elevated road beds where the concrete is both pre-stressed and post-tensioned. Under these conditions the rails must necessarily be secured to the road bed with minimum tolerances and be capable of vertical and horizontal adjustment for alignment purposes through their fasteners.

As an example, prior rail fasteners which provide either electrical isolation or resilient mounting are typified by the patents to Gorrell 1,104,660, Protzeller 2,656,116, Austin et al. 2,162,599, Moses 3,295,760, Funston 1,972,825, Reddick 2,337,497 and Roberts 1,602,458. These fasteners do not provide vertical or horizontal adjustability, minimal tolerances in rail location, and minimal longitudinal and lateral rail movements when in use. Moreover, considerable labor or specialized tools are required to install such fasteners. The fasteners are complicated in construction and therefore are difficult to manufacture.

Many known rail fasteners have the additional disadvantage of passing anchor bolts or the like through resilient pads or other insulating members used with the fastener. In addition, certain of these last-mentioned fasteners and other fasteners extend the anchor bolts through spring members or tabs or other means for engaging the rail. Either of these arrangements serve to weaken those functions of the fastener components thus effected.

I overcome these disadvantages of the prior art by providing a two-part rail fastener which in its several modifications is capable of positive but resilient engagement with the rail flange. My fastener is simple in construction and easily adjusted. For electrical isolation, a resilient pad or cushion member can be inserted between the rail and fastener at the aforementioned positive or resilient engagement. For more positive electrical isolation, similar resilient material can be located between the bottom of the rail fastener and the tie or road bed to which the rails are secured. The cushion members provide sound and energy absorption in addition to electrically isolating the rails from both the fasteners and from the road bed. The anchor bolts or other means cast in the road bed or ties, when made from concrete, also can be isolated from the fasteners where desired.

The clamping components of my novel rail fasteners can be adjustably moved toward one another to predetermined positions to apply increasing and predetermined securance forces to the rails. To adjust the elevation thereof relative to the road bed, shim plates can be inserted beneath the fasteners. Additionally, the fastener components can be adjusted as a unit laterally of the

road bed for lateral adjustment of the rails or for compensating gauge irregularities therein.

When the fastener components have thus been moved toward one another to the desired extent, various means are provided in accordance with my invention for securing the components against withdrawing movements and for anchoring the fasteners components to the road bed after the aforementioned adjustments have been made. In still another arrangement of my novel railway fastener, the aforementioned securing means are arranged to back up or reinforce the rail-engaging portions of the fastener to further minimize the securance tolerances of the fastener without unduly diminishing the resilient sound and vibration absorption thereof. In particular, such reinforcing means desirably engage the bend areas of rail engaging tabs when the latter are used in certain forms of my invention.

When my novel rail fasteners are thus assembled there is no necessity of passing anchor bolts or the like through resilient pads or other insulating member associated with the fasteners or through the rail engaging portions of the fasteners.

I accomplish these desirable results by providing a rail fastener comprising a pair of complementary fastening members, each of said members having a rail engaging securance lug, the lugs of said members being apposed at a juxtaposed position of said members and said rail one to another so as to secure said rail therebetween, said members being displaceable relative to one another so that said lugs can be moved toward and away from one another to engage and disengage said rail therebetween, and means securable to each of said members for preventing such displacement when said rail is securingly engaged by said lug.

I also desirably provide a similar fastener wherein said displacement preventing means include at least one retainer plate engaging said members and extending across the adjacent end portions thereof, and cooperative securing means provided on said members and said retainer plate to prevent said displacement when said retainer plate is engaged with said members.

I also desirably provide a similar fastener wherein said retainer plate is provided with an edge portion disposed for bearing contact with the adjacent one of said lugs to reinforce the engagement thereof with said rail.

I also desirably provide a similar fastener wherein each of said lugs is provided with relatively wide sweeping heel section and a terminal rail engaging portion for resilient securance of said rail.

I also desirably provide a similar fastener wherein a pre-shaped pad of elastomeric material is inserted between a pre-shaped pad of elastomeric material is inserted between said rail and the adjacent surfaces of said members including said lugs.

