April 5, 1932. G. W. MULLER 1,852,469

SPRING PLATE HOLDER FOR RAILROAD ROADBED CONSTRUCTION

Filed April 15, 1931 2 Sheets-Sheet 1

Fig. 1.

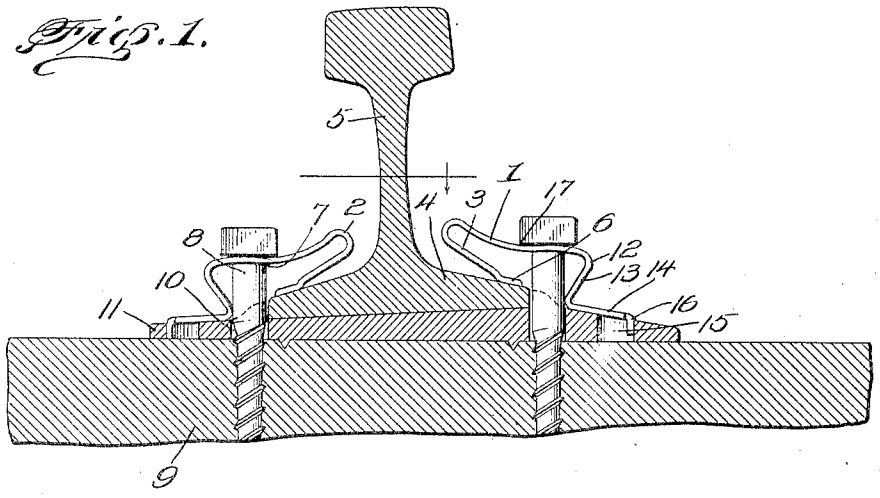


Fig. 2.

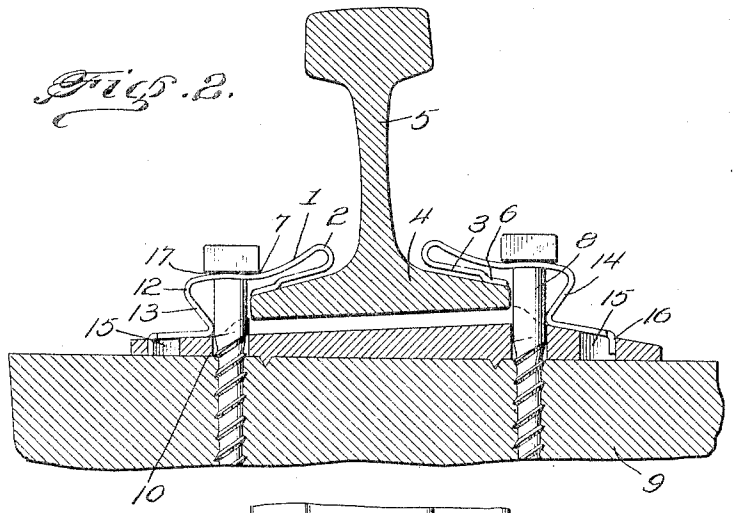
