United States Patent [19]

Kirik

[11] **3,827,631**

[45] **Aug. 6, 1974**

[54] **RAIL MOUNTING PAD**

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[73] Assignee: **Syntex Rubber Corporation,** Bridgeport, Conn.

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[21] Appl. No.: **319,865**

[52] **U.S. Cl.** **238/283,** 238/287, 238/307, 238/349

[51] **Int. Cl.** **E01b 9/40,** E01b 9/14

[58] **Field of Search** 238/305, 302, 283, 287

[56] **References Cited**

UNITED STATES PATENTS

2,996,256	8/1961	Moses	238/283
3,581,990	6/1971	Kirik	238/283

FOREIGN PATENTS OR APPLICATIONS

896,471	5/1962	Great Britain	238/283

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[57] **ABSTRACT**

A pad for use in a rail mounting assembly to dampen the rail vibration while providing electrical insulation between a rail and a tie, particularly where positive retention of the pad against lateral slippage is accomplished independently of the means used to secure the rail to the tie. Retention against lateral slippage is provided by disposing embossments on the pad which mate into socket recesses in the tie. Wear, permanent set, and cracking are alleviated by disposing apertures through the embossments to interrupt the lateral propagation of the strain wave caused by compressive stress imposed on the rail mounting assembly from rolling train wheels. Dampening of rail vibration is supplemented by cooperatively configuring the embossments and the socket recesses to develop desired spring forces upon compression of the pad.

