March 7, 1939. O. V. GREENE 2,149,599

MEANS FOR CUSHIONING AND PREVENTING CREEP OF RAILS

Filed Aug. 25, 1937 3 Sheets-Sheet 1

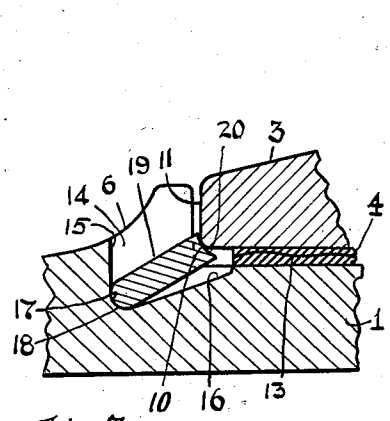


Fig. 3.

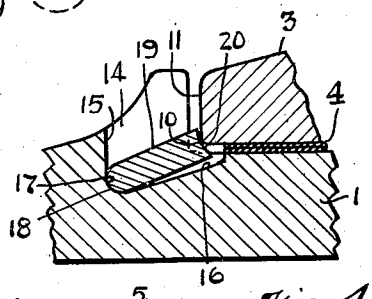


Fig. 4.

Fig. 2

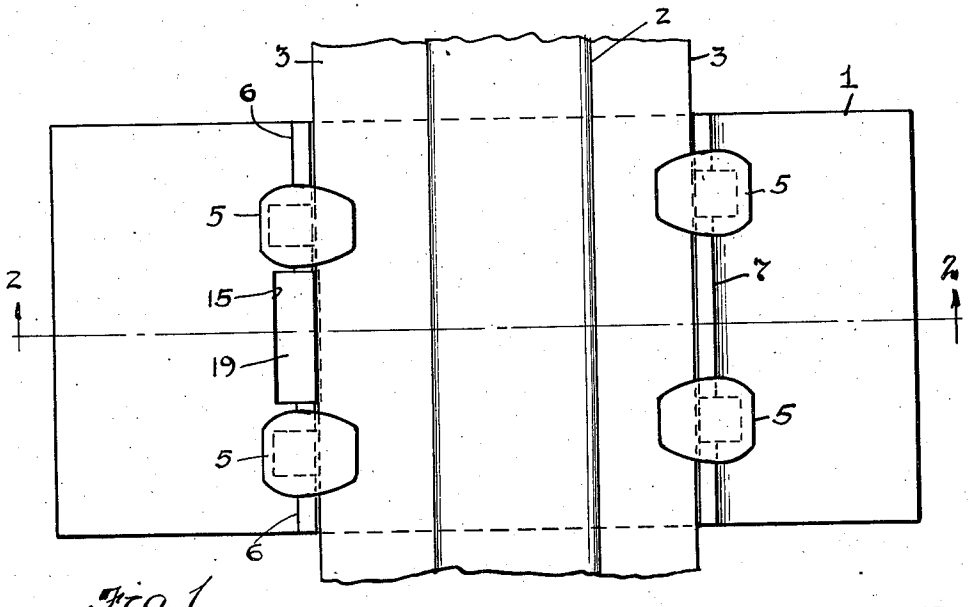


Fig. 1.

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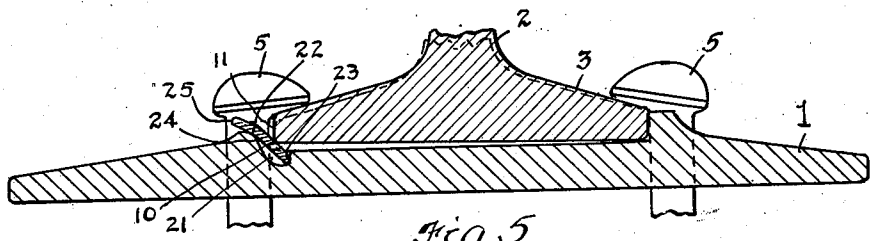


Fig. 5.

