July 6, 1937. O. V. GREENE 2,085,970

RAIL SECURING AND SUPPORTING DEVICE

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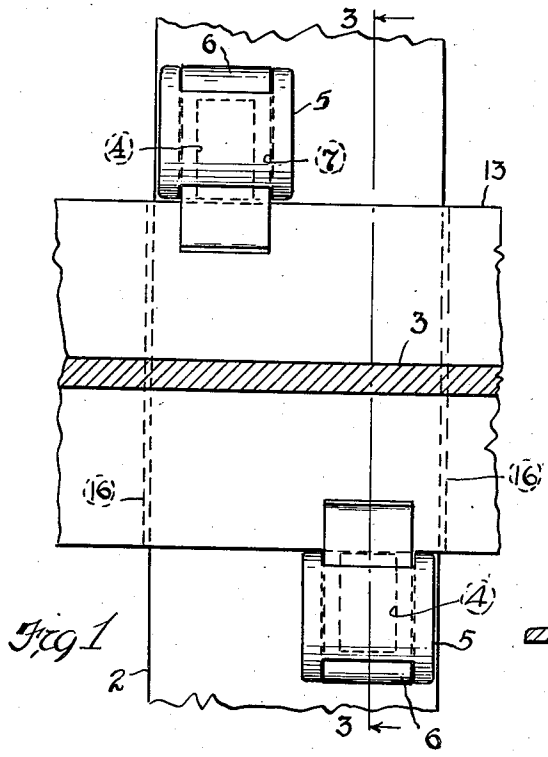

