Aug. 8, 1939. J. A. McGREW 2,168,676

RAILROAD TRACK CONSTRUCTION

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Fig. 2

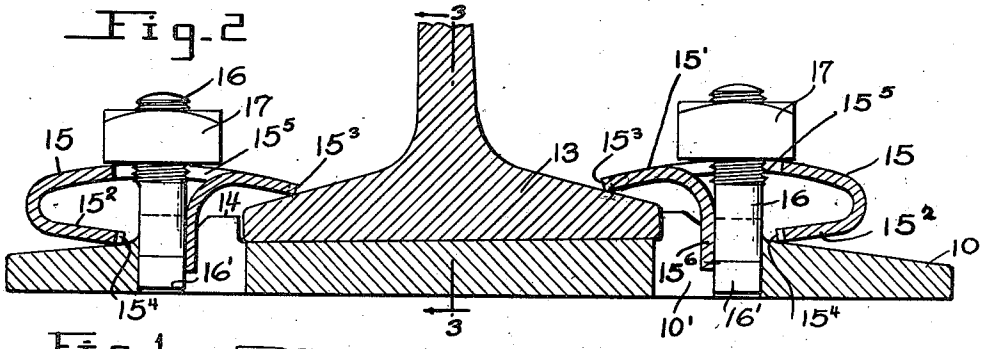


Fig. 1

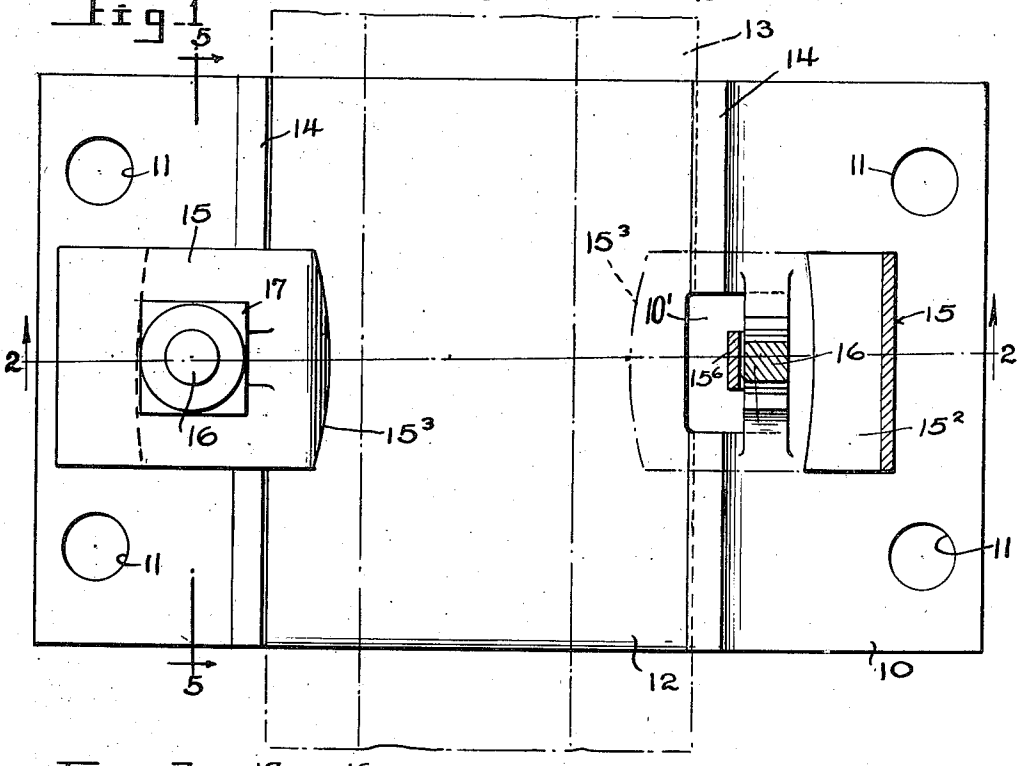
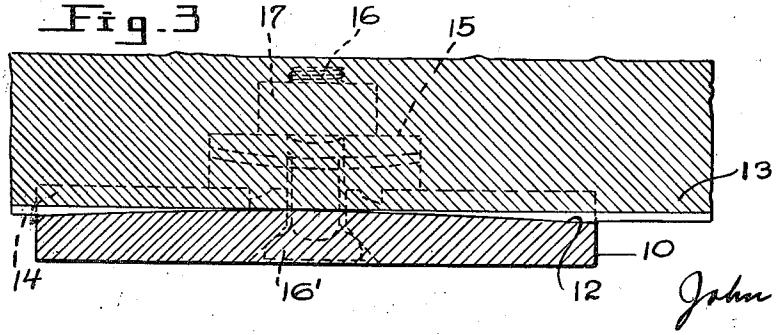