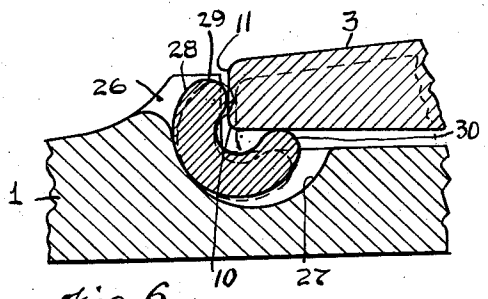


Fig. 6

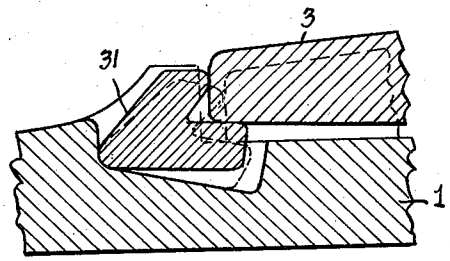


Fig. 8.

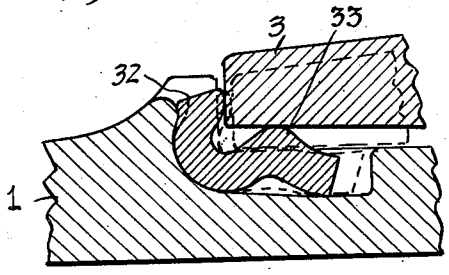


Fig. 9

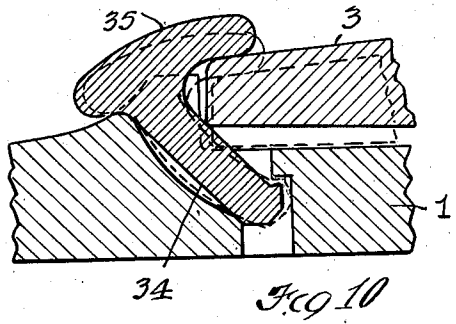


Fig. 10

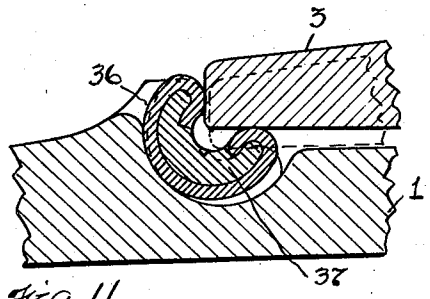


Fig. 11

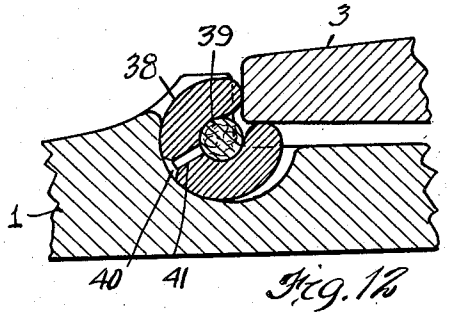


Fig. 12

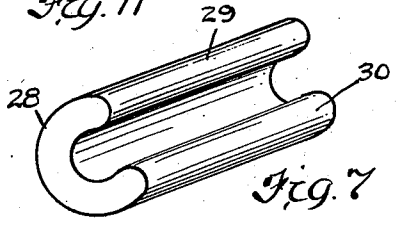


Fig. 7

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MEANS FOR CUSHIONING AND PREVENTING CREEP OF RAILS

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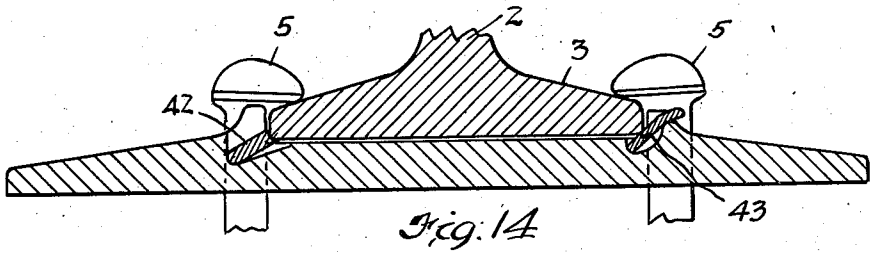