During the foregoing discussion, various objects, features and advantages of the invention has been set forth. These and other objects, features and advantages of the invention together with structural details thereof will be elaborated upon during the forthcoming description of certain presently preferred embodiments of the invention and presently preferred methods of practicing the same.

In the accompanying drawings I have shown certain presently preferred embodiments of the invention and have illustrated certain presently preferred methods of practicing the same.

FIGURE 1 is a top plan view of one arrangement of my novel rail fastener and illustrating a broken way segment of rail secured thereby;

FIGURE 2 is a longitudinally sectioned view of the rail fastener shown in FIGURE 1 and showing a cross-sectional view of the rail secured thereby;

FIGURE 2A is a similar but partial view showing the use of an insulated retainer plate;

FIGURE 3 is a partially exploded, isometric view of still another arrangement of my novel rail fastener;

FIGURE 4 is a partial, longitudinally sectioned view of the fastener as shown in FIGURE 3 and taken along reference line IV—IV thereof;

FIGURE 5 is a partial, longitudinally sectioned view of still another form of my rail fastener and illustrating the use of a combined retaining and reinforcing plate;

FIGURE 6 is a similar view showing another form of the retaining and reinforcing plate;

FIGURE 7 is an isometric view, partially exploded, of still another form of my rail fastener having modified withdrawal preventing means;

FIGURE 8 is a partial, longitudinally sectioned view similar to that of FIGURE 2 but illustrating a modified rail engaging portion of the fastener for the purpose of increasing the resilient engagement thereof;

FIGURE 9 is a similar view showing alternative rail engaging means without the use of an intervening resilient pad or member;

FIGURE 10 is a similar view showing still another arrangement of my rail fastener with protection means for the intervening resilient pad or similar member;

FIGURE 11 is a reduced, top plan view of one form of resilient pad which can be employed between certain forms of my rail fastener and the adjacent surfaces of the rail;

FIGURE 12 is a top plan view of one arrangement of hand tool or tongs useful in installing the rail fasteners of my invention;

FIGURE 13 is a cross sectional view of the tool shown in FIGURE 12 and taken along reference line XIII–XIII thereof;

FIGURE 14 is an isometric view of still another form of my rail fastener;

FIGURE 15 is an isometric view of still another form of my novel rail fastener;

FIGURE 15A is a cross sectional view of the fastener shown in FIGURE 15 and taken along reference line XVA—XVA thereof;

FIGURE 16 is a partial top plan view illustrating another form of my lateral restraining means useful in the fastener of FIGURES 15 and 15A and in other forms of my novel rail fastener;

FIGURE 16A is a cross sectional view of the fastener of FIGURE 16;

FIGURE 17 is a partial longitudinally sectional view of still another form of my novel rail fastener;

FIGURE 18 is a partial top plan view of the fastener shown in FIGURE 17; and

FIGURE 19 is a top plan view of still another form of my rail fastener.

Referring now more particularly to FIGURES 1 and 2 of the drawings, the exemplary form of my invention shown therein comprises a fastener denoted generally by reference character **20**. The fastener **20** includes in this example a pair of substantially identical fastener components or members **22** and **24**. Each of these components is provided with a rail flange engaging tab or lug **26** as better shown in FIGURE 2. Each end of each component **22** or **24** can be provided with one or more holes **28** or **30** whereby the components **22, 24** can be secured to suitable anchor bolts **33** (FIGURE 2) or spiked to wooden ties as desired. The holes **28** or **30** can be elongated in the longitudinal direction of the fastener components **22, 24** as explained below, to permit lateral adjustment of the rail **32** secured thereby.

A resilient pad **34** such as that described below in connection with FIGURE 11 is desirably inserted between the rail **32** and the fastener components **22, 24** to provide electrical isolation and absorption of sound and other vibrational energies. Pad **36** of similar material can be placed, if desired, for similar purposes between the fastener **20** and the tie or road bed denoted generally by reference character **38**. Additional energy absorption is afforded by the tabs **26**, whose resiliency can be modified as explained in connection with FIGURES 5, 6, 8 and 9.