Fig. 1

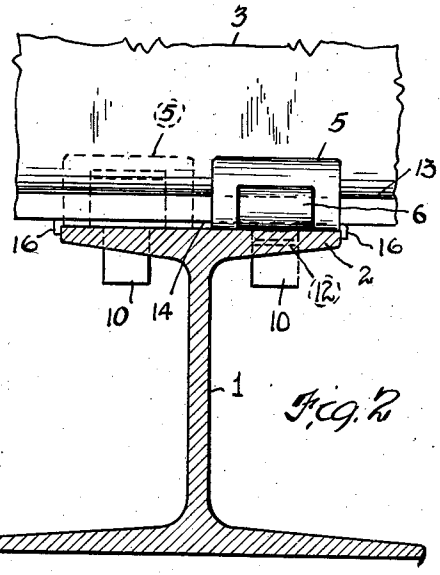

Fig. 2

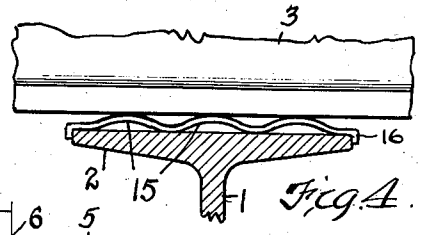

Fig. 4

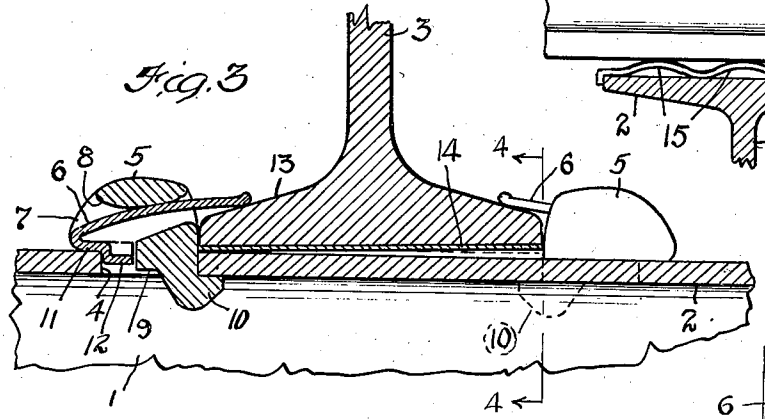

Fig. 3

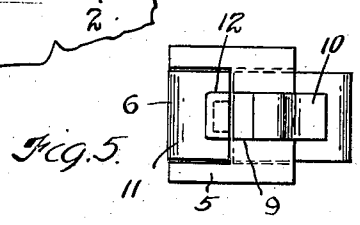

Fig. 5

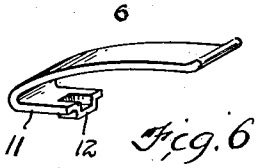

Fig. 6

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Fig. 8

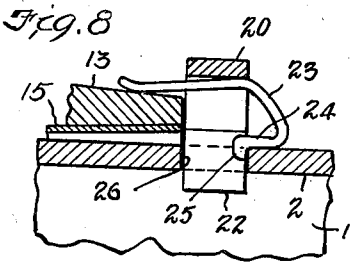

Fig. 9

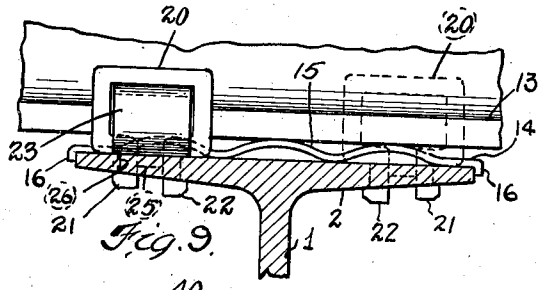

Fig. 7

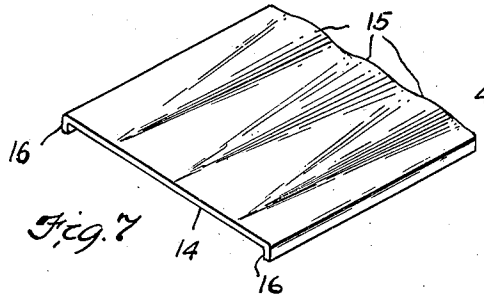

Fig. 12

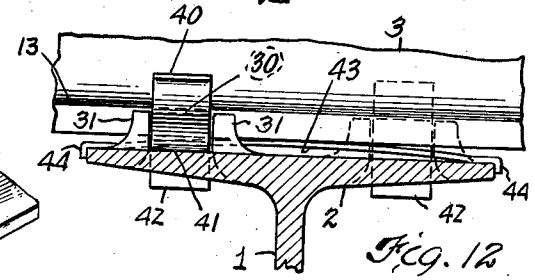

Fig. 10

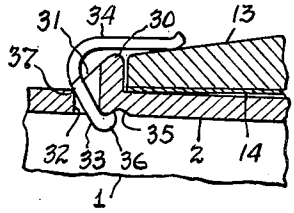

Fig. 11

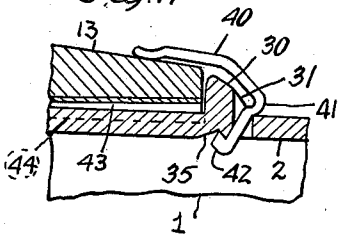

Fig. 13

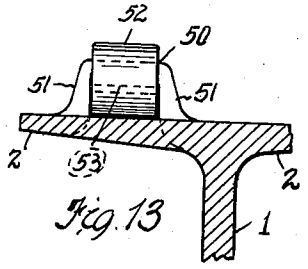

Fig. 15

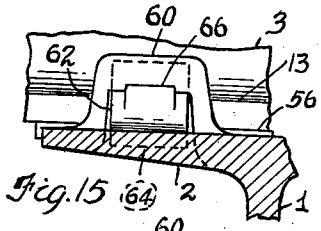

Fig. 16

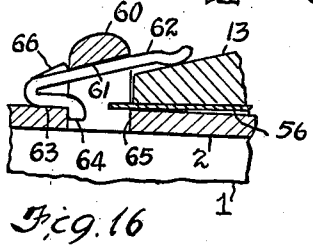

Fig. 14

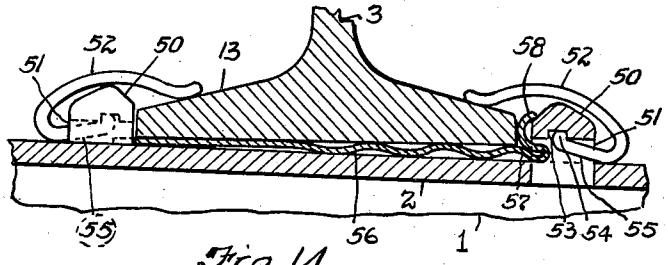