Fig. 14

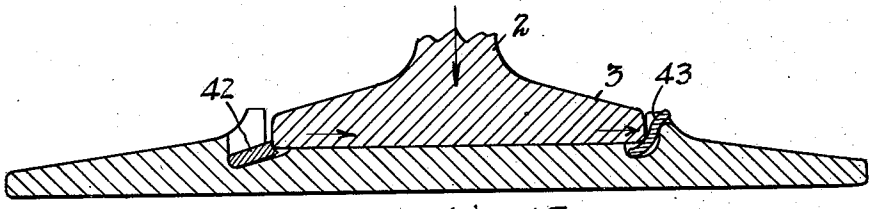


Fig. 15

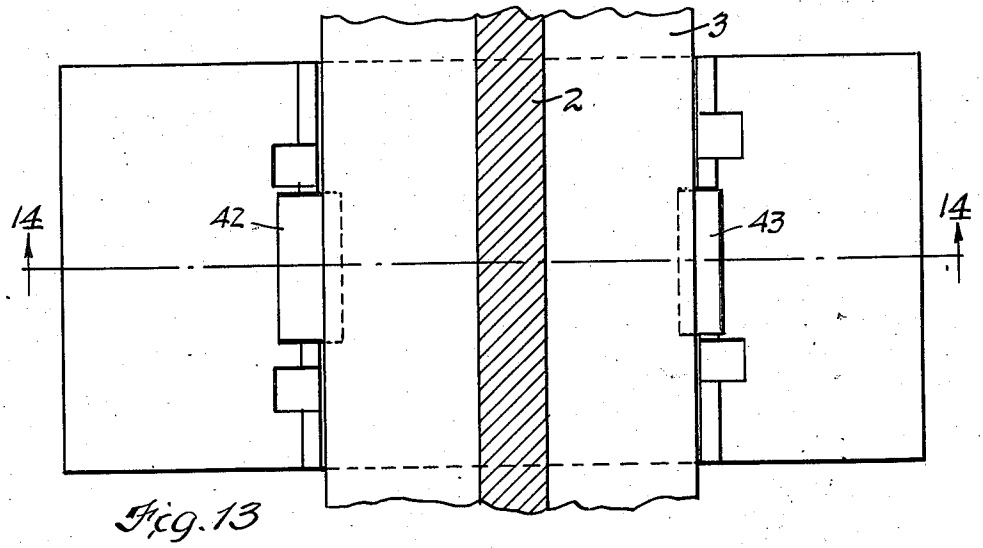


Fig. 13

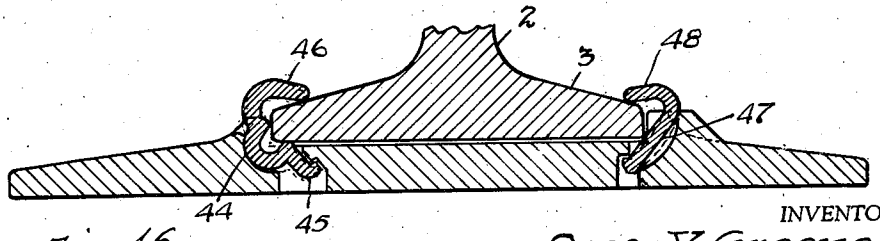


Fig. 16

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UNITED STATES PATENT OFFICE

2,149,599

MEANS FOR CUSHIONING AND PREVENTING CREEP OF RAILS

Oscar V. Greene, Cleveland Heights, Ohio

Application August 25, 1937, Serial No. 160,761

10 Claims. (Cl. 238—279)

This invention relates, as indicated, to means or devices for cushioning and preventing creep of rails.

Among other objects of the invention are to provide devices of the character described which by intensifying the normal friction of traffic will be effective to firmly lock or hold rails against longitudinal movement or any tendency to "creep" during movement of rolling stock over the rails; which will not interfere with the normal expansion and contraction of the rail due to temperature changes; which will function to cushion and retain the rails in a desirable manner; which can be manufactured at low cost and easily secured in position and removed without the aid of special tools; and the use of which will not require material changes in the present standard or conventional type of tie-plates or in the conventional methods of securing the tie-plates to the cross-ties.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims; the annexed drawings and the following description setting forth in detail certain structures embodying the invention, such disclosed structures constituting, however, but a few of the various mechanical forms in which the principle of the invention may be embodied.