When installing the rail **32** on its fasteners, such as the fastener **20** (FIGURE 1), the fastener components **22, 24** are first inserted from either side of the rail **32** as denoted by directional arrows **46** in order to position their tabs or lugs **26** closely adjacent the flange **42** of the rail. With the component tabs **26** thus preliminarily engaged with the pad **34** and the rail flange **42** a suitable hand tool such as that described in connection with FIGURES 12 and 13, or a comparatively simple power tool, can be manipulated while engaged with the heel or bent portions **44** of the tabs **26** to forcefully move the components **22, 24** closer together in the direction of arrows **46** to pre-load the resilient pad **34** and the rail flange **42** to attain the desired securance force. While the tabs **26** thus are urged together the rail fastener **20** is then secured to the road bed or tie **38** by suitable anchor bolts or spikes passed through the holes **28** and **30**. The elevation of the rail **32** relative to the road bed can be adjusted through the use of apertured shim plates (not shown) which can be mounted on the anchor bolts **33**.

In order to utilize the bipartite fastener **20** of FIGURES 1, 2 or 2A against separation of the components **22, 24**, transverse retainer plates **48**, having corresponding mounting apertures **50** are placed over the securance ends **52** and **54** of each fastener component **22** or **24**. The plates **48** then are secured in the position shown by the aforementioned anchor bolts or spikes.

As better shown in FIGURE 2A the fastener **20** can be electrically isolated from the tie or road bed **38** through the use of unitizing or retaining plates **56** fabricated from an electrically insulating structural material, such as neoprene or polyurethane elastomer of suitable durometer and provided with integral bushings **58** insertable into the apertures such as apertures **28** of the fastener components **22, 24**. In the arrangement of FIGURE 2A the insulating retainer plates **56** are provided with correspondingly smaller apertures **60** extending therethrough and through the integral bushings **58**. The bushings **58** and apertures **60** serve to position the anchor bolts such as the anchor bolt **62** centrally of the fastener component apertures **28** to isolate electrically the anchor bolts therefrom. As indicated previously both the anchor bolts **33** passing through the apertures **28** and the retainer plates **48** or **56** prevent withdrawing movements (denoted by arrows **46** in FIGURE 1) of the fastener components **22, 24** and thereby preserve the forces exerted by the component tabs.

In FIGURES 3 and 4 of the drawings another arrangement of my novel fastener **20'** is shown therein which presents a minimum requirement of two anchor bolts, i.e., one anchor bolt for each of the fastener components **22', 24'**. In this connection each of the fastener components is provided with a single longitudinally elongated slot **64**. A retainer plate **66** preferably extends across each pair of adjacent end portions of the fastener components **22', 24'**, and each retainer plate is furnished with a similarly elongated slot **68** which aligns with the associated slot **64** of the fastener when the retainer plate is seated as denoted by the plate **66***a*. Each plate is further provided with projections such as the bent end portions **70** and **72** which are closely fitted into notches **74, 76**. The projections and notches thus are elongated in the direction of withdrawing or displacing movement of the fastener. Preferably the tolerances of the fit between the end portions **70, 72** and the notches **74, 76** are sufficient by close components, that any tendency of the fastener components **22', 24'** to withdraw in the direction of arrows **40'** is positively prevented by the inability of the relatively wide retainer plate **66** to cant or to become transversely misaligned.

On the other hand, withdrawal or bending movements of the component tabs **26'** can be more positive prevented by locating the notches **74, 76** so that the inward edge **78** of each retainer plate **66** abuts the heel portion **44'** of the adjacent tab **26'**. As better shown in FIGURE 5 the inward edge **78'** of a modified retainer plate **66'** can be provided with a reinforcing lip **80** at least along the width of the adjacent tab **26'** to stiffen further the resilient tab **26'** by limiting flexure in the heel portion **44'** thereof. As better shown in FIGURE 6 of the drawings, a complementary tab **82** or **82***a* secured to a modified retainer plate **66''** can be extended at least over a portion of the adjacent tab **26'** to further stiffen its resilient engagement with the rail flange **42**.