Fig. 3



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RAILROAD TRACK CONSTRUCTION

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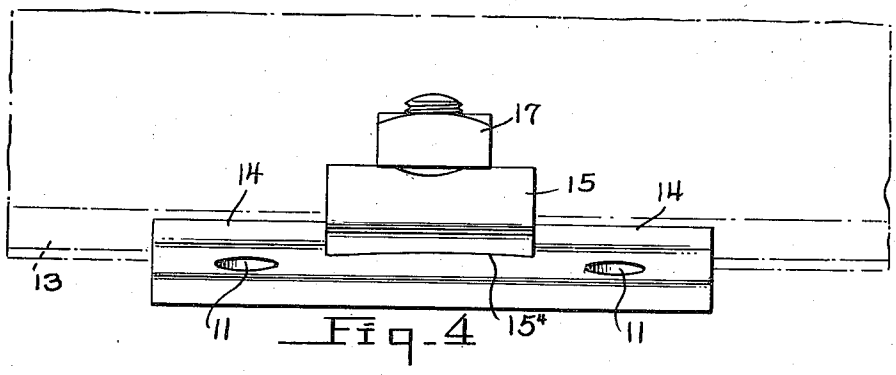


Fig. 4

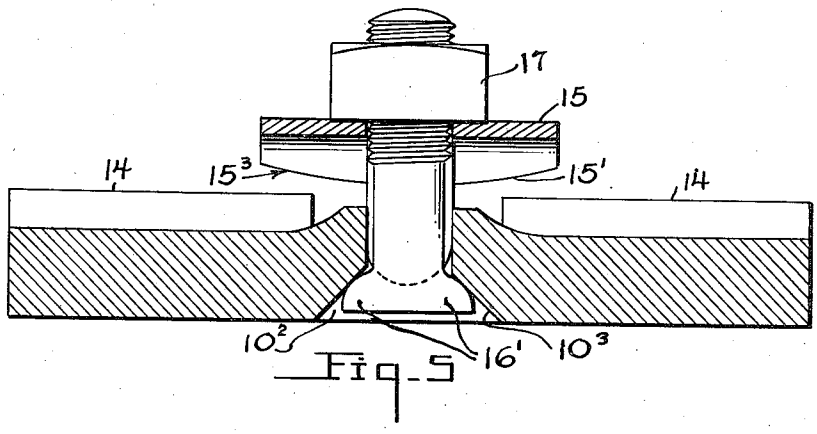


Fig. 5

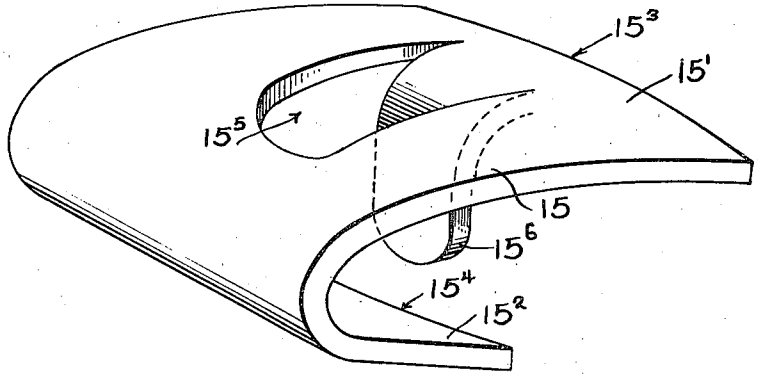