6 Claims, 9 Drawing Figures

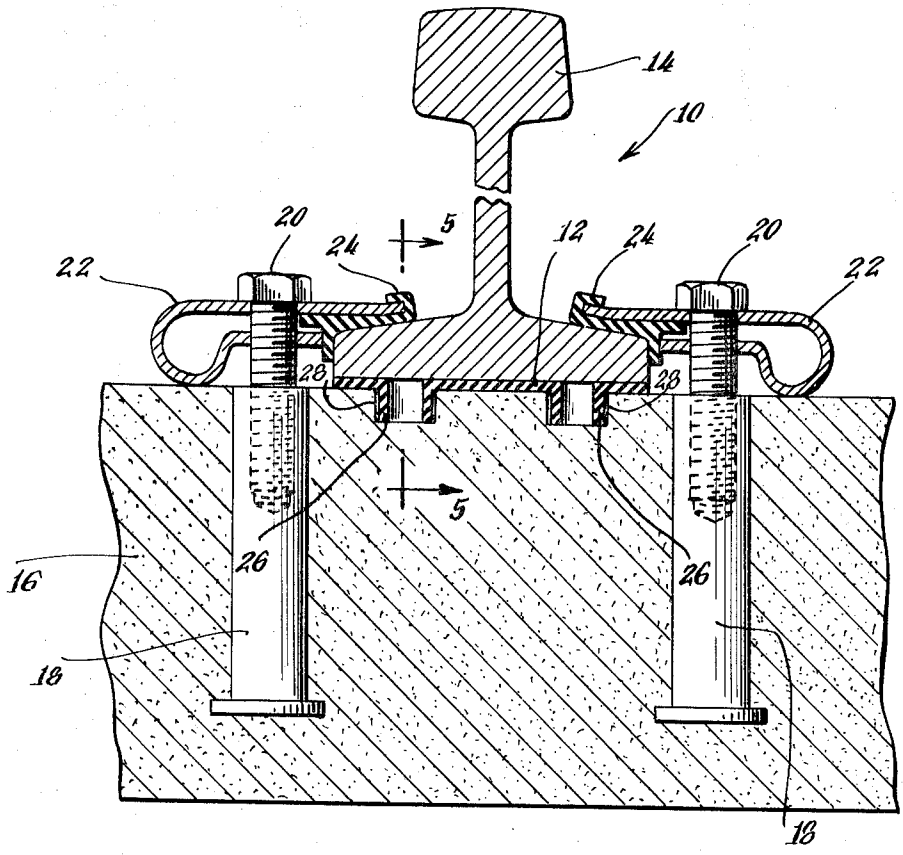
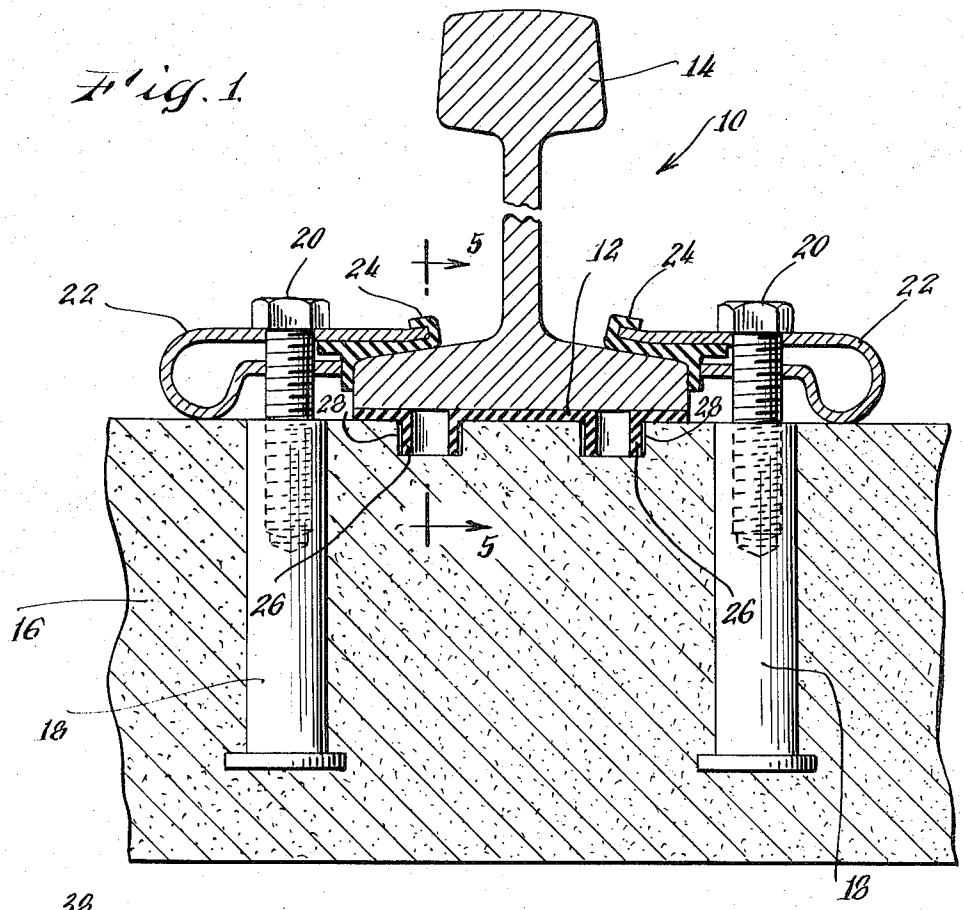


Fig. 1.



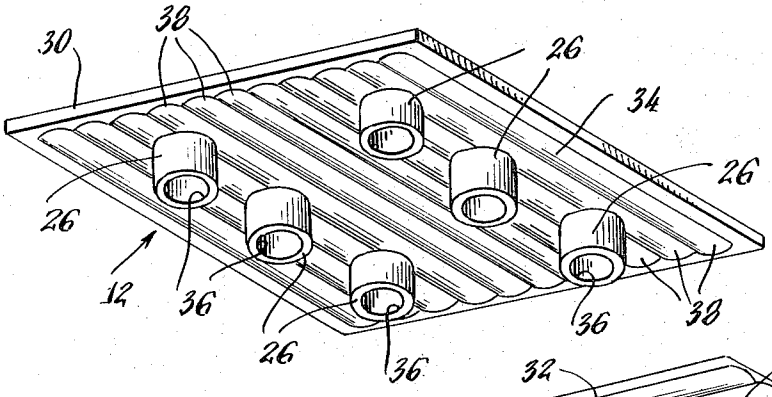


Fig. 2.