In FIGURE 7 of the drawings another form **20''** of my rail fastener is illustrated with still another form of withdrawal preventing means. In this arrangement of the invention the apposing edges of the fastener components **22', 24'** are provided with mutually engageable complementary projections such as the serrations **84**. When the tabs **26'** have been driven together to a desired amount as described above and the serrations **84** are enmeshed so to speak, means are provided for laterally restraining the fasteners components to prevent separation of the engaged serrations **84** so that the fastener components **22', 24'** cannot be withdrawn in the direction of arrows **40'** as long as the fastener components are thus restrained.

One arrangement for so laterally restraining the fastener components **22', 24'** includes a pair of retaining brackets **86** having bent ends or other suitable projections **88** for closely engaging the outward lateral edges **90** of the fastener components **22', 24'** in the engaged position of their serrations **84** or other suitable complementary projections. Each of the brackets **86** is provided with one or more apertures **92** which are alignable with a similar number of elongated anchor slots **94** in the adjacent end portions of the fastener components. The elongated slots **94** permit limited longitudinal adjusting movement of the fastener components **22', 24'** as a unit after the brackets **86** are installed but before the anchor bolts **96** are tightened. As the bracket ends **88** are not fitted in slots or openings, the brackets can remain stationary at the anchor bolts, during such movement to adjust laterally the position of rail **32**. With this arrangement the component tabs **26'** can be similarly adjusted to a number of securance positions relative to the rail as determined by the fineness or coarseness of the serrations **84** and the length of the component slots **94**. This is made possible by the fact that the end portions **88** of the brackets **86** are not keyed to particular locations at the outward edges of the fastener components **22', 24'**.

When the fastener components **22', 24'** are thus keyed or clamped together, such as described above with reference to FIGURES 3 and 7 or below with reference to FIGURES 14 and 15, the fastener components can be moved as a unit to position the fastener adjustably relative to the anchor bolts mounted in the road bed, to the extent permitted by the length of the anchor bolt slots.

In FIGURE 8 of the drawings a modified form **98** of the rail engaging tab is disclosed. The modified tabs such as the tab **98** can be employed in place of the tabs **26** or **26'** in any of the preceding embodiments of the invention. The tab **98** is provided in this example with a wide sweeping heel portion **100** to lend increased resiliency to the rail engaging section **102** of the tab. Owing to the presence of the space **104** between the tab heel portion **100** and the rail **32** the intervening resilient pad when utilized can be provided in the form of discontinuous sections **106, 108**, if desired.

If desired, the rail engaging section **102** of the tab **98** can be extended as denoted by chain outline **110** thereof to apply restraining or securing forces directly to the web **112** or under the head **113** of the rail **32** as well as to the flange **42** thereof. In the latter case the pad section **108**, if employed, is similarly extended as denoted by chain outline **114**.

FIGURE 9 illustrates modifications **98'** and **98''** of the resilient tab useful in applications wherein the aforementioned resilient pad **34** or **34'** or pad sections **106, 108** are not required for either electrical isolation or added resiliency. The heel portion **100'** of the tab **98'** in this

example terminates in direct bearing contact at its terminus **116** against the rail flange **42**. An alternative arrangement denoted by the chain outline **98''** utilizes a resilient heel portion **100''** of reduced cross sectional area as denoted by reference character **118**. The alternative tab **98''** provides maximum rail flange contact and minimum spring action, while the former tab modification **98''** provides minimum contact and maximum spring action.

In FIGURE 10 of the drawings still another arrangement of my novel rail fastener **120** is illustrated. In the fastener **120** each of the fastener components such as the component **24** is provided with a protective strip member **122** fabricated from a suitable structure material such as relatively thin carbon steel and inserted between its rail engaging tab **26'** and the resilient pad **34'**. The protective strip **122** prevents the adjacent edge **124** of the tab **26'** from gouging the resilient pad material when the fastener components, including the component **24'** are driven toward one another. To facilitate driving the fastener components toward one another the securance end portion such such as the end portion **52'** adjacent each tab **26'** is provided at its outer end with an up-turned lip **126** for driving engagement with a hammer or similar hand tool. Desirably, each end of each fastener component **22'**, **24'** is provided with an up-turned lip **126** or **127**, in this example, to facilitate holding the cross pieces **129** in place.

