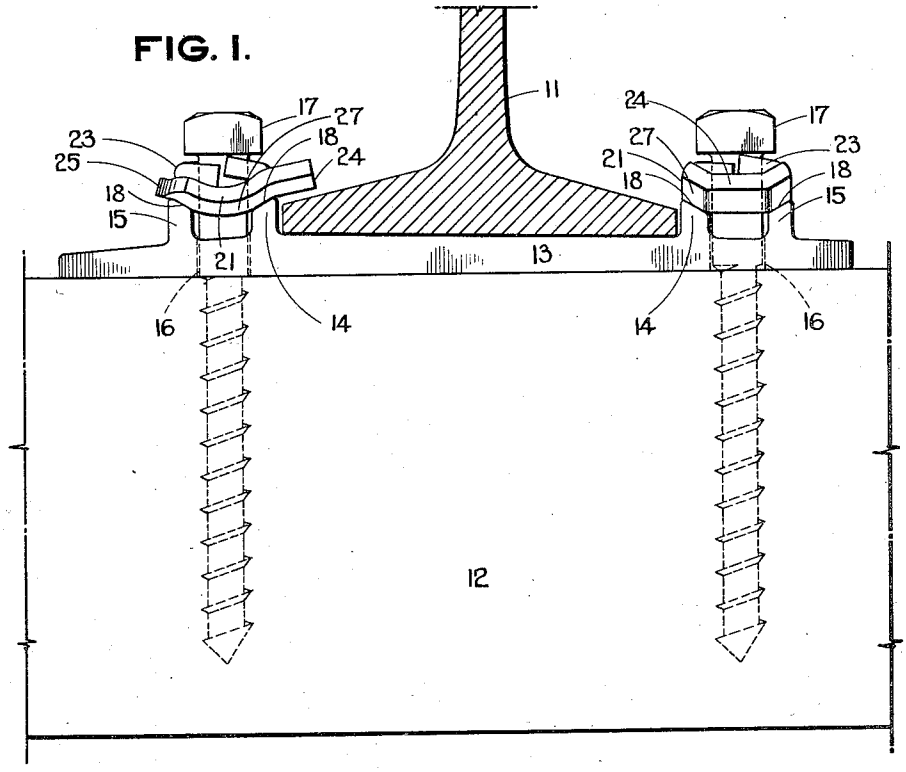
July 23, 1935. F. W. COOPER 2,008,946

RAILWAY RAIL MOVEMENT RESTRAINING MEANS

Filed Jan. 15, 1932 2 Sheets-Sheet 1

FIG. 1.



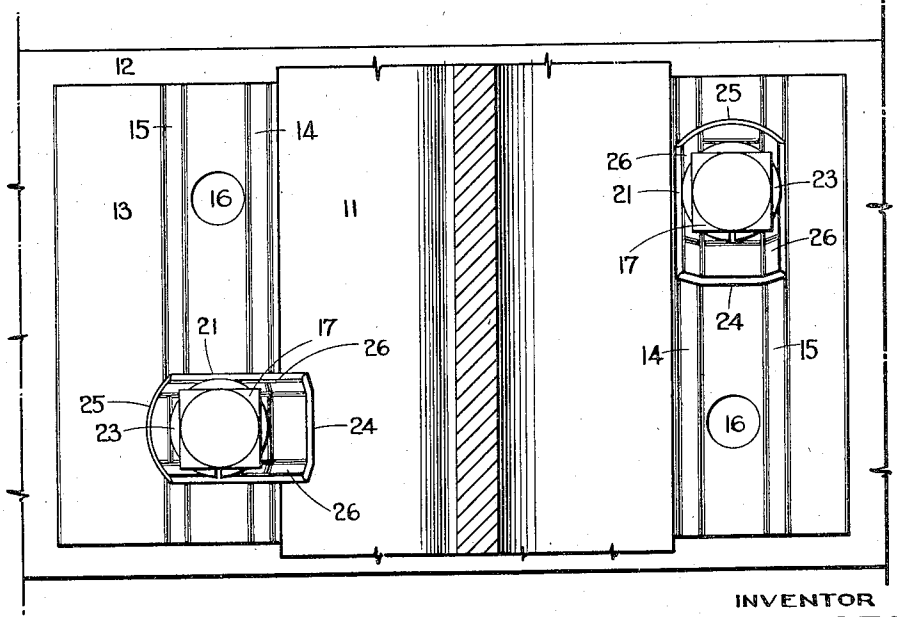




FIG. 2.

INVENTOR
F. W. COOPER.