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Fig. 18

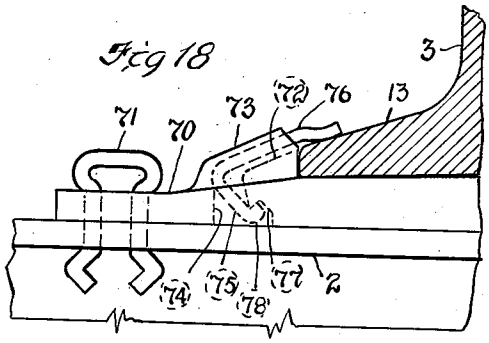
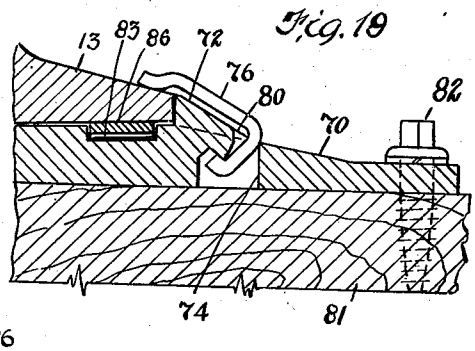


Fig. 19



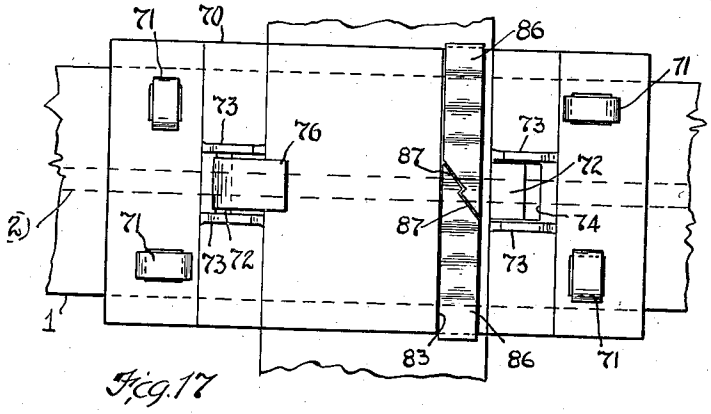


Fig. 17

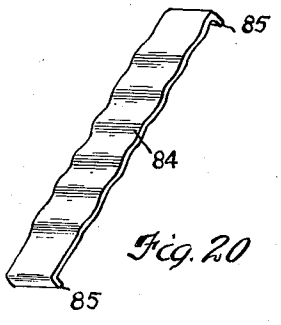
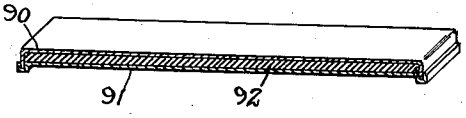


Fig. 20

Fig. 21



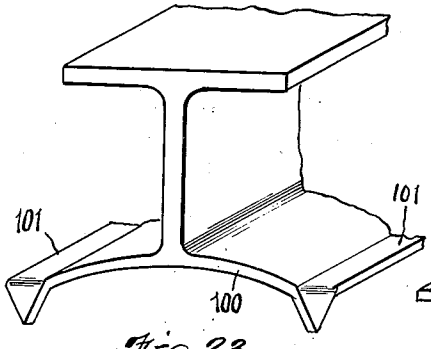


Fig. 23

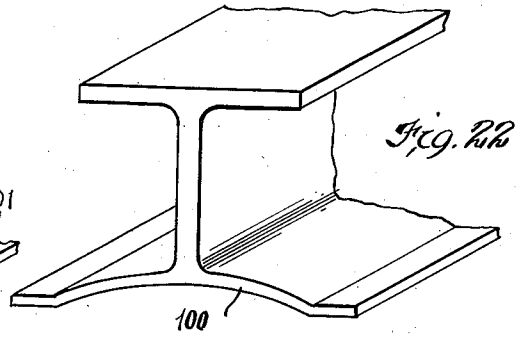


Fig. 22

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UNITED STATES PATENT OFFICE

2,085,970

RAIL SECURING AND SUPPORTING DEVICE

Oscar V. Greene, Cleveland Heights, Ohio

Application July 25, 1934, Serial No. 736,870

24 Claims. (Cl. 238—349)

This invention relates in general to devices for resiliently supporting railroad rails on and securing them to the tie plates and cross-ties.