Fig. 6

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RAILROAD TRACK CONSTRUCTION

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Fig. 8

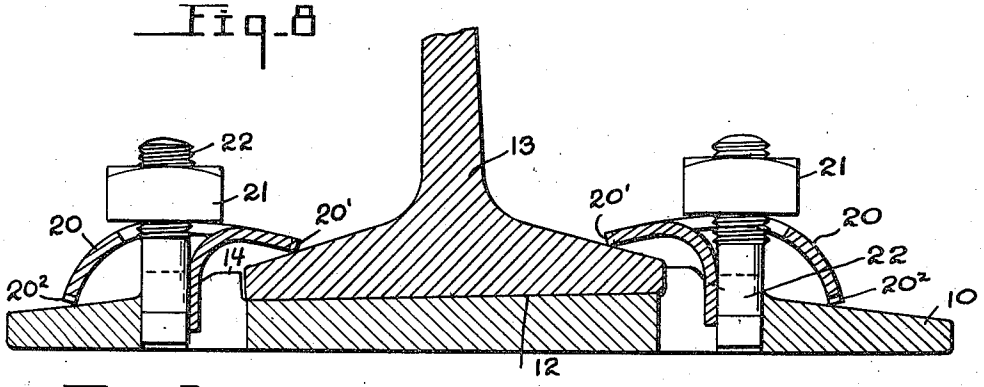


Fig. 7

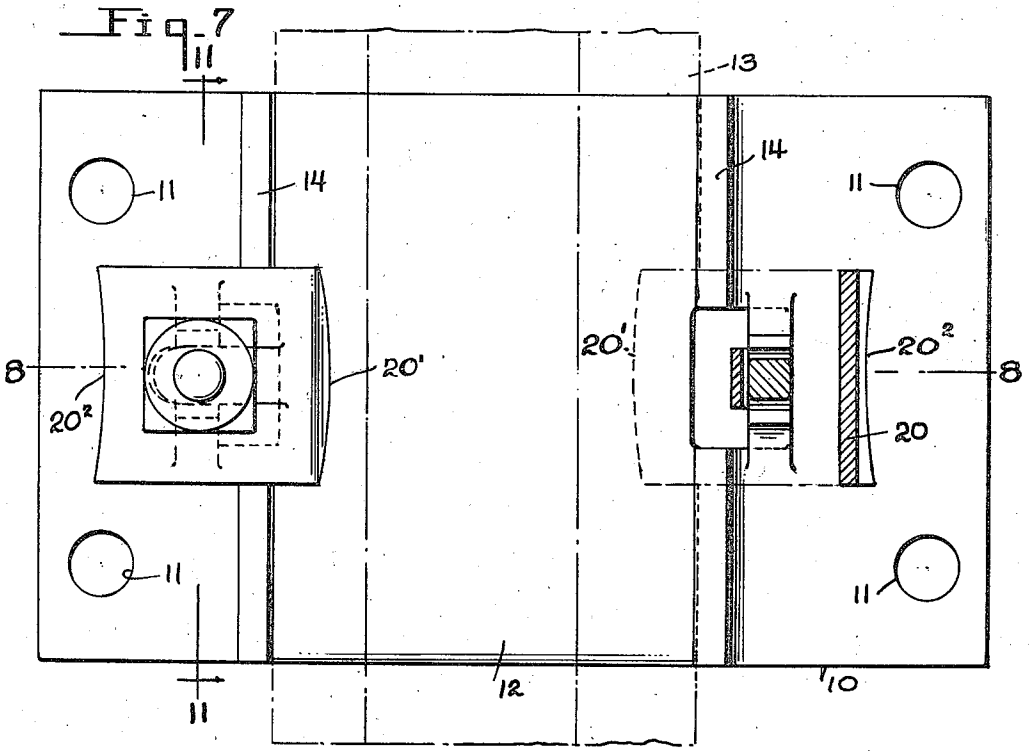
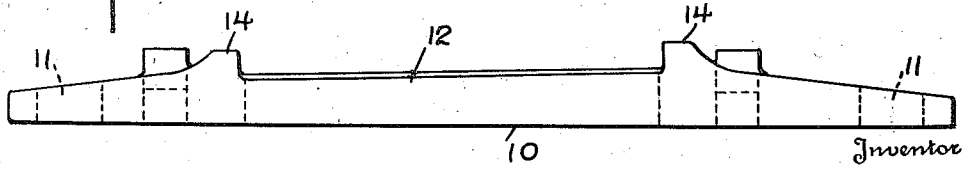