ATTORNEY

July 23, 1935. F. W. COOPER 2,008,946

RAILWAY RAIL MOVEMENT RESTRAINING MEANS

Filed Jan. 15, 1932 2 Sheets-Sheet 2

FIG. 3.

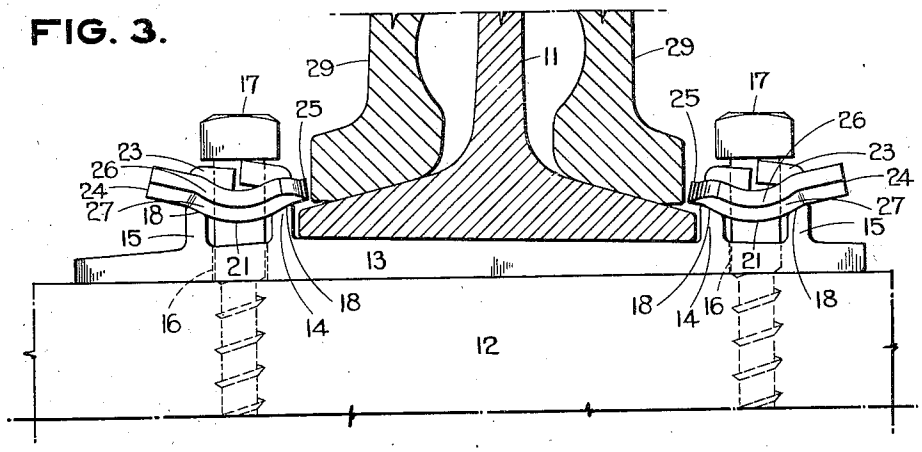
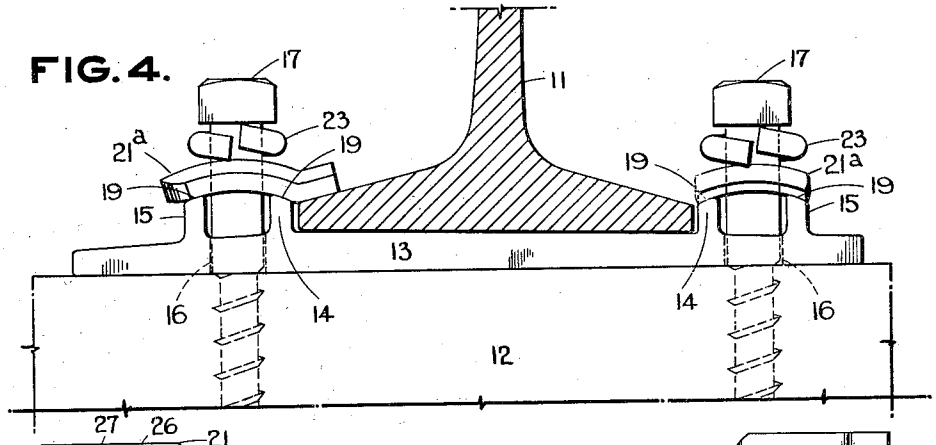



FIG. 4.



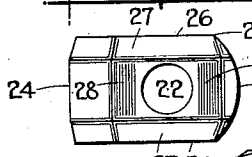




FIG. 6.

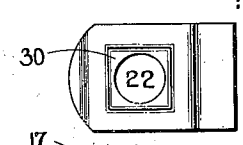



FIG. 7.




FIG. 5.

INVENTOR
F. W. COOPER.

ATTORNEY

Patented July 23, 1935 2,008,946

# UNITED STATES PATENT OFFICE

2,008,946

## RAILWAY RAIL MOVEMENT RESTRAINING MEANS

Francis W. Cooper, Montreal, Quebec, Canada

Application January 15, 1932, Serial No. 586,875

4 Claims. (Cl. 238—394)

This invention relates to improvements in means for restraining the movement of railway rails in one or more directions, and the primary object of the invention is to provide means connected to a railway tie or other structure underlying a rail and adapted to overlie the rail base to restrain upward movement of the rail relatively to said underlying means.

A further object is to provide means connected with a railway tie or other structure underlying a rail and adapted to press down upon the upper surface of the rail base, thereby to restrain both upward and longitudinal movement of the rail relatively to the underlying structure.

A still further object is to provide means connected to a railway tie or other structure adapted to underlie a rail, said means being releasably held to said underlying structure in either operative or inoperative position and adjustable from operative to inoperative position and vice versa without adjustment of the means securing it to the underlying structure, thereby to permit assembly of the tie and rail holding means prior to incorporation in a track and also to facilitate replacement of rails and ties in service.