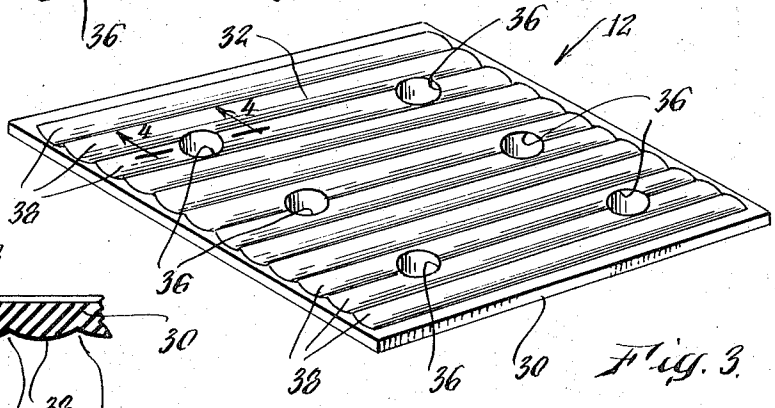
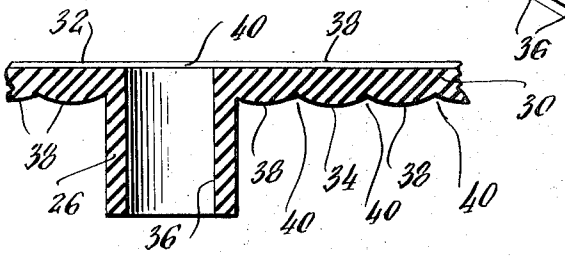


Fig. 3.

Fig. 4.



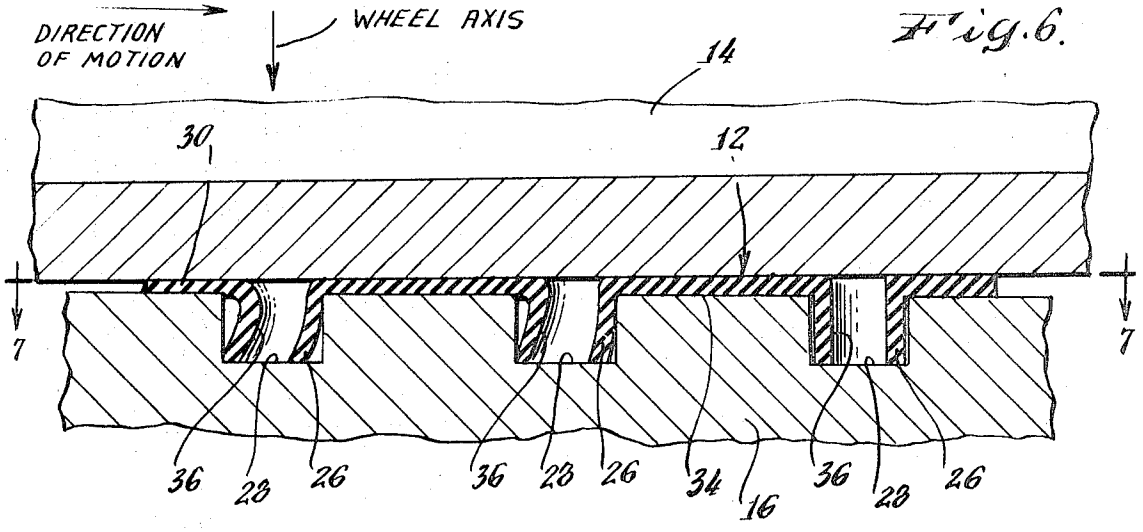


Fig. 6.