Fig. 9



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RAILROAD TRACK CONSTRUCTION

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Fig. 10

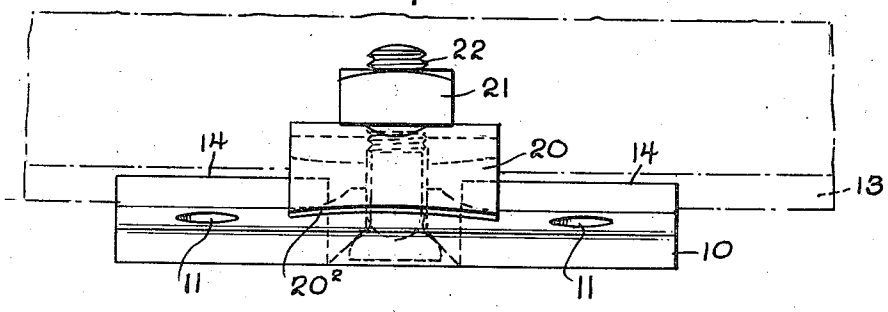


Fig. 11

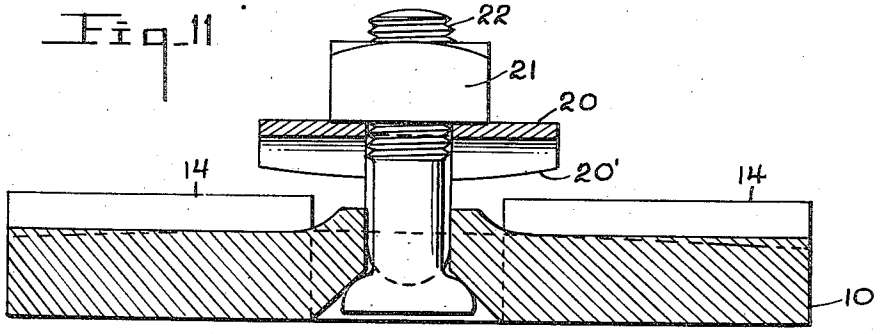
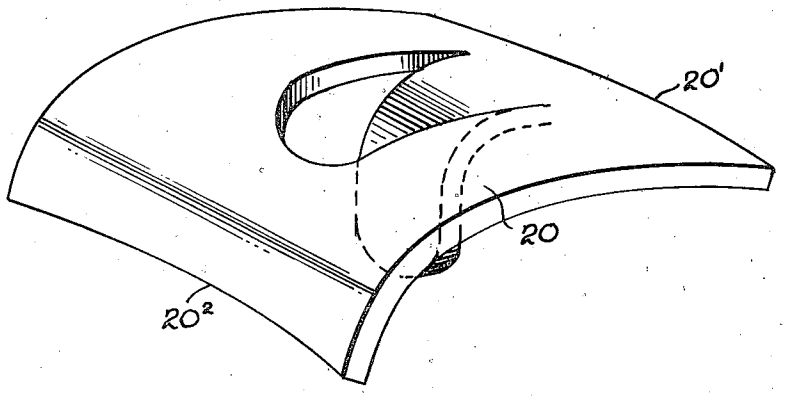


Fig. 12



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UNITED STATES PATENT OFFICE

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RAILROAD TRACK CONSTRUCTION

John A. McGrew, Albany, N. Y.

Application August 5, 1937, Serial No. 157,623

13 Claims. (Cl. 238—349)

This invention relates to railway track constructions and more particularly to the means employed for supporting rails upon and securing them to cross ties.

Many suggestions have heretofore been advanced for the improvement of railway track constructions by the provision of devices of various types for mounting and securing the customary rails permanently in position upon the usual cross ties of the roadbed, for the most part such devices having been designed and intended to so positively secure the rail base to the tie or like supporting element that relative movement between the rail and tie is substantially prevented, the rail engaging elements of the securing devices comprising rigid members attached in turn to an associated tie plate or other rail support by non-resilient means. It has heretofore been proposed, however, that resilient means might advantageously be employed for effecting the attachment of the rail to its underlying support and certain attachment devices embodying resilient rail engaging clips have been demonstrated to be generally satisfactory in actual use. The rail attachment means embodying a resilient clip has the advantage of permitting wave action of the rail under rolling wheel loads to freely occur without causing tilting or rocking of the ties which, particularly where traffic is heavy, has been found to be quite injurious to tie and roadbed.

One form of such resilient rail fastening means heretofore used with success comprises a resilient clip or spring lever disposed transversely of the longitudinal axis of the rail and having its inner end resting on the upper surface of the rail flange and its outer end resting on the upper surface of the laterally projecting portion of the underlying tie plate. An attachment bolt located intermediate the ends of the spring clip or lever connects the clip positively to the tie plate. Preferably both rail securing devices used in connection with a single tie plate are of the resilient type and preferably also the rail seating surface of the tie plate is cambered in a direction longitudinally of the rail, the resilient rail engaging clips being positioned substantially in the transverse vertical plane of the peak or highest element of the longitudinally cambered rail seating surface.

In track constructions having rail securing devices of this kind, each short section of rail may rock slightly, or roll, upon the underlying rail seating surface when wave action occurs due to the passage over the rail of the wheels of locomotives and heavy cars, and it has been found that, despite this rocking movement of the rail upon the tie plate, the resilient securing devices quite adequately hold the rail in its proper position, not only preventing overturning, but also preventing creeping. Wear of the resilient clips due to repeated passage of trains is negligible, but even where some slight wear occurs, there is no loosening of the grip of the securing clip upon the rail base because of the resilience of the clip, and the rail base is firmly gripped or clamped at all times, an advantage not realized when rail attachment devices of non-resilient type are used, such devices tending to eventually become loose and to require constant adjustment and attention. Likewise, when resilient rail securing devices of the type described are made use of a very considerable wear and tear on the ties themselves is eliminated since no tie need follow the rail in its wave motion but may remain quiescent in its position in the ballast.