Still another object is to provide resilient rail movement restraining means whereby the fastening members connecting same to a tie or other structure underlying the rail are protected against withdrawal due to wave motion of a rail, thereby to maintain unimpaired grip of the fastening members in a tie and to prolong the life of the tie.

An additional object is to provide rail movement restraining means capable of use at rail joints as well as in the length of rail between joints.

A further additional object is to provide a novel form of railway track construction.

Various other objects and the advantages of the invention may be ascertained from the following description and accompanying drawings.

The present invention comprises essentially in co-operative relation with a tie and means such as a tie plate secured to the tie and extending laterally of the rail, rotatable rail holding members secured to a tie plate or equivalent and adapted to be moved into and out of overlying relation with a rail base, thereby in one position to restrain upward movement of a rail or upward and longitudinal movement of a rail relatively to the tie and in the inoperative position to permit ready assembly or separation of rails and ties.

More particularly, the invention comprises broadly and specifically the features or elements hereinafter described, claimed and illustrated, together with mechanical or functional equivalents thereof, and all combinations thereof or of equivalents therefor productive of attainment of the objects herein set forth.

The invention is capable of a number of different embodiments of which certain are shown in the accompanying drawings, but it will be understood that the invention is in no way limited to the embodiments illustrated or to the particular details or combinations of details illustrated, but is capable of embodiments in other forms.

In the accompanying drawings;—

Fig. 1 is a side elevation of one embodiment of the invention showing the same in both operative and inoperative positions.

Fig. 2 is a plan view of the structure illustrated in Fig. 1.

Fig. 3 is a view similar to Fig. 1 illustrating use of the invention at a rail joint.

Figs. 4 and 5 are views similar to Fig. 1 illustrating further embodiments of the invention.

Fig. 6 is a bottom plan view of one of the rail holding members shown in Figures 1, 2 and 3.

Fig. 7 is a bottom plan view of one of the rail holding members shown in Figure 5.

Referring more particularly to the drawings, 11 designates a rail, 12 a tie and 13 a tie plate interposed between the tie and rail. The tie plate is provided with pairs of spaced parallel ribs 14 and 15 extending transversely of the plate, that is to say, in the direction of rail length. In each rib pair, the rib 15 is located between the adjacent rib 14 and the adjacent edge of the plate, so that the ribs 14 may be termed inner ribs and the ribs 15 outer ribs. The spacing of the ribs 14 is such that they will receive between them the base of the rail and will constitute abutments for the edges of the rail base in the well known manner and for the well known purpose. The spacing of the ribs 14 will vary according to the width of base of the rail with which the plate is intended to be used. While the ribs 14 and 15 are continuous across the width of the plate, it will be understood that this is immaterial and that either or both of the ribs may extend through less than the width of the plate if desired. The plate is provided with apertures 16 located between the ribs 14 and 15 and designed for the passage of fastening members such as the lag screws 17 illustrated.

In the embodiment shown in Figures 1 to 3, the upper surfaces 18 of adjacent ribs 14 and 15 incline relatively to the bottom surface of the plate, the inclination of each rib top being down-

ward and toward the adjacent rib. In the modification shown in Fig. 4, the upper surfaces 19 of the ribs incline oppositely to the upper surfaces of ribs in the previous modification. In the modification shown in Fig. 5, the upper surfaces 20 of the ribs are approximately parallel with the lower surface of the plate.

Referring now to the drawings in general and in particular to the embodiment illustrated in Figs. 1, 2, 3 and 6, dished rail holding members 21 rest convex side down upon the sloping tops of the ribs 14 and 15 and are each provided with an aperture 22 for passage of a headed pivot such as the fastening member 17 to pivotally mount the holding member. A resilient washer 23 is preferably interposed between the upper or concave surface of each rail holding member and the under side of the fastener head, so that when the fastening members are suitably positioned, the washers will be tensioned and will urge the holding members 21 downwardly into contact with the upper surfaces of the ribs 14 and 15. Each holding member is approximately rectangular and oblong in shape, as clearly shown in Fig. 6, and the aperture 22 is located somewhat further from one end 24 than it is from the other end 25. The holding member 22 is slightly trough-shaped from end to end, so as to provide wing portions 26, the lower surfaces 27 of which are in the same angular relation to one another as are the upper surfaces 18 of adjacent ribs 14 and 15. Each holding member is further bent between its ends, so as to provide lower surface portions 28 arranged on opposite sides of the apertures 22, the angular relation of the two surface portions 28 being the same as the angular relation of the inclined tops 18 of adjacent ribs 14 and 15. From the foregoing, it will be seen the lower surface of each rail holding member is pyramidal in form and will seat securely on the upper surfaces of the ribs 14 and 15 when the holding member is disposed with its major axis either parallel with or transverse of the ribs. If the holding member is turned from either of these positions to the other position while in contact with the upper surfaces of the ribs, it will be raised bodily by reason of its pyramidal formation and will then subside to substantially its former elevation. When assembled to a tie and tie plate by means of the fastening member and flexed washer 23, the holding member will be maintained securely in either of the said two positions but may be forcibly turned from one position to the other against the resistance of the washer occasioned by increased flexion thereof resulting from the aforesaid bodily upward movement of the holding member during rotation.