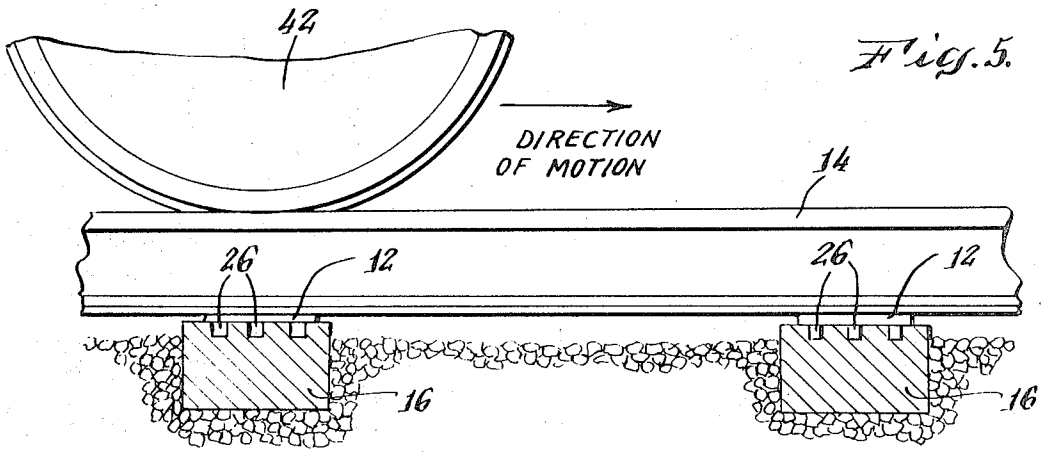


Fig. 5.

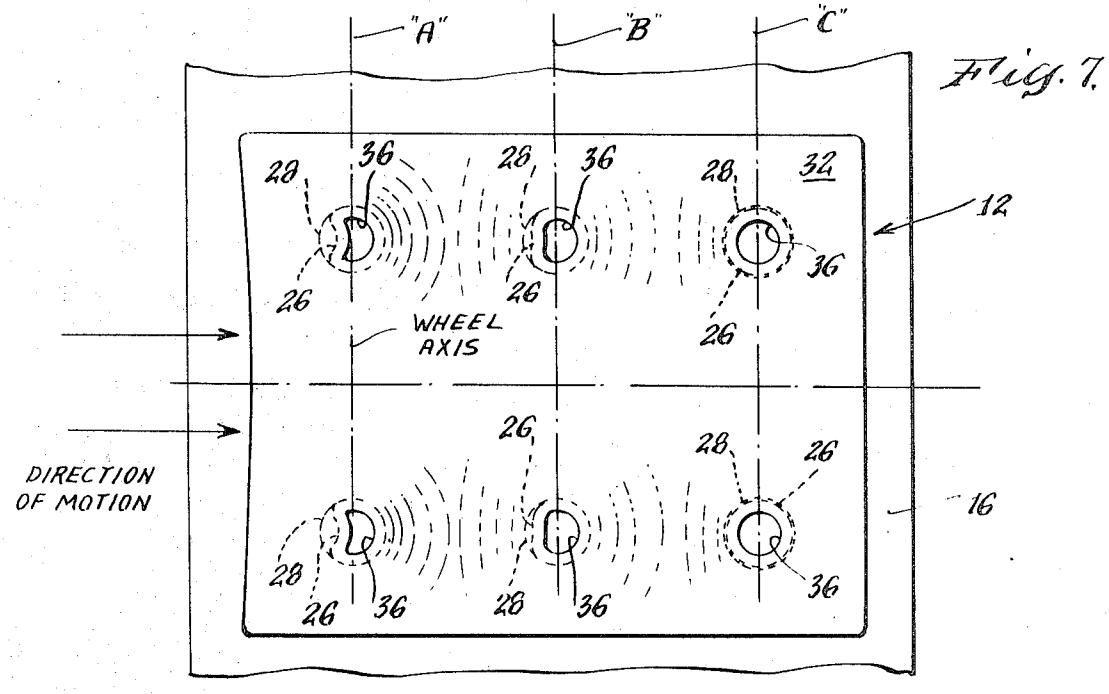


Fig. 7.

Fig. 8.