In said annexed drawings:

Fig. 1 is a fragmentary plan view of a structure embodying independent rail cushioning and anti-creep devices;

Fig. 2 is a cross-sectional view of the structure, taken on the line 2—2 of Fig. 1;

Fig. 3 is a view, on an enlarged scale, of a portion of Fig. 2 and showing the normal position of the anti-creep device, and the cushioning device in unstressed condition;

Fig. 4 is a view similar to Fig. 3, but showing the anti-creep device in operative position, that is, the position assumed in response to movement of rolling stock over the rails, and showing also the cushioning device in stressed or compressed condition;

Fig. 5 is a view similar to Fig. 2, but embodying a unitary or single device having combined rail-cushioning and anti-creep functions;

Fig. 6 is a fragmentary view similar to Fig. 3, but embodying a modified and preferred form of rail-cushioning and anti-creep device;

Fig. 7 is a perspective view of the device shown in Fig. 6;

Figs. 8 to 12, inclusive, are views similar to Fig. 6, but embodying various other modified forms of rail-cushioning and anti-creep devices;

Fig. 13 is a fragmentary plan view of a structure embodying devices for cushioning, preventing creep, and limiting upward movement of a full-floating rail;

Fig. 14 is a cross-sectional view, taken on the line 14—14 of Fig. 13, and showing the normal position of the cushioning and anti-creep devices;

Fig. 15 is a view similar to Fig. 14, but showing the cushioning and anti-creep devices in operative position, that is, the position assumed in response to movement of rolling stock over the rails; and

Fig. 16 is a view similar to Fig. 14, but showing modified forms of rail-cushioning and anti-creep devices for a full-floating rail.

Considering first those figures of the drawing which illustrate the devices of the invention in association with rails of the semi-floating type, i. e., Figs. 1 to 12, inclusive, and referring more particularly to Figs. 1 to 4, inclusive, it will be seen that the structure comprises a tie-plate 1, a rail 2 having a base flange 3, a rail-cushioning device 4 interposed between the tie-plate and rail base flange, and spikes 5 which secure the tie-plate to the cross-tie (not shown) and the rail to the tie-plate.

The tie-plate is provided with a pair of spaced rail-retaining flanges 6 and 7, which locate the rail on the tie-plate and prevent undue lateral movement thereof. In order to permit free expansion and contraction of the rail resulting from differences in temperature, as well as to permit "breathing" of the rail, as described in my Patent No. 2,085,970, slight clearances are provided between the edges of the rail base flange and the flanges 6 and 7 of the tie-plate.

The rail, as shown in Figs. 2 and 3, is of the semi-floating type, that is to say, the rail is canted inwardly to a slight extent, with the lower end 8 of the inboard edge 9 of the rail base flange virtually touching the tie-plate, and the lower end 10 of the outboard edge 11 of said flange spaced vertically from the tie-plate. As a result, when a train, represented by the car wheel 12, moves over the rail, the latter tends to rock in an arc having as its center the point 8, the rail moving from the position shown in solid lines in Fig. 2, and in Fig. 3, to the position indicated by the dotted lines in Fig. 2, and solid lines in Fig. 4. In other words, the rail, as a result of movement or weight of rolling stock thereover, assumes a substantially vertical position, returning to its canted

position after passage of the rolling stock. This movement is referred to in my aforesaid patent as "breathing" of the rails.

For the purpose of cushioning the downward portion of this "breathing" movement, and assisting in the return of the rail to its normal canted position, the cushioning device 4 is provided. This device may be a wedge-shaped member comprising a corrugated metallic plate 13 having layers of rubber bonded to the upper and lower surfaces of the plate, or any of the various cushioning devices shown and described in my aforesaid patent.

In order to prevent or minimize "creeping" or longitudinal movement of the rail, resulting from movement of rolling stock thereover, a portion of the tie-plate and the outboard flange 6 intermediate the spikes 5 is removed to provide a socket or recess 14 extending longitudinally of the rail and beneath the outboard portion of the rail base flange. The wall of this recess, at the intersection of the outer wall 15 and bottom 16 thereof, is rounded so as to form a bearing surface 17 for the outer convexed or rounded edge 18 of a toggle member 19. The inner concaved edge 20 of this toggle member engages the rail base flange at substantially the point 10. While the inner edge of the toggle member is shown as concave, this is for the purpose of preventing unauthorized removal thereof, but this edge may, if desired, be flat.

When there is no movement of rolling stock over the rail, the various parts of the structure will occupy the position shown in solid lines in Figs. 2 and 3. In this position, the rail is not clamped to the tie-plate in any manner other than by its slight frictional engagement with the cushioning device 4, toggle member 19 and spikes 5, and is therefore substantially free to expand and contract as a result of temperature changes.