A suitable, resilient pad member **34** useful with the aforedescribed rail fasteners, is shown in plan in FIGURE 11 and is provided with tab underlayment sections **128** which are inserted between the tabs **26** or **26'** of the fasteners and the rail flange. The pad **34** can be fabricated from a suitable elastomeric material such as rubber or neoprene. The pad **36** (FIGURE 2) where used, can be similarly fabricated, or alternatively polyethylene or the like material can be employed.

Referring now to FIGURES 12 and 13 of the drawings, an exemplary hand tool **130** is depicted for moving the railway fastener components **22, 24,** or **22', 24'** together. The tool **130** is provided with a pair of elongated handles **132** the length of which is determined in accordance with the leverage required at their terminal jaws **134**. The handles are pivoted at **135** after the manner of a pliers. In this example, each jaw **134** is provided with a recessed area or off-set **136** as better shown in FIGURE 13 whereby each jaw engages an associated one of the aforedescribed rail engaging tabs as denoted by chain outline **138** thereof. For a given shape and size of fastener the jaws **134** can be moved only to a minimum opening as denoted by dimensional arrow **140** as determined by abutting engagement of a pair of stop members **142** secured to the handles **132**. The minimal dimension **140** denotes the spread of the rail engaging tabs **26, 26'** or **98** at the secured position of the rail fastener relative to the rail **32**. It will be understood, of course, that the length and position of the stops **132** will be determined by the particular dimension **140** as dictated by a given rail installation.

It will be understood also that the tool **130** is not necessary for the installation of my novel rail fastener as the latter can be installed by conventional hand tools such as a hammer by hammering either the heel portion **44** or **100** of the aforementioned tabs or the outer ends of the fastener components **22, 24** or **22', 24'** after the rail **32** has been placed in bearing contact therewith. In this connection any of the aforedescribed fasteners can be provided with the up-turned hammering lip **126** of FIGURE 10.

Referring now to FIGURE 14 of the drawings, another form **150** of my novel rail fastener is shown therein. The rail fastener **150** also is of bipartite construction and is formed from substantially identical fastener components **152** and **154** of generally F-shaped configuration. Thus, each of the components **152, 154** includes an integral back-up end bracket **156** and an integral intermediate rail tab bracket **158**. A rail engaging tab **160** is formed integrally with the bracket **158** of the associated fastener component **152** or **154**. Each of the brackets **158** is provided with an inclined edge portion **162**, which is inclined away from the tab **160** to reinforce the latter.

The brackets **156, 158** of each fastener component **152** or **154** define a complementary notch **164** into which the tab bracket **158** of the other fastener component is seated after the fastener components **152, 154** have been advanced longitudinally as denoted by arrows **166** and then laterally as denoted by arrows **168** to enmesh the tab brackets **158** and notches **164** in the rail-securing position of the fastener **150**. At the latter position as shown in FIGURE 14, the outer end portion of each component end bracket **156** overlies the projecting leg portion **170** of the other fastener component **152** or **154**. Each of the end brackets is provided with an upward bend **172** for this purpose.

Each of the end brackets **156** is provided with a pair of anchor slots **174, 176** with the outer slot **176** overlying an alignable slot **178** in the juxtaposed leg portion **170** at the clamped position of the rail fastener **150** as shown in FIGURE 14. Desirably, the slots **174, 176, 178** are elongated longitudinally of the fastener **150** or transversely of the rail (not shown) secured between the tabs **160** to permit lateral adjustment of the rail.

In the arrangement as shown, an inside edge **180** of each of the end brackets **156** engages heel portion **182** of the adjacent rail tab **160**. This engagement prevents withdrawal or separation of the tabs **160** when the fastener components **152, 154** are anchored and enmeshed, and also backs up or strengthens the securance characteristic of the tabs **160**. The rail fastener **150** of FIGURE 14 has the additional advantage of directly opposing the tabs **160** in the transverse direction of the rail to eliminate application of torque or twisting forces to the rail fastener **150**. The pair of directly opposed tabs **160** in addition are located centrally of the bipartite fastener **150** so that symmetrical forces are applied to the anchor bolts (not shown) extending through the apertures **174, 176, 178.**