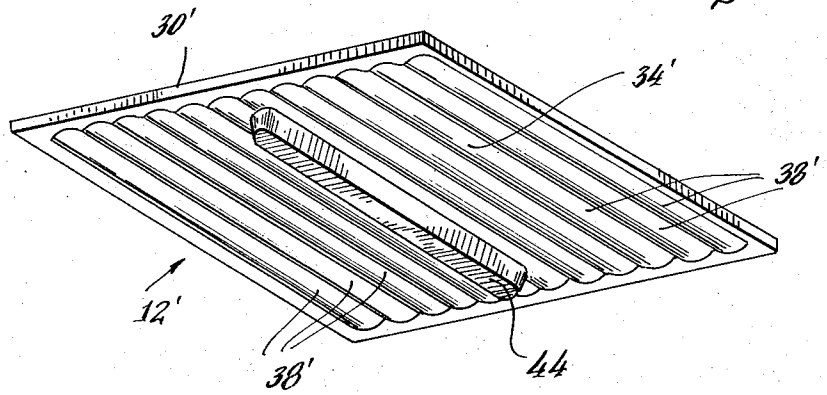
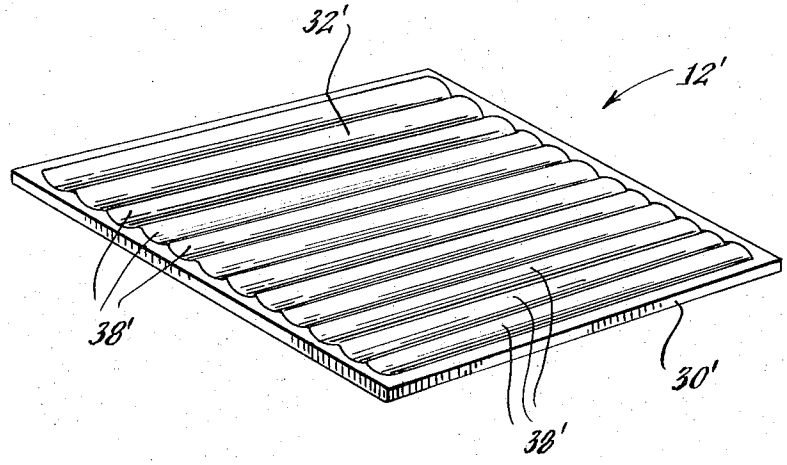


Fig. 9.



RAIL MOUNTING PAD

BACKGROUND OF THE INVENTION

The present invention relates to a rail mounting pad and especially to such a pad having positive retention means which is independent of the fastening means existing between the rail and the tie. Specifically, this invention relates to improvements in the mounting pad disclosed in the Kirik U.S. Pat. No. 3,581,990 and assigned to the present assignee. The disclosure of the Kirik patent is hereby incorporated by reference.

In the Kirik patent, a mounting pad is disclosed consisting of a double sided bearing portion to which tubular mounting embossments are attached at opposite ends. During assembly of the rail to the tie, the pad is inserted therebetween with the embossments aligned for inclusion into the fastening means used to secure the rail to the tie. Positive retention of the pad against lateral slippage is thereafter provided through the fastening means.

While the Kirik patent has proven successful in overcoming the disadvantages of previously known mounting pads, the required alignment between the tubular bosses and the fastening means is cumbersome and complicates the assembly of the rail to the tie. Also, the tubular bosses are useful only in withstanding shear stress to limit the lateral slippage and are not effective to supplement the dampening of rail vibration or to absorb the lateral propagation of the strain wave.

SUMMARY OF THE INVENTION

It is, therefore, a general object of the present invention to provide a rail mounting pad which minimizes and obviates the disadvantages of the prior art.

It is a specific object of the present invention to provide a rail mounting pad which is retained between the rail and the tie independently of the fastening means existing therebetween.

It is a more specific object of the present invention to provide a rail mounting pad which interrupts strain wave propagation to reduce cracking, permanent set and wear.

It is a further object of the present invention to provide a rail mounting pad which utilizes embossments to both withstand the shear stress encountered and dampen the rail vibration.