The present invention contemplates an improved fastener or securing device of the type just above generally described, embodying a resilient clip of novel form and construction and a clip securing or attachment bolt of novel form, the principal purpose of the invention being to provide a clip and bolt assembly of such nature that the possibilities of breakage thereof, even under the most severe conditions of operation, are eliminated. It will be apparent that in the usual case, and where a rail fastening device including a resilient clip is used, the clip itself will be subjected to certain twisting forces when in use, having one end resting upon the surface of a relatively stationary member, i. e., the tie plate and its other end resting upon and tightly engaging a rocking member, i. e., the rail base. While in many instances the movement of the rail base with reference to the tie plate is not sufficiently great to cause such distortion of the resilient clips as to bring about excessive internal strains and failures thereof, it nevertheless has been found that a certain amount of breakage of these clips results from the repeated strains set up therein due to repeated twistings under heavy traffic. This is particularly true where the resilient clip is formed of a flat metallic member of substantial width, one edge of which bears upon the rail base for a distance co-extensive with the width of the clip and the other end of which bears upon the tie plate for the same distance, a form of clip which has heretofore been found to be particularly useful in actual practice. Likewise, strains due to twisting have been set up in the clips heretofore employed because of the use of

attachment bolts so secured to the tie plates as to be immovable when once installed, the bolt itself opposing the minor movements of the clip when wave action of the rail occurs and hence further increasing the stresses set up in the clip. Again, in the case of the rail securing means embodying a resilient clip which has heretofore been found most successful in use, the flat metallic clip has been centrally apertured, the securing bolt passed through this aperture, and an adjustable nut placed upon the upper end of the bolt, the lower surface of which rests upon and bears against the upper surface of the clip, the lower surface of the securing nut being in contact with the upper surface of the clip over a considerable area. The securing nut has therefore tended to also oppose the minor twisting movements of the clips and to further magnify the strains set up therein in service and which tend to produce breakage.

In accordance with the present invention a railway track construction is provided embodying resilient clips and attachment bolts of the type heretofore found most generally successful in use, the clips comprising relatively wide metallic spring members, but the structure of both clip and bolt is so modified that the possibility of clip breakage due to distortion is eliminated. The clip itself is so designed that that end thereof which normally contacts with the upper surface of the rail flange is shaped to contact with that surface at one point only, or at most for a very short distance only, this point of contact being in a vertical plane transverse to the rail and through the axis of the securing bolt, this plane also including the peak or uppermost element of the cambered rail seating surface of the tie plate. Hence wave action, or rocking motion of the rail on the tie plate, is not communicated to the tie plate, at least to any appreciable degree, while at the same time the metal of the clip is not subjected to the strains due to twisting as heretofore observed. Preferably, although not necessarily, that end of the metallic clip which rests upon the tie plate at a point remote from the rail base is so formed that its corners only engage this surface, a clip thus formed having thus three points of contact, two points of contact with the tie plate and a single point of contact with the base of the rail.

Furthermore, the clip is upwardly arched from end to end, its highest point, when assembled in a track structure, being substantially at the point where it is apertured for the passage of the track securing bolt. Hence the clip securing nut on the upper end of the bolt, which nut will have the customary flat lower surface, will make only line contact with the upper surface of the clip instead of bearing against the clip over a substantial area of the surface of the clip, thus offering no resistance to any deformation of the clip in a longitudinal vertical plane, and further reducing the possibility of overstrain. Again, the enlarged heads of the clip securing bolts, which heads are adapted to engage spaced, downwardly diverging, flat surfaces in the tie plate, are cylindrically curved so that the opposed curved surfaces of the head of the bolt make line contact only with such surfaces. This permits the bolt to rock in a plane parallel to the vertical plane of the rail axis to a slight extent and thus facilitates self-adjustment of the attachment device. It has heretofore been customary to so form the head of the attachment bolt and the undercut recess of the tie plate into which this head is received that rocking movement of the bolt relatively to the tie plate has not been possible, thus increasing the likelihood that injurious strains in the clip may be set up, by resistance of the bolt to movement of the clip, as has been previously pointed out.

The clip of the present invention likewise is so designed that it may be manufactured with great economy and assembled with ease in a track construction. It furthermore is so formed as to cooperate in a novel manner with the rail and tie plate in securing the attachment bolt in its normal position so that accidental dislodgment of the bolt is not possible. The greater the tension in the clip, the more firmly it presses the attachment bolt into normal position. The bolt engaging portion of the clip likewise locks the clip itself against movement outwardly of the rail and in fact the several elements of the attachment device are so designed that failure of the clip is impossible except in the very rare instance of defective material. Other advantages of the invention will be apparent to one skilled in the art.

In the accompanying drawings two forms of the invention are disclosed by way of example, these embodiments being similar in all respects except for the formation of the resilient securing clip, the first form of the invention being illustrated in Figures 1 to 6 and the second form in Figures 7 to 12.