Alternatively, the bipartite fastener **150** can be arranged for use with a single pair of anchor bolts (not shown) by provision of only the slots **174** or the slots **176, 178**. Desirably, the longitudinally aligned slots **174** relative to the securance tabs **160** are thus used for maximum transverse holding characteristic relative to the rail (not shown in FIGURE 14). If desired, chain-outlined apertures **186, 188** formed respectively in the end portions of the end brackets **156** and in the leg portion **170** of the fastener components **152, 154** can be provided for a mounting bolt or a pin for the purpose of securance in these areas to positively prevent lateral displacement of the fastener components **152, 154**. In most applications, however, the use of the aforementioned single pair of anchor bolts and the abutment between the rail tab heel portions **182** against the inner edges **180** of the end brackets **156** are sufficient to prevent canting and lateral displacement of the fastener components **152, 154** or separation of their tabs **160**, when the fastener **150** is properly anchored. In this connection, it should be pointed out that any tendency to vertical separation of the tabs **160** and the end brackets **156** are prevented by the aforementioned anchor bolts and the overlapping end portions of the end brackets **156** and leg portions **170** of the fastener components **152, 154.**

Another symmetrical arrangement of the rail engaging tabs **160'** is illustrated in FIGURES 15 and 15A of the drawings. In this arrangement the fastener components **152', 154'** are provided with additional complementary projections **190** to provide added engaging edge surfaces **192** as additional means for preventing withdrawing movements of the tabs **160'**. In this example, the engaging edges **192** are inclined relative to the long axis of the components **152', 154'** to provide camming surfaces

which aid the installation of the fastener **194**. When the components **152'**, **154'** are placed side by side beneath the rail at positions close to their rail-secured postions, the components can be moved or driven laterally toward one another such that the camming action of the inclined surfaces **192** causes the tabs **160'** to be moved toward one another into the proper rail-securing position.

At the latter position the fastener components are retained against disengagement of their complementary projections **190** by a pair of cross pieces or brackets **196**. These brackets are fitted into outward edge projections **198** in the manner described above in connection with FIGURES 3 and 4 of the drawings. By thus retaining the inclined edges **192** of the projections **190** in complete engagement, withdrawal of the rail engaging tabs **160'** is prevented.

Displacement of the tabs by bending can be prevented by engagement of the inward edges **200** of the cross pieces **196** with the bend portions of the tabs **160'**. This engagement reinforces the bend portions of the tabs **160'** and thus increases the strength of the rail-securing tabs.

In this example each of the cross pieces **196** is provided with a single anchor bolt aperture **202** which is elongated as shown in FIGURE 15 to provide longitudinal movement of the assembled fastener **194** for lateral adjustment of the rail secured thereby. If required the end portions of the cross pieces **196** can be pinned or otherwise secured (not shown) to one or both of the adjacent, projecting end portions **204** of the fastener components **152'**, **154'**.

Also if desired, each of the cross pieces **196** can be provided with a convex or bowed configuration as better shown in FIGURE 15A in order to pre-load fastener **194** and its anchor bolts (not shown). The bowed cross pieces **196** in that case exert a springing action upon the anchor bolts in the manner of a lock washer to prevent turning and loosening thereof.

In FIGURES 16 and 16A of the drawings means are provided for driving the fastener components **152''**, **154''**, more securely together in certain applications. Such means in this example are provided by modified fastener components **152''**, **154''** wherein the outer lateral edge slots **197** are tapered inwardly toward the adjacent ends of the associated fastener component. In a preferred form of manufacture, as better shown in FIGURE 16A, the notches **197** are provided by shearing and bending upwardly the adjacent lateral edges of the fastener components to provide upwardly extending lip portion **199** which are engaged by the downwardly extending edges **201** of the transverse restraining brackets **196**.

When assembling the fastener **194'** after the fastener components **152''**, **154''** are positioned as described previously, the transverse brackets **106** are laid upon the fastener **194'** substantially as denoted by the solid outline of the brackets **196** in FIGURE 16. Then each bracket **196** is driven toward the rail engaging tab **160''** as denoted by arrow **203** and the chain outline position **205** of the bracket. The camming engagement of the depending ends **201** of each bracket **196** with the upwardly extending angularly disposed lips **197** forcefully urge the fastener components **152''**, **154''** toward one another. It will be understood, of course, that the camming components just described can be applied to appropriate ones of the other forms of rail fasteners described herein.