These objects are accomplished in one form according to the present invention by extending embossments from the mounting pad to engage socket recesses in the tie. A bearing interface of the embossments against the socket recesses is utilized to translate any shear stress developing between the mounting pad and the tie. The embossments are specially configured to allow flow of compressible pad material into the socket recesses and also to compress into the socket recesses in developing spring forces proportional to the load exerted on the rail. To preclude continuous propagation of a strain wave across the mounting pad, the embossments are arranged thereon in a pattern which periodically interrupts the propagation along a plane through the mounting pad.

BRIEF DESCRIPTION OF THE DRAWINGS

The manner in which these and other objects of the invention are achieved will best be understood by reference to the following description, the appended claims, and the attached drawings wherein:

FIG. 1 is a sectional view of a rail mounting assembly into which a mounting pad of this invention has been incorporated;

FIG. 2 is a bottom perspective view of the mounting pad utilized in FIG. 1;

FIG. 3 is a top perspective view thereof;

FIG. 4 is a partial section thereof taken substantially along line 4—4 of FIG. 3 to illustrate the embossment configuration;

FIG. 5 is a reduced sectional view taken substantially along line 5—5 of FIG. 1 and having the rail fasteners removed to illustrate the distortion caused to the mounting pad when compressed by the load of a rolling wheel;

FIG. 6 is a similar view to FIG. 5 but is greatly enlarged to illustrate the uneven distribution of the compressive stress resulting from the rolling motion of the wheel;

FIG. 7 is a reduced sectional view taken substantially along line 7—7 of FIG. 6 to illustrate the interruptions resulting to the strain wave due to material flow through the embossments and into the socket recesses;

FIG. 8 is a bottom perspective view of another mounting pad having an alternate configuration in accordance with this invention; and

FIG. 9 is a top perspective view thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to the drawings, a rail mounting assembly **10** incorporating a mounting pad **12** having the improvements of this invention is illustrated in FIG. **1**. In the rail mounting assembly **10**, a steel rail **14** is secured to a concrete tie **16** with the mounting pad **12** interfacing therebetween to dampen the vibration of the rail **14**. Threaded inserts **18** are embedded into the tie **16** and cooperate with bolts **20** to secure rail fasteners **22** which thereby retain the rail mounting assembly **10**. Rail fastener pads **24** cover the rail contacting ends of the rail fasteners **22** so as to electrically insulate the rail **14** from the tie **16**. Embossments **26** extend from the mounting pad **12** and engage into socket recesses **28** in the tie **16** to translate shear stress, absorb strain, and supplement rail vibration dampening.

The mounting pad **12** utilized in the rail mounting assembly **10** of FIG. **1** is only one of many possible embodiments for this invention and is illustrated in FIGS. **2 – 4**. In general configuration the mounting pad **12** is rectangularly shaped, being equivalent in width to the rail **14** in one direction and approaching the width of the tie **16** in the other direction. Therefore, within the rail mounting assembly **10** the mounting pad **12** presents a bearing portion **30** having a top surface **32** in contact with the rail **14** and a bottom surface **34** in contact with the tie **16**. The mounting pad **12** is made of an elastomeric composition, such as rubber, selected for its resistance to aging in air, resistance to atmospheric ozone, resistance to oil and water, and resistance to compression set.

Any suitable means may be utilized to fabricate the mounting pad **12**, such as molding. Therefore, the embossments **26** may be of any desired configuration and may be disposed across the mounting pad **12** in any desired arrangement. The embossments **26** protrude from the bottom surface **34** of the mounting pad **12** and apertures **36** extend through each embossment **26** and the bearing portion **30**. The socket recesses **28** in the tie **16** are arranged in the identical pattern as the embossments **26** on the mounting pad **12**. Within the rail mounting assembly **10**, each engaging embossment **26** and socket recess **28** are cooperatively configured to provide a circumferential clearance therebetween and to abut at the bottom of the socket recess **28**. A plurality of longitudinal beads **38** are formed on both the top surface **32** and the bottom surface **34** of the mounting pad **12**, with an open space **40** existing between each pair of adjacent beads **38**. Depending on the particular application, the beads **38** on the top surface **32** may be superposed, parallel and offset, perpendicular (as illustrated in FIGS. **2** and **3**) or at any angle to the beads **38** on the bottom surface **34**.