Figure 1 shows in plan a single tie plate comprising one element of the track construction, the superposed rail being indicated in chain lines and the securing clips and attachment bolts shown, one clip and its associated bolt being shown in plan and the other in horizontal section;

Figure 2 is a section on line 2—2 of Figure 1;

Figure 3 is a section on line 3—3 of Figure 2;

Figure 4 is a side elevation of the structure shown in Figure 2;

Figure 5 is a section on line 5—5 of Figure 1;

Figure 6 is a perspective view of the resilient clip;

Figure 7 is a plan view of a tie plate similar to that shown in Figure 1, the attachment clips illustrated, however, being of modified form;

Figure 8 is a section on line 8—8 of Figure 7;

Figure 9 is an edge view of the tie plate;

Figure 10 is a side elevation of the structure shown in Figure 8;

Figure 11 is a section along the line 11—11 of Figure 7; and

Figure 12 is a perspective view of the modified form of a resilient clip.

It will be understood that those elements of the railway track construction which are not illustrated may be of conventional form and for that reason need not be specifically described. The ties made use of are generally of wood, but the invention contemplates the use of concrete or metallic ties, the ties being either seated in the usual crushed rock or conventional ballast or rigidly supported, as when mounted on bridges.

The tie plate 10 is provided with a plurality of apertures 11 for the reception of devices by means of which it may be secured to a tie, these devices being preferably screw bolts where wooden ties are used so that the plate is firmly attached in position. Centrally of the tie plate is a rail base receiving portion, indicated at 12, upon which the base of the rail 13 rests, the rail base receiving surface of the tie plate being substantially coextensive in width with the base of the rail, ribs 14, or equivalent integral portions of the tie plate laterally defining the limits of the rail receiving

surface. This surface 12 is upwardly arched or cambered in a direction longitudinally of the rail, as indicated in Figure 3 (where the degree of curvature is somewhat exaggerated), so that the rail may rock or roll slightly on its seating surface when it flexes vertically due to the passage thereover of heavy wheel loads. The peak of the cambered surface is midway of the seating surface 12 and the rail attachment devices are positioned in the transverse vertical plane which includes the peak or uppermost element of the cambered surface. Preferably these attachment devices are identical, although it is not necessary that this be so. One only will be described.

The resilient clip is indicated at 15 and the attachment bolt at 16, the clip extending horizontally and the bolt vertically. The clip is preferably formed from a flat member of sheet or strip steel by stamping and bending operations of simple nature. When completed it is generally U-shaped, as shown, with a relatively long upper arm 15', which is upwardly arched from end to end, and a relatively short lower arm 15^2, which may be straight. It will be understood that the clip is being described as it appears when operatively positioned in a track structure. The free end of the upper arm 15' of the clip is convexly curved as shown at 15^3 and the free end 15^4 of the lower arm is convexly curved, the free end of the upper arm therefore contacting with the flat inclined upper surface of the rail base at one point, or at most for a short distance only, and the free end of the lower arm contacting with the flat upper surface of the tie plate at spaced points, i. e., at its corners. The clip therefore has only one point of contact with the rail and this point of contact is in the transverse vertical plane which includes the highest or peak element of the longitudinally curved or cambered surface of the rail seating surface 12, the downward pressure of the clip therefore being applied in such manner that the rail bottom is strongly forced against the highest point of the seating surface when the rail is in its normal position. When the rail flexes under moving wheel loads its line of contact with the seating surface will change but, even though the rocking or rolling movement of the rail on the tie plate may be quite extensive, no twisting of the clip will result owing to the fact that the clip contacts with the rail at one point or at most only for a very short distance. While it is preferred that the free end of the shorter arm 15^2 of the clip contact with the tie plate at two spaced points only, thus giving the clip a three point contact with rail and tie plate, this is not essential, and the end of the arm may, if desired, make line contact with the surface of the tie plate.

The upper arm 15' of the clip has an aperture 15^5 formed therein for the reception of the attachment bolt 16. This aperture is located at the highest point of the arch of the clip. The metal removed in the formation of the aperture is not completely severed but remains connected to the arm 15' as shown, and is so directed that it comprises a downwardly projecting tongue 15^6. The securing bolt 16 has a threaded upper end and an enlarged or headed lower end which is retained within a suitably shaped recess formed in the tie plate. This recess has a portion 10' rectangular in plan, into which the enlarged bolt head may be freely lowered, and a communicating slot 10^2 into which the bolt head may be laterally moved so that the oppositely extending wings or projections 16' of the bolt head underlie, respectively, the flat upwardly converging walls 10^3 of the tie plate. The upper surfaces of the projections 16' of the bolt head are, respectively, cylindrically curved about parallel axes, which axes are, when the bolt is positioned as shown, disposed normally to a vertical plane through the rail axis so that each of these projections has contact with the inclined surface above it along a line normal to this plane. Hence, during assembly of the bolt and clip the bolt may automatically position itself so as to be subjected to tension only and at no time thereafter will it positively oppose small movements of the clip longitudinally of the rail, if such movements occur. Therefore the bolt cannot itself cause the clip to be strained in any way during use, as has sometimes occurred in prior devices of similar nature in which the attachment bolt, by reason of the nature of its connection to the tie plate, has been immovable in a plane parallel to the rail axis.