In FIGURE 17 of the drawings the fastener **206** is provided with a modified rail engaging components. Thus, the rail engaging tabs of the preceding figures are each replaced by a pair of upstanding arms **208**, **210** and a generally U-shaped lug **212**. At the assembled position of the fastener **206**, the inward arms **210** are spaced sufficiently to receive the rail flange **42** and a compressed mat **214** of neoprene or other elastomeric material.

Each pair of arms **208**, **210** are angled toward one another to retain a compressed resilient or elastomeric member **216** and the bight **218** of the retaining lug **212**. In furtherance of this purpose, the bight **218** is trapezoidal in cross section (or some other keying configuration) so that the resilient member **216** and the bight **218** can be snapped-in between the inclined arms **208**, **210**. The legs **220** of the lug **212** can be notched as shown in FIGURE 17 to provide a complementarily shaped shoes **222** for engaging the adjacent surfaces of the rail flange **42**. If desired, the central portion or the bight **218** can be twisted or displaced counterclockwise as denoted by chain outline **224** thereof so that the resulting unequal displacements of the resilient member **216** preloads the engagement of the shoes **222** against the rail flange **42**.

As better shown in FIGURE 18 the U-shaped lug **212** is formed from a shaft **226** of keying cross section which is otherwise fitted between arms **208**, **210** and partially wrapped with resilient member **216**. A pair of rail flange engaging arms **228** are keyed or otherwise secured to the projecting ends of the shaft **226**. One projecting end **230** of the shaft **226** can be engaged by a suitable wrench or other tool for turning the shaft **226** in the counterclockwise direction prior to securing the arm **228** thereto in order to preload the arm **228** against the rail flange **42**.

It will be understood of course that each pair of lug retaining arms **208**, **210** can be mounted on one associated pair of the previously described fastener components and held together by the lateral restraining and keying means of FIGURES 15 and 16 for example. Alternatively, the pairs of arms **208**, **210** can be mounted on a single base plate as designated by reference numeral **232** in FIGURE 17.

In FIGURE 19 a modified form of the latter described rail fastener is shown. Fastener **234** including components **236**, **238** is provided with relatively deep end notches **240**. Each fastener component **236** or **238** is provided with a pair of lugs **242** and **244** respectively adjacent the lateral edges of the notches **240**. The juxtaposed pairs of lugs **242** or **244** together engage the end portions of a keying shaft **226'** similar to that shown in FIGURES 17 and 18. However, a single rail engaging member **246** is mounted centrally of each shaft **226**. The rail fastener **234** of FIGURE 19 otherwise functions in the manner described in connection with FIGURES 17 and 18. It will be understood of course that instead of the composite plate member formed by the fastener components **236**, **238**, a continuous or single piece plate member (not shown) can be substituted.

From the foregoing it will be apparent that novel and efficient forms of rail fasteners have been disclosed herein. These fasteners are capable of electrical isolation, sound and other energy absorption, rail positioning within relatively close toleranes, and suitable adjustment to provide relatively unvarying or undistored rail surfaces for quiet engagement by a railway vehicle. While I have shown and described certain presently preferred embodiments of the invention and have illustrated presently preferred methods of practicing the same, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the spirit and scope of the invention.

I claim:

1. A rail fastener comprising a pair of elongated complementary fastening members, each of said members having a rail engaging securance lug, the lugs of said members being apposed at a juxtaposition of said members and said rail one to another so as to secure said rail therebetween with said members protruding transversely on each side of said rail, said members being displaceable relative to one another so that said lugs can be moved toward and away from one another to engage and disengage said rail therebetween, means securable to each end of each of said members for preventing such displacement from said juxtaposition whereby said rail is securingly engaged by said lugs, and means secured to said last-mentioned means and disposed to engage outer surfaces of said lugs for reinforcing said lugs.

2. The combination according to claim 1 wherein each of said lugs is provided with a relatively wide-sweeping heel section and a terminal rail engaging portion for resilient securance of said rail.