During passage of a train or other rolling stock over the track, however, the various parts of the structure will assume the position shown in dotted lines in Fig. 2 and in solid lines in Fig. 4. In other words, the rail will tend to assume a vertical position, compressing the cushioning device 4 until the upper and lower surfaces thereof are substantially parallel with each other. At the same time, the rail causes the toggle member 19 to rotate or rock about its outer edge 18 in a clockwise direction, and to an extent sufficient to cause the rail base flange to be pressed by the toggle member laterally towards the inboard flange 7 of the tie-plate and to become jambed against said flange. In other words, the vertical pressure of passing traffic is converted into lateral pressure against the rails, that is to say, the friction between the rails and their supports, due to the weight of passing traffic, is greatly intensified or multiplied. In this way, the rail is firmly locked or held against longitudinal movement or any tendency to "creep" as long as movement of the rolling stock thereover continues. The anti-creep effect is further enhanced by virtue of the frictional engagement between the bottom surface of the rail and upper rubber surface of the cushioning device 4, since the coefficient of friction between steel and rubber is normally greater than that between steel and steel.

After passage of the train, the various parts of the structure reassume their normal position and shape, as shown in Fig. 3. It may be noted at this point that since the toggle member is under stress for only a very short time, there is little wear thereof, and it may therefore be made of medium carbon steel. If desired, however, it may be made of tempered spring steel or other spring alloy.

Referring now to Fig. 5 of the drawings, the structure therein shown is the same as that shown in Fig. 2, with the exception that the rail-cushioning device 4 of the latter structure is dispensed with, and instead, a single device is provided which functions both as a rail-cushioning and anti-creep means. Portions of the tie-plate and the outboard flange are removed to provide a socket or recess 21 extending longitudinally of the rail between the spikes 5 and beneath the outboard portion of the rail base flange. Mounted within this socket, and supported at spaced points 22 and 23 so as to be free to yield or flex between these points, is a substantially flat member 24, which, due to the method by which it is supported, I term a "bow spring". The operation of this form of the invention will be more or less apparent. The member 24, in its normal or unflexed condition, supports the rail at the lower end 10 of its outboard edge 11, and in such a manner that this end 10 is suspended above the tie-plate. Upon movement of rolling stock over the rail, the rail tends to assume a vertical position, causing the bow spring 24 to yield or flex between its points of support, as indicated by the dotted lines, thereby not only forcing the rail laterally against the inboard flange of the tie-plate so as to lock and effectively prevent creeping of the rail, but also cushioning the descent of the rail in a desirable manner against shock, etc. In other words, the effects produced by the use of the single member 24 are substantially equivalent to the combined effects of the cushioning device and toggle members in that form of the invention shown in Fig. 2. The member 24 is preferably provided with a short lateral projection or extension 25 to facilitate removal of said member as by means of a pinch bar inserted between the tie-plate and said extension.

Referring to Figs. 6 and 7 of the drawings, wherein is shown the preferred form of rail-cushioning and anti-creep device, portions of the tie-plate and the outboard flange are removed to provide a socket or recess 26 having a semi-cylindrical bottom or wall 27, which extends under the outboard portion of the rail base flange. Disposed within this recess is a member 28, which due to the fact that it acts both as a toggle arm and flexes to some extent, I term a "flexible toggle". This is an extruded spring steel member of semi-cylindrical form, simulating a short length of thick-walled metal tubing, with a portion thereof removed and the ends 29 and 30 of the remaining portion rounded or convexed as shown. The external diameter of the member 28 is somewhat less than the diameter of the wall 27 of the recess 26, so that the member 28 has a line contact with the latter surface. The end surface 29 of the member 28 is in engagement with the outboard edge 11 of the rail base flange and the end surface 30 thereof is in engagement with the lower surface of said flange. Thus the member 28 has a one-line contact with the tie-plate and a two-line contact with the rail base flange, whereas the member 24, as shown in Fig. 5, has a two-line contact with the tie-plate and a one-line contact with the rail base flange. The member 28, in its normal or unflexed condition, supports the rail in such a manner that the end 10 of its outboard edge 11 is suspended above the tie-plate. Upon movement of rolling stock over the rail, the rail assumes a vertical position,