The clip securing nut 17 has a flat lower surface which bears upon the upper surface of the clip. Because the upper arm 15' of the clip is upwardly arched from end to end, however, the nut 17 has only line contact therewith, the line of contact (interrupted centrally by the aperture 15^5) being parallel to the rail axis and passing through the center of the bolt. The tongue 15^6 of the clip is so located that, after assembly of the bolt and clip in operative position, and tightening of the nut 17 to cause the end of the clip to bear upon the rail base with the desired pressure, the tongue presses against the bolt 16 to hold it securely in position. The bolt, by reason of the fact that it cannot move outwardly or away from the rail, comprises a stop for the clip, preventing the clip from moving away from the rail, no matter how heavily stressed. The free end of the tongue 15^6 projects downwardly into the recess formed in the tie plate and its lower extremity is horizontally opposed to the vertical outer end wall of the slot within which the bolt head is located, so that the force exerted on the bolt by the clip does not tend to overturn the bolt.

By reason of the fact that the clip has one point contact with the rail base, the securing nut line contact with the clip, and the bolt may move or rock in a plane parallel to the rail axis, assembly of the attachment unit may be quickly accomplished without danger of setting up in the clip stresses which tend to twist the clip. Furthermore, during service the clip cannot be twisted or strained notwithstanding substantial rocking movements of the rail base on its seating surface.

The clip or spring lever 20 shown in Figures 7, 8, 10, 11 and 12 is of modified form but will function in the same manner as that just described. By reason of the fact that it is not U-shaped in vertical section, having no lower arm, it is somewhat stiffer and less resilient than that shown in Figures 1 to 6. Its inner end 20', however, makes point contact with the rail base, or contacts therewith for a very short distance only, the securing nut 21 makes line contact with the upwardly arched surface thereof, and the bolt 22 is of the self-aligning type previously described, the tie plate being identical with the tie plate 10 shown in the figures of the drawings first described. By preference the outer end 20^2 of the clip contacts with the tie plate at two spaced points only, although, as in the case of the form of clip first described, this is not essential. This form of clip is somewhat less expensive to fabri-

cate than that first described and, in certain types of track constructions, may be preferred. It is clear that the clip, bolt and tie plate may be changed or modified in minor respects without departure from the teachings of the invention.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A railroad track construction comprising in combination, a tie plate having a cambered rail engaging and supporting portion and portions extending laterally therefrom, a rail having its base resting upon the rail supporting portion of the tie plate, and a spring clip attached to one of the laterally extending portions of the tie plate at substantially the transverse center line thereof and extending over the rail base and at substantially right angles therewith, the end of the clip having a relatively sharp edge contacting with the rail base at substantially a single point above the peak of the camber on the tie plate.

2. A railroad track construction comprising the combination with a rail to be supported of a tie plate underlying the base of the rail and having a surface cambered longitudinally of the rail upon which the rail rests, and upon which surface the rail may rock when it flexes vertically under moving wheel loads, and a spring clip attached to the tie plate and having an end overlying the rail base, said clip having a relatively sharp edge contacting with the rail base at substantially a single point, which point is directly above the line of contact of the rail and tie plate when the rail is in its normal unflexed condition.

3. A railroad track construction comprising in combination, a rail, a longitudinally cambered tie plate underlying the rail and projecting laterally therefrom, an upwardly arched spring clip having one end engaging the upper surface of the rail base above the peak of the camber on the tie plate and the other end engaging the upper surface of the tie plate, the center line of the clip being at right angles to that of the rail, said clip having a central aperture therein at its highest point, a securing bolt projecting through said aperture and having its lower end attached to the tie plate, a nut on said bolt above the clip, said nut having line contact with the upper surface of the clip when adjusted to tension the clip.

4. A railroad track construction comprising a tie plate having a longitudinally cambered rail seating surface and portions projecting laterally thereof, a resilient clip engaging the upper surface of the rail base at one point adjacent the peak of the camber of said tie plate and engaging the tie plate at two points spaced apart, and means for maintaining the clip in contact with the tie plate and rail base respectively.

5, A railroad track construction comprising a tie plate having a cambered rail seating surface and a portion projecting laterally of such surface, a rail seated on said surface, and rail flange clamping means including a bolt and arched resilient clip, one end of the clip having a relatively sharp edge affording substantially point contact with the rail flange above the peak of the camber on the tie plate and the bolt having a nut thereon which makes line contact with the clip.