Among other objects of the invention are to provide devices of the character described which may be used to replace existing devices of this character which have become worn out or broken; which are of such construction as to be readily manufactured by ordinary commercial methods and with equipment now in use for manufacturing rail accessories; which hold the rails securely in position while permitting a certain degree of freedom of movement of the rails occasioned by movement of the rolling stock thereover and which may be easily secured in position and removed without the aid of special tools.

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 the preferred forms of the rail supporting and securing devices; Fig. 2 is an elevation of the structure shown in Fig. 1, viewed from the inner side of the rail; Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 1; Fig. 4 is a fragmentary cross-sectional view, taken on the line 4—4 of Fig. 3; Fig. 5 is a bottom plan view of one of the assembled rail securing devices of Fig. 1; Fig. 6 is a perspective view of the spring clip shown in Figs. 1, 2, 3 and 5; Fig. 7 is a perspective view of the preferred form of rail supporting or cushioning device; Figs. 8 and 9 are fragmentary views showing a modified form of rail securing device; Fig. 10 is a fragmentary view showing a third form of rail securing device; Figs. 11 and 12 are fragmentary views showing a fourth form of rail securing device and also a modified form of supporting or cushioning device; Figs. 13 and 14 are fragmentary views of a fifth form of rail securing device as well as a modified form of rail supporting or cushioning device; Figs. 15 and 16 are fragmentary views of a sixth form of rail securing device; Fig. 17 is a plan view of a structure embodying a tie plate, a rail securing device somewhat similar to that shown in Fig. 10 and a modified form of rail cushioning device; Fig. 18 is a fragmentary elevation of a portion of the structure shown in Fig. 17; Fig. 19 is a view of a structure similar to that shown in Figs. 17 and 18, and in which a wooden crosstie is employed and the side guards on the tie plate for the spring clip are omitted; Figs. 20 and 21 are perspective views of modified forms of rail cushioning devices adapted to be used in that form of construction shown in Figs. 17, 18 and 19; and Figs. 22 and 23 are fragmentary perspective views of modified forms of steel crossties.

In the preferred form of the invention shown in Figs. 1 to 7 inclusive, a steel crosstie 1 is employed which is of standard cross-section and upon the upper flange 2 of which the rail 3 is adapted to be supported. The flange 2 is punched at points adjacent the rail base to provide rectangular openings 4, which openings are of such a size as to receive rail clips and securing bolts of a standard form now in use, so that the securing devices now about to be described are readily adapted to be used as replacement equipment for such standard devices after the latter have become worn out or broken in use. Each of the rail securing devices or clamps consists of a rail retaining member 5 and a spring clip 6 which cooperates with the member 5 to securely hold the rail against lateral displacement while permitting a certain degree of "breathing" or canting of the rail which will be presently described. The rail-retaining members 5 may be made as forgings or as malleable or steel castings and each has an opening 7 extending therethrough which is defined at the top by a convex surface 8 which slopes abruptly upwardly adjacent that end of the opening which lies adjacent the base of the rail 3 and slopes upwardly more gently adjacent that end of the opening which is more remote from the rail base. Each of the members 5 is also provided with a tenon-like downwardly extending portion 9 which occupies a portion of the opening 4 and terminates in a jaw 10 which underlies the flange 2 of the crosstie and cooperates with the spring clip now to be described to limit vertical movement of the rail. The clip 6 is preferably made of spring steel and extends through the opening 7 in the member 5, being provided with a rebent end 11, a portion of which is pressed downwardly to provide a tenon-like element 12, which is of rectangular contour and is disposed in and occupies substantially all of that portion of the opening 4 which is not occupied by the tenon-like portion 9 of the member 5. The member 5 and clip 6 thus serve not only to clamp the rail in position but also to lock each other in position so as to prevent displacement of either from its