3. The combination according to claim 1 wherein said displacement preventing means include a pair of retainer plates flushly engaging said members and extending across the adjacent end portions thereof respectively, and cooperatively securing means are provided on said members and said retainer plates to prevent said displacement when said retainer plates are engaged with said members.

4. The combination according to claim 3 wherein said securing means include complementary engageable projections formed respectively on the juxtaposed edges of said members, and said retainer plates are provided with projections for closely engaging the outward edges of said members to maintain said projections in engaged relationship when said members have been displaced to engage securingly their lugs with said rail.

5. The combination according to claim 3 wherein said retainer plates are provided with a pair of spaced projections which are elongated in the path of said displaced movement, said projections being insertable into closely fitting openings therefor in said members respectively to prevent said displacement.

6. The combination according to claim 3 wherein said reinforcing means include an edge portion of each of said retainer plates disposed for bearing contact with the adjacent one of said lugs to reinforce the engagement thereof with said rail.

7. The combination according to claim 3 wherein said reinforcing means include a reinforcing lug joined to each of said retainer plates and overlying at least a portion of the adjacent one of said rail engaging lugs to reinforce the latter.

8. The combination according to claim 3 wherein there is provided a resilient pad member having a complementary configuration relative to the combined surface areas of said members, said pad being inserted between the adjacent surfaces of said fastener members and of a road bed for said rail, said retaining plate being fabricated at least partially from an electrically insulating structural material so that said fastener is electrically isolated both from said road bed and said anchor means.

9. A rail fastener comprising a pair of complementary fastening members, each of said members having a rail engaging securance lug, the lugs of said members being apposed at a juxtaposed position of said members and said rail one to another so as to secure said rail therebetween, said members being displaceable relative to one another so that said lugs can be moved toward and away from one another to engage and disengage said rail therebetween, and means securable to each of said members for preventing such displacement when said rail is securingly engaged by said lugs, said displacement preventing means including at least one retainer plate engaging said members and extending across the adjacent end portions thereof, and cooperative securing means on said members and said retainer plate to prevent said displacement when said retainer plate is engaged with said members, the adjacent end portions of said members are

spaced from one another and said retainer plate is bowed and slotted for springing engagement with anchor means passed between said end portions.

10. A rail fastener comprising a pair of complementary fastening members, each of said members having a rail engaging securance lug, the lugs of said members being apposed at a juxtaposed position of said members and said rail one to another so as to secure said rail therebetween, said members being displaceable relative to one another so that said lugs can be moved toward and away from one another to engage and disengage said rail therebetween, and means securable to each of said members for preventing such displacement when said rail is securingly engaged by said lugs, each of said lugs includes a portion of keying cross section which can be shaped in between suitably positioned arms secured to an associated one of said fastening members.

11. The combination according to claim 10 wherein a pre-loadable resilient member is inserted between said keying cross section and said arms for preloading the engagement of said lugs with said rail.

12. A rail fastener comprising a pair of complementary fastening members, each of said members having a rail engaging securance lug, the lugs of said members being apposed at a juxtaposed position of said members and said rail one to another so as to secure said rail therebetween, said members being displaceable relative to one another so that said lugs can be moved toward and away from one another to engage and disengage said rail therebetween, and means securable to each of said members for preventing such displacement when said rail is securingly engaged by said lugs, said displacement preventing means including at least one retainer plate engaging said members and extending across the adjacent end portions thereof, and cooperative securing means on said members and said retainer plate to prevent said displacement when said retainer plate is engaged with said members, cooperative securing means includes camming surfaces formed on said fastening members and said retainer plate such that movement of said retainer plate longitudinally of said members forcefully urges said members toward one another.

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CERTIFICATE OF CORRECTION

Patent No. 3,476,317 November 4, 1969

Harold Gassner

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 42, "modication" should read -- modification --; line 46, "Railways" should read -- Railway --. Column 3, line 65, "same." should read -- same, wherein: --. Column 7, line 13, "structure" should read -- structural --; line 21, cancel "such", second occurrence. Column 9, line 53, "106" should read -- 196 --; line 66, cancel "a". Column 10, line 51, "toleranes" should read -- tolerances --. Column 11, line 9, "operatively" should read -- operative --.

Signed and sealed this 27th day of October 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
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Commissioner of Patents