The width of the holding member is preferably substantially equal to the distance between the remote surfaces of adjacent ribs 14 and 15, so that when the holding member is arranged with its major axis parallel with the ribs, as shown in the right hand sides of Figures 1 and 2, the holding member will not project inwardly beyond the inner rib 14 and will not overlie the rail seat between the ribs 14. The length of the holding member is considerably greater than the distance between the remote surfaces of adjacent ribs 14 and 15, so that when the holding member is disposed with its major axis transverse of the ribs, the holding member will project inwardly beyond the rib 14 and will overlie the rail seat between the ribs 14, as shown in the left hand of Figs. 1 and 2 and in Fig. 3. While the aperture 22 has been shown midway between the long edges of the holding member, it will be understood that this particular disposition, though desirable, is not essential providing one edge of the holding member is adapted to be so positioned that it will not overhang the rail seat.

Owing to the eccentric disposition of the aperture 22, the end 24 of the holding member is adapted to overhang the rail seat to considerable extent as shown in the left hand sides of Figs. 1 and 2, whereas the end 25 is adapted to overhang the rail seat only a short distance, as shown in Fig. 3. This end 25 is designed for rail holding at rail joints and is preferably substantially circularly curved concentrically with the aperture 22, so as to permit a holding member opposite a joint bar 29 to be rotated from the inoperative position shown in the right hand of Figs. 1 and 2 to the operative position shown in Fig. 3, with its end 25 projecting inwardly from the rib 14 only enough to overlie that portion of a rail base outside the joint bar.

It will be noted in Figs. 1 and 3 that the height of the ribs 14 and 15 is such as to position the inwardly projecting ends of the holding members a short distance above the upper surface of the rail base, but it will be obvious that the ribs may be formed slightly lower, so as to enable the holding members to engage the upper surface of the rail base, as shown in Fig. 4. In this lower position of the holding members, the height of the ribs may be such that the members will be urged downwardly against the rail base by the expansive action of the spring washers 23 and thus operate to resist longitudinal movement of the rail.

In the embodiment illustrated in Fig. 4, the form of the holding member $21^a$ is substantially the same as that already described, excepting that it is inverted relatively thereto, so that the lower surface of the holding member is concave and rests upon and co-operates with the outwardly inclining upper surfaces of the ribs 14 and 15 while the convex surface is disposed uppermost.

In the embodiment illustrated in Figs. 5 and 7, the holding member $21^b$ presents the same peripheral form and location of fastening aperture as in the form of Figs. 1 to 3 and 6. The holding member $21^b$, instead of being trough-shaped and bent from end to end as in the other forms, is substantially flat and is characterized by the provision on its lower surface of a square depending projection 30 arranged symmetrically of the aperture 22 and dimensioned to fit snugly between the adjacent ribs 14 and 15, so as to resist rotation of the holding member from either its operative or its inoperative position and to cause a bodily upward movement of the member against the spring washer, as already described. The projection 30 is preferably formed by upsetting or stamping the metal of the holding member and the side walls or edges of the projection are thereby naturally inclined and rounded so as to exert a camming action on the adjacent edges of the ribs 14 and 15 (which are usually slightly rounded as shown).

The relations of tie, tie plate, rail holding members, fastening members, and spring washers are in general the same as described in connection with the embodiment of Figs. 1, 2 and 3.