operative position. The inner or free end of the clip 6 bears resiliently against the upper surface of the base 13 of the rail 3. Interposed between the flange 2 of the crosstie 1 and the rail base 13 is a resilient wedge-shaped cushioning device 14 which is in the form of a rectangular plate having corrugations 15 extending transversely of the rail and increasing in depth and width from the inner edge of the rail base to the outer edge thereof, the plate 14 being also provided with downwardly extending flanges 16 which engage the flange 2 of the crosstie and prevent displacement of the cushioning plate longitudinally of the rail. Lateral displacement of the plate 14 is prevented by the members 5. In order to remove the rail-securing devices, it is only necessary to insert a chisel or crowbar under the rebent ends 11 of the spring clips so as to lift them sufficiently to withdraw the elements 12 from the openings 4, whereupon the devices may be shifted away from the rail base, as by a hammer blow, and removed from the crosstie.

It will be noted that the rail is canted inwardly to a slight extent, so that when a train moves over the rails, the latter tends to rock in an arc having as its center the lower inboard edge of the rail base flange 13, the rail assuming a substantially vertical position during such passage of the train thereover. This rocking movement, which, together with the return of the rails to their normal canted position, I term "breathing" of the rails, is cushioned in a desired manner by means of the corrugated plate 14. During this so-called "breathing" of the rails, the bases 13 thereof are elevated to a very slight extent, but such movement, most of which is communicated in compression to the thick end of the wedge-shaped cushioning device 14, contrary to its tendency to loosen rail devices now in common use, actually tends to cause the members 5 and clips 6 to more tightly grip or clamp the rail. This results from the fact that the curved surface 8 of the member 5 constitutes a variable fulcrum for the spring clip 6, so that as the spring flexes upwardly upon raising of the rail base, the fulcrum point shifts toward the rail so as to increase the tension of the clip against the rail flange and hold the locking element 12 more securely in position. Maximum protection against dislodgement of the spring clip during track service or accident is thus afforded.

In that form of the invention shown in Figs. 8 and 9, the rail-retaining member 20, which corresponds to the member 5 in the preferred form of the invention, is made from a strip of metal formed into a rectangular shaped loop and provided with spaced downwardly extending tie-engaging and embracing elements 21 and 22. These elements tend normally to spring apart and are provided with beveled ends so as to facilitate insertion of the member in position by merely striking it with a hammer until the elements spring apart and into locking engagement with the flange 2 of the crosstie. The spring clip 23, in this case, is fulcrumed on the member 20 and is formed with a rebent portion 24 which terminates in an integral tenon-like end 25 which extends downwardly into the opening 26 in the crosstie and between the elements 21 and 22 and thus locks the member 20 in position so as to prevent unauthorized removal of the latter. It will be noted that the member 20 is locked in position as effectively as the member 5 in the preferred form of the invention, that upward movement of the rail base serves to increase the tension of the spring clip on the rail base and that the member 20 cannot be removed without first removing the spring clip or at least withdrawing the end 25 thereof from its position between the elements 21 and 22.

In those forms of the invention shown in Figs. 10 to 16 inclusive, the structure is simplified to the extent that the rail retaining members are not formed as separate or independent parts, as in Figs. 1 to 9 inclusive, but are formed integrally with the crosstie.

In Fig. 10, the metal of the flange 2 of the crosstie is deformed by special dies to provide integral rail-retaining or engaging members or ribs 30. These ribs extend for a short distance alongside the rail base and terminate in side guards 31 for the spring clips. The metal is so deformed as to leave an opening 32 through which the rebent portion 33 of the spring clip 34 extends, the flange 2 of the crosstie being further provided with a socket or recess 35 to receive the hook-like end 36 of the spring clip. The rebent portion 33 of the spring clip is of reduced width so as to provide shoulders 37, which cooperate with the hook-like end 36 of the clip to lock the clip in position. It will be noted that the spring clip is fulcrumed directly on the flange 2 of the crosstie and that vertical movement of the rail base tends only to lock the spring clip more securely in position.