As illustrated in FIGS. **5 – 7**, the wheels **42** of railroad cars roll over the rail **14** and each rail mounting assembly **10** is subjected to compressive stress as each wheel **42** passes over its portion of the rail **14**. Being fabricated of elastomeric material, the mounting pad **12** is compressible and distorts as the compressive stress is applied. Due to the rolling motion of the wheels **42**, the compressive stress is not applied evenly across the mounting pad **12** and, therefore, a strain wave is propagated laterally thereacross in advance of each rolling wheel **42**, as illustrated in FIG. **6**. The elastomeric material of the mounting pad **12** is also resilient and, therefore, the mounting pad **12** recovers to its original shape after the wheel **42** has passed and the compressive stress is removed. However, this recovery will propagate in the same direction as the strain wave and since the compressive stress causing the strain wave is not removed until after the recovery has commenced, the mounting pad **12** must walk or slip laterally between the rail **14** and the tie **16** to accumulate the material necessary for the recovery. This slippage occurs for each cycle of compression and recovery and builds up over a plurality of cycles to dislocate the mounting pad **12** from between the rail **14** and the tie **16**, if sufficient retaining means is not provided. Such dislocation is precluded by the embossments **26** which develop a bearing interface against the socket recesses **28** to translate any shear stress developing between the mounting pad **12** and the tie **16**. Therefore, the mounting pad **12** is retained between the rail **14** and the tie **16** independently of the threaded inserts **18** and bolts **20**.

A much higher shear stress is developed where the strain wave is permitted to propagate across the mounting pad **12** without inhibition or interruption. Even where provisions are incorporated to translate the higher shear stress, other difficulties result therefrom, such as cracking, permanent set or excessive wear. Although they are not shown in FIGS. **5 – 7**, the open spaces **40** between the beads **38** are disposed to fill with distorted material and thereby inhibit the propagation of the strain wave. The orientation of the beads **38** for achieving maximum absorption of distorted material will depend on the manner in which the wheels **42** distribute the compressive stress to the rail mounting assembly **10**.

The magnitudes of both the shear stress and the slippage are drastically reduced in the rail mounting assembly **10** by periodically interrupting the propagation of the strain wave through the mounting pad **12**. This is accomplished by completely absorbing the strain wave at particular locations on the mounting pad **12**, as a result of the particular embossment arrangement and the cooperative configuration existing between the embossments **26** and the socket recesses **28**. Any cooperative configuration permitting the unimpeded inflow of the strain wave through the embossments **26** and into the socket recesses **28** may be utilized. Where the mounting pad **12** includes the apertures **36**, such inflow can be adjusted very simply by varying the size of the apertures **36**. Embossment arrangement will depend on the manner in which the wheels **42** distribute the compressive stress to the rail mounting assembly **10**. For the embossment arrangement and the cooperative configuration utilized in this embodiment, a strain wave propagated along the longitudinal axis of the rail **14** will be interrupted at three locations, as illustrated in FIG. **7** along planes "A," "B," and "C." Of course, the greater the number of embossments **26** utilized in the arrangement, the greater the number of strain wave interruptions attainable. However, a singular interruption to the propagation of the strain wave could be attained with one embossment **26** of suitable arrangement and configuration.

In addition to translating the shear stress and absorbing the strain wave, the embossments **26** also serve to supplement the rail vibration dampening provided by the bearing portion **30**. This is accomplished by developing a spring force in proportion to the compressive stress applied on the rail mounting assembly **10**, as a result of the cooperative configurations existing between the embossments **26** and the socket recesses **28**. Any cooperative configuration permitting the embossments **26** to be compressed into the socket recesses **28** in the desired proportion to the compressive stress applied on the rail mounting assembly **10** may be utilized. Where the mounting pad **12** includes apertures **36**, the desired proportion can be adjusted very simply by varying the size of the apertures **36**. When this approach is utilized, care must be taken in developing very high spring forces because as the size of the apertures **36** is reduced, the inflow of the strain wave into the socket recesses **28** through the embossments **26** is impeded to a greater degree and, therefore, the strain wave absorption capability through the embossments **26** is reduced.