In operation, the tie plates, rail holding members, fastening members and washers are preferably assembled to the ties at a location remote from the point of use, for example, at a tie

treating plant or tie storage yard, and constitute a unit for transportation, distribution and assembly to rails. In this unit construction, the rail holding members are arranged longitudinally of the ribs, as shown in the right hand sides of Figs. 1, 2, 4 and 5, and the fastening means fully inserted so that the spring washers **23** are in compression and serve to secure the rail holding members in their inoperative positions. When the tie unit as described is assembled to a rail, the rail holding members do not obstruct the entry of the rail into its seat. When the rail is seated on the plate, the holding members are turned each through an angle of 90°, so as to overhang the upper surface of a rail base and secure the ties and rails together. Where joint bars do not prevent, the ends **24** of the holding members are turned inwardly over the rail base but where the ties are located under joint bars, as shown in Fig. 3, the curved ends of the holding members are turned inwardly over such portions of the rails as project outwardly beyond the joint bars. The operation of turning the holding members to secure the rails to the ties may be accomplished by a suitable instrument, such as a track bolt wrench, or the members may be turned by striking an appropriate corner thereof with a hammer. The securement of the rails and ties together may thus be effected very much more easily and in much less time than is required to drive ordinary drift spikes or insert lag screws or other types of fastenings. When it is desired to remove a tie or to replace a rail, the holding members are merely rotated to their inoperative positions and the rail and tie assembly then separated. If the fastening members are properly inserted in the first instance, it is not necessary to adjust the same either for the assembly or the separation of ties and rails, with the resultant advantage that the grip of the fastening members in the tie is not impaired. The initial assembly of the ties, tie plates, rail holding members and fastening members very materially expedites the laying of new track or the making of repairs and substantially prevents the loss of small parts, which is customary in railway track work. Depending on the height of the ribs **14** and **15**, the holding members may be spaced slightly above the rail base or may be in contact with the upper surface thereof. In the first case, the rail is permitted free movement to the extent incident to wave motion thereof without disturbing the tie in the ballast. In the second case, the vertical movement of the rail incident to wave motion thereof is permitted substantially without disturbance of the tie, by reason of the resilient support afforded to the holding members by the spring washers, and at the same time the downward pressure of the holding members on the rails serves to resist longitudinal movement of the rails.

Various embodiments of the invention are possible additional to those herein disclosed, also modifications, and as indicative of the field within which such other embodiments or modifications may lie, it may be stated the invention is not confined to the use of separate ribs **14** and **15** nor to the arrangement of the plate ribs, forming the holding member positioning surfaces, such as **18**, in parallelism with the rail.

Having thus described my invention, what I claim is;—

1. In railway rail movement restraining means, a tie plate including longitudinal ribs formed to present a pair of oppositely facing, longitudinally extending, laterally inclined surfaces above the normal upper surface of the plate; a pivotally mounted rail holding member engageable with said surfaces in rail holding and in rail releasing positions, the lower surface of said holding member presenting pairs of elongated bearing surfaces of substantial area arranged at right angles to one another and adapted for co-operation with the inclined surfaces of said ribs; and resilient means urging the holding member against said surfaces thereby to releasably hold said member in either of said positions while permitting limited vertical displacement of the member during rotation from one said position to the other.

2. In railway rail movement restraining means, a tie plate including longitudinal ribs formed to present a pair of oppositely facing, longitudinally extending, oppositely inclined surfaces above the normal upper surface of the plate; a rail holding member engageable with said surfaces in rail holding and in rail releasing positions, said holding member presenting bearing surfaces in quadrilateral arrangement adapted for engagement with said rib surfaces; an anchoring member passing through said holding member concentrically of said quadrilateral arrangement of bearing surfaces and pivotally supporting the member, and a spring in compression between said anchoring member and said holding member urging said holding member against the plate ribs.

3. In railway rail movement restraining means, a tie plate including longitudinal ribs formed to present a pair of oppositely facing, longitudinally extending and laterally inclined surfaces above the normal upper surface of the plate; an oblong rail holding member apertured nearer one end than the other and formed on its lower surface to present a quadrilateral arrangement of bearing surfaces disposed symmetrically about said aperture and inclined from the aperture to the edges of the plate and adapted for engagement with the upper surfaces of said ribs; an anchoring member passing through the holding member aperture and pivotally supporting the holding member; and a spring arranged in compression between said anchoring member and holding member and urging the holding member against the upper surfaces of said ribs.

4. In railway rail movement restraining means, a tie plate presenting a pair of longitudinal parallel spaced ribs; an oblong rail holding member apertured nearer one end than the other and formed on its lower surface with a quadrilateral depressed portion arranged symmetrically about said aperture and adapted for engagement between said ribs; an anchoring member passing through said holding member and pivotally supporting the holding member; and a spring in compression between said anchoring member and holding member and urging the holding member against the ribs, whereby rotation of the holding member is resisted by engagement of said quadrilateral depressed portion between the ribs and the holding member and the holding member is releasably held against rotation.

FRANCIS W. COOPER.