In Figs. 11 and 12, the construction is substantially the same as in Fig. 10, with the exception of the spring clip and rail cushioning device. In this case, the spring clip 40 is provided at the intersection of its main and rebent portions with a hump 41 which cooperates with the hook-like end 42 of the clip to lock the latter in operative position. The wedge-shaped rail cushioning device, in this case, comprises a plate 43 which is bent into the form of an arch, the height of which increases from the inner edge of the rail base to the outer edge thereof. The plate 43 is also provided with downwardly extending flanges 44 which prevent movement of the plate longitudinally of the rail.

In Figs. 13 and 14, the metal of the upper flange 2 of the crosstie is slit at suitable points and is pressed or stretched upwardly into a rail retaining member in the form of a loop 50, the sides 51 of which form side guards for a spring clip 52. The transverse portion of the loop 50 is provided in its lower surface with a recess 53 forming a seat adapted to receive the hook-like end 54 of the rebent portion 55 of the spring clip. The spring clip is fulcrumed on the flange 2 of the crosstie and it will be noted that any upward movement of the rail base tends to more effectively hold the spring clip in its operative position. The wedge-shaped rail-cushioning device employed is in the form of a plate 56 provided with corrugations which extend longitudinally of the rail and increase in depth from the inner edge of the rail base to the outer edge thereof, the plate terminating at its outer edge in a rebent flange 57 having a curved portion 58 which is interposed between the outer edge of the rail base and the loop 50. This flange takes the wear occasioned by the "breathing" of the rail, transferring the wear from the loop 50 which is an integral part of the crosstie and is therefore not readily replaceable to the cushioning device which is inexpensive and may be quickly and easily replaced.

In that form of the invention shown in Figs. 15 and 16, the metal of the upper flange of the crosstie is slit at suitable points, the slitted portion being pressed or stretched into the form of a

loop 60, the lower surface 61 of the transverse portion of which is inclined to form a bearing or fulcrum for the correspondingly inclined portion of the spring clip 62. This spring clip is provided with a rebent portion 63 terminating in a tenon 64 which extends downwardly into an opening 65 in the upper flange of the crosstie. This tenon prevents movement of the spring clip away from the rail, while a protrusion 66, formed by pressing the metal of the spring clip upwardly, serves as a stop to limit the movement of the spring clip towards the rail, the tenon 64 and stop 66 cooperating to lock the spring clip against movement normal to the rail and the side walls of the loop 60 preventing movement of the spring clip longitudinally of the rail.

In that form of the invention shown in Figs. 17 and 18, the rail is supported on a tie-plate 70 which in turn is removably secured to the flange 2 of the crosstie as by means of spring clips 71. The metal of the tie plate is deformed to provide integral rail-retaining or engaging members or ribs 72, which extend for a short distance alongside the rail base and terminate in side guards 73 for the spring clips. The metal is so deformed as to leave an opening 74 through which the rebent portion 75 of the spring clip 76 extends, the tie-plate being further provided with a socket or recess 77 to receive the hook-like end 78 of the spring clip. The spring clip 76 is similar to the spring clip 34 and is secured to the tie plate in the same manner in which the clip 34 is secured to the crosstie.

In that form of construction shown in Fig. 19, the construction is similar to that shown in Figs. 17 and 18, with the exception that the walls 80 adjacent the sides of the opening 74 do not extend above the upper surface of the rib 72 as in Fig. 18, and the tie plate 70 is secured to a wooden crosstie 81 as by means of screw bolts 82 instead of to a steel crosstie.

Where the rail is supported on a tie plate, as in Figs. 17, 18 and 19, the tie plate is preferably provided in its upper surface with a seat or recess 83 extending longitudinally of the rail and adapted to receive a rail-cushioning device. This rail-cushioning device may be in the form of a single corrugated strip 84 of spring steel, as shown in Fig. 20, which is provided at its ends with downwardly extending flanges 85 embracing the sides of the tie plate so as to prevent longitudinal displacement of the strip. To facilitate replacement of the cushioning device in case of breakage, it is preferred to employ the device shown in Figs. 17 and 18, consisting of two corrugated strips 86 having interlocking ends 87, and which may be inserted in position by merely pushing the strips endwise into the recess 83. In place of a corrugated metal strip, a cushioning device such as shown in Fig. 21 may be employed, which comprises metallic strips 90 and 91 between which is interposed a layer 92 of rubber or other resilient material.