6. The combination with a rail and a longitudinally cambered tie plate of rail securing means comprising a vertically disposed bolt and a resilient clip, the bolt being connected to the tie plate and at least one of the contacting surfaces of the bolt and tie plate being curved to provide for swinging movement in a plane parallel to the rail axis and the clip being engaged by the bolt head and having one point contact with the rail in a plane including the axis of the bolt and the peak of the camber, and normal to the rail axis.

7. As an article of manufacture, a clip of resilient metal, generally U-shaped, and having a relatively long arm and a relatively short arm, said long arm being apertured for the reception of a bolt, the ends of both of said arms being arcuately formed for providing limited points of contact between the clip and the rail base and tie plate surfaces.

8. A railroad track construction comprising the combination with a rail to be supported of a tie plate underlying the base of the rail and having a longitudinally cambered rail supporting surface upon which the rail may rock slightly as it flexes under moving wheels loads, and other portions extending laterally from said tie plate upon each side of the rail, a resilient clip having relatively acute edge portions thereon providing three point contact with the rail base and the tie plate, two of such points being spaced apart on the tie plate in the direction longitudinally of the rail, and the third being on the rail base at a point intermediate the other two as considered in the same direction and above the peak of the camber on the tie plate, and means for applying the clip with clamping pressure to the rail and tie plate.

9. A railroad track construction comprising the combination with a rail to be supported of a tie plate underlying the base of the rail and having a longitudinally cambered rail supporting surface upon which the rail may rock slightly as it flexes under moving wheel loads, and other portions extending laterally from said tie plate upon each side of the rail, a resilient clip being formed of a metal strip having arcuate forward and rear ends, the forward end being curved convexly toward the center line of the rail, the convex lower edge of said end being tangent to the surface of the rail base which it overlies and contacting therewith at substantially a single point and above the peak of the camber on the tie plate, the concave rear end of the clip forming relatively sharp corners at each side of the rear edge of the clip and bearing upon the extending portion of the tie plate with point contact at spaced points longitudinally of the rail, and means for applying clamping pressure to the clip.

10. A railroad track construction comprising the combination with a rail to be supported of a longitudinally cambered tie plate underlying the base of the rail and having a rail supporting surface upon which the rail may rock slightly as it flexes under moving wheel loads, and other portions extending laterally from said tie plate upon each side of the rail, a resilient clip having relatively acute edge portions thereon providing three point contact with the rail base and the tie plate, two of such points being spaced apart on the tie plate in the direction longitudinally of the rail, and the third being on the rail base at a point intermediate the other two as considered in the same direction and above the peak of the camber on the tie plate, and a bolt and nut assembly passing freely through the substantially central portion of said clip and serving to connect said clip with the tie plate, the bolt and nut assembly bearing on the top of the clip with line contact in a direction longitudinally of the rail.

11. A railroad track construction comprising the combination with a rail to be supported of a longitudinally cambered tie plate underlying

the base of the rail and having a rail supporting surface upon which the rail may rock slightly as it flexes under moving wheel loads, and other portions extending laterally from said tie plate upon each side of the rail, a resilient clip having relatively acute edge portions thereon providing three point contact with the rail base and the tie plate, two of such points being spaced apart on the tie plate in the direction longitudinally of the rail, and the third being on the rail base at a point intermediate the other two as considered in the same direction and above the peak of the camber on the tie plate, and a bolt and nut assembly passing freely through the substantially central portion of said clip and serving to connect said clip with the tie plate, the bolt and nut assembly bearing on the top of the clip with line contact in a direction longitudinally of the rail and bearing upwardly against a portion of the tie plate at two spaced points with line contact transversely of the rail, at least one of the cooperating surfaces of the bolt and nut assembly and the tie plate being curved to provide a self-centering connection at said point.

12. A railroad track construction comprising the combination with a rail to be supported of a longitudinally cambered tie plate underlying the base of the rail and having a rail supporting surface upon which the rail may rock slightly as it flexes under moving wheel loads, and other portions extending laterally from said tie plate upon each side of the rail, a resilient clip having relatively acute edge portions thereon providing three point contact with the rail base and the tie plate, two of such points being spaced apart on the tie plate in the direction longitudinally of the rail, and the third being on the rail base at a point intermediate the other two as considered in the same direction and above the peak of the camber on the tie plate, a bolt passing through an aperture in said clip and an aperture in said tie plate, said last named aperture having an enlarged portion adjacent the rail seat, and a tongue depending from said clip, entering said last named aperture and bearing outwardly against said bolt to prevent the latter being displaced laterally toward said rail into the enlarged portion of said aperture.

13. As an article of manufacture, a rail fastening clip of resilient plate metal, said clip being substantially rectangular in outline but having an outwardly or convexly arcuate end and an inwardly or concavely arcuate end, for providing points of limited contact with a rail base and tie plate, the midpoint of the convex end adapted to bear sharply on the rail base and the two spaced side points of the concave end adapted to bear sharply on the tie plate.

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