The embossments **26** on the mounting pad **12** are cylindrically configured and, therefore, the bearing interface developed thereby against the socket recesses **28** is of the same magnitude regardless of the direction at which the shear stress is oriented. In many applications, however, the shear stress is preponderant in a single direction and, therefore, it is desirable to develop the bearing interface of greatest magnitude perpendicularly to this direction. A mounting pad **12'** having an embossment **44** for developing the greatest bearing interface in a single direction is illustrated in FIGS. **8** and **9** where because of the similarities which exist with the mounting pad **12** of FIGS. **2 – 4**, similar parts are identified by the same reference numerals as those used in FIGS. **2 – 4**, but with a prime (') added.

Mounting pad **12'** is rectangularly shaped and has a bearing portion **30'** with a top surface **32'** and a bottom surface **34'**. A plurality of longitudinal beads **38'** are formed on both the top surface **32'** and the bottom surface **34'** with open spaces (not specifically indicated) existing between each pair of adjacent beads **38'**. The embossment **44** is disposed across the bottom surface **34'** and is generally configured as a rectangular strip having a longitudinal axis. Again, the mounting pad **12'** is made of an elastomeric composition and, of course, a plurality of embossments **44** could be disposed on the mounting pad **12'** in any desired arrangement.

The embossment **44** engages a cooperatively configured socket recess in a tie (not shown) and functions to preclude dislocation of the mounting pad **12'** between the tie and a rail (not shown), in the same manner as described above for mounting pad **12.** However, the mounting pad **12'** must be located between the tie and the rail with the longitudinal axis of the embossment **44** aligned perpendicularly to the direction of greatest shear stress. Although no aperture is disposed through the bearing portion **30'** and the embossment **44,** the cooperative configuration necessary between the embossment **44** and the socket recess may be achieved to supplement rail vibration dampening and to interrupt strain wave propagation. Of course, an aperture (not shown) could be disposed through the bearing portion **30'** and the embossment **44** to more closely simulate the functioning discussed above for mounting pad **12.**

Those skilled in the art should readily appreciate that the rail mounting pad embodied by this invention is retained between the rail and the tie independently of the fastening means existing therebetween. Also, the cracking, permanent set and wear caused by strain wave propagation is reduced. Furthermore, the retention means is configured to supplement the rail vibration dampening achieved by the bearing portion of the mounting pad.

It should be understood that the present disclosure has been made only by way of example and that numerous changes in details of construction and the combinations or arrangements of parts may be resorted to without departing from the true spirit and scope of the invention and, therefore, the present disclosure should be construed as illustrative rather than limiting.

What I claim is:

1. A mounting pad for interfacing between a rail and a tie, comprising:

a bearing portion configured to locate under the rail within the parameters thereof, said bearing portion being compressible under stress to dampen rail vibration; and

at least one embossment protruding from said bearing portion with an aperture extending through said embossment and said bearing portion, said embossment being configured to engage a socket recess in the tie for developing a bearing interface thereagainst in translating shear stress to retain said pad against lateral slip, said aperture allowing flow of compressed pad material into the socket recess and said embossment being arranged on said pad to interrupt propagation of a compressive strain wave thereacross.

2. The pad of claim **1** wherein said embossment is cylindrically configured and develops a bearing interface of equal magnitude in any lateral direction.

3. The pad of claim **1** wherein said embossment is a rectangular strip and develops a bearing interface of greatest magnitude in a direction perpendicular to the longitudinal axis of said rectangular strip.

4. The pad of claim **1** wherein said embossment is configured to compress into the socket recess in proportion to compressive stress on the rail, said embossment developing a spring force when compressed to supplement the rail vibration dampening of said bearing portion.

5. The pad of claim **1** wherein a plurality of embossments protrude from said bearing portion.

6. The pad of claim **5** wherein said embossments are configured to compress into the socket recesses in proportion to compressive stress on the rail, each said embossment developing a spring force when compressed to supplement the rail vibration dampening of said bearing portion.

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