It will be understood that the rail-cushioning devices shown in Figs. 17 to 21 inclusive function in a manner similar to those of the previously described rail-cushioning devices to facilitate "breathing" of the rails.

Instead of using a steel crosstie of a conventional form, as shown in Fig. 2, steel crossties such as shown in Figs. 22 and 23 may be employed, in which the bottom flange 100 is arched to increase the cushioning effect of the crosstie, so as to more closely approach the cushioning effect of an ordinary wooden crosstie. Also, as shown in Fig. 23, the flat marginal portions 101 of the bottom flange of the crosstie may be provided at their ends with downwardly extending pointed members which are adapted to be embedded in the roadbed and assist in preventing lateral displacement of the crosstie.

It is thus seen that I have provided devices of the character described which, in some instances, may be used to replace existing equipment of similar character at a minimum cost, which can be readily manufactured by ordinary casting, rolling, punching, pressing and forging operations and with equipment now in use for manufacturing similar devices, which effectively serve the purposes for which they have been designed and which can be easily secured in position and removed without the aid of tools other than those usually employed for track-laying and maintenance purposes.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In combination, rail-supporting means, a rail mounted thereon, a rail-retaining member having a portion engaging the edge of the rail base, said portion having an opening extending therethrough, said opening being bounded on its upper portion by a convex surface, and a spring clip extending through said opening and having a surface facing said convex surface which is curved oppositely to that of said convex surface, said clip bearing at its ends on said rail supporting means and rail base respectively and intermediate its ends against said convex surface, said convex surface constituting a variable fulcrum for the clip.

2. In combination, a rail, a cross-tie for supporting said rail, a resilient rail cushioning device interposed between said cross-tie and rail, said cushioning device increasing in depth from the inner edge of the rail base flange to the outer edge thereof, and means securing said rail to said cross-tie.

3. In combination, rail supporting means, a rail mounted thereon, a rail-cushioning device interposed between said supporting device and rail, said cushioning device comprising a plate having corrugations extending transversely of the rail base flange and increasing in depth from the inner edge of said flange to the outer edge thereof, and means securing said rail to said supporting means.

4. In combination, rail supporting means, a rail mounted thereon, a rail-cushioning device interposed between said supporting means and the outer portion of the base flange of said rail, said cushioning device comprising metallic plates of a width considerably narrower than the width of the base flange of said rail and having a layer of resilient material interposed therebetween, and means securing said rail to said supporting means.

5. In combination, rail supporting means, a rail mounted thereon, a rail-cushioning device interposed between said supporting means and rail, said cushioning device comprising a plate having corrugations extending parallel with the rail and increasing in depth from the inner edge of the base flange of the rail to the outer edge

thereof, and means securing said rail to said supporting means.

6. A rail cushioning device comprising a corrugated plate, the corrugations increasing in depth from one edge of said plate to the opposite edge thereof.

7. In combination, a rail, rail-supporting means, means interposed between said rail and supporting means for resiliently cushioning said rail, said last-named means cushioning the outer portion of the rail to an extent greater than the inner portion thereof, and means for resiliently maintaining said rail in engagement with said cushioning means.

8. In combination, a rail, rail-supporting means, means underlying said rail for resiliently cushioning the same, said last-named means cushioning the outer portion of the rail to a degree greater than the inner portion thereof, and a spring clip resiliently retaining said rail in engagement with said cushioning means.

9. In combination, a cross-tie, spaced rails mounted on said cross-tie, said rails being normally inclined inwardly but movable to a vertical position in response to movement of rolling stock thereover, means underlying said rails for resiliently cushioning the same during such movement of rolling stock, and spring clips bearing upon the outer portions of the rail base flanges for limiting the inward inclination of the rails, said clips bearing on said flanges throughout said movement of the rails.

10. In combination, a cross-tie, spaced rails mounted on said cross-tie, said rails being normally inclined inwardly but movable to a vertical position in response to movement of rolling stock thereover, means underlying said rails for resiliently cushioning the same during such movement of rolling stock, said means cushioning the outboard portion of the rails to a degree greater than they cushion the inboard portions of the rails, and spring clips bearing upon the outboard portions of the rail base flanges for limiting the inward inclination of the rails.

11. In combination, rail supporting means, a rail mounted thereon, a resilient wedge-shaped rail cushioning device interposed between said supporting means and rail, said device having its edge of maximum depth disposed adjacent the outboard portion of the rail, whereby to provide a variable cushioning effect transversely of said rail, and means securing said rail to said supporting means.

12. Rail cushioning means comprising a resilient wedge-shaped device adapted to be disposed beneath a rail with its edge of maximum depth adjacent the outboard portion of the rail, whereby to provide a variable cushioning effect transversely of said rail.

13. In combination, rail supporting means, a rail mounted thereon, a resilient variably compressible rail-cushioning device interposed between said supporting means and rail, said device having its edge of maximum compressibility disposed adjacent the outboard portion of the rail, whereby to provide a variable cushioning effect transversely of said rail, and means securing said rail to said supporting means.

14. Rail cushioning means comprising a resilient variably compressible device adapted to be disposed beneath a rail with its edge of maximum compressibility adjacent the outboard portion of the rail, whereby to provide a variable cushioning effect transversely of said rail.

15. In combination, a rail having a base, a rail support, a resilient device interposed between said base and support, said device adapted to yield to a greater degree at one side of said base than at the opposite side thereof, and means securing said rail to said support.

16. In combination, a railroad track comprising rails and supports therefor, said rails comprising heads, webs and base flanges, resilient means cooperating with said base flanges and said supports to cushion one edge of each of said flanges to a greater extent than the opposite edges thereof during the movement of trains over said track, and means securing said rails to said supports.

17. In combination, a rail, a rail support, a thinly tapered resilient device interposed between said rail and said support, said device being arranged to flex to a greater degree at one side of said rail than at the opposite side thereof, and means securing said rail to said support.

18. In combination, rail supporting means, a rail mounted thereon having a base flange comprising inboard and outboard portions, yielding means interposed between said supporting means and outboard portion of said base flange, whereby to permit movement of said portion of the flange relatively to said supporting means during passage of a train over said rail, and means for maintaining the inboard edge of said inboard portion of the flange relatively stationary with respect to said supporting means during such passage of a train.

19. In combination, a railroad track comprising rail supports, rails mounted thereon having base flanges comprising inboard and outboard portions, said supports being adapted to permit said rails to rock slightly about the inboard edges of said flanges during passage of a train over said track, means interposed between said supports and the outboard portions of said flanges for cushioning said rocking movement of said rails, and means securing said rails to said supports.

20. In combination, a rail support, a rail mounted thereon comprising a central web and inboard and outboard base flanges extending from opposite sides of said web, means cooperating with said support to secure the edge of said inboard flange against movement with respect to said support and means interposed between said support and outboard flange to provide a cushion therebetween.

21. In a railroad track, the combination with rail supports of T rails, said rails being tiltable on said supports about the inboard edges of the bases of said rails, resilient devices interposed between said supports and the outboard portions of said rail bases adapted to cushion said last-named portions of the rail bases during passage of trains over said track, and means securing said rails to said supports.

22. In a railroad track, the combination with rail supports of T rails mounted on said supports and comprising heads, webs and base flanges extending transversely of said webs, said base flanges having inboard edges maintained relatively stationary with respect to said supports, and outboard portions movable vertically towards said supports in response to passage of a train over said track, compressible devices interposed between said supports and said outboard portions of said flanges retarding said vertical movement, and means securing said rails to said supports.

23. In a railroad track, the combination of rail supports, rails mounted thereon and provided with base flanges, said flanges having inboard edges fixed relatively to said supports and outboard portions adapted to move through vertical arcs towards said supports during passage of a train over said track, and means coacting between said supports and said outboard portions of said flanges to limit and cushion said vertical movement.

24. In a railroad track, the combination of rail supports, rails having base flanges mounted on said supports, the inboard portions of said flanges coacting with said supports to provide a hinge joint about which the outboard portions of said flanges may rotate, elastic means interposed between said supports and said outboard portions of the base flanges to cushion said rotary movement, and means securing said rails to said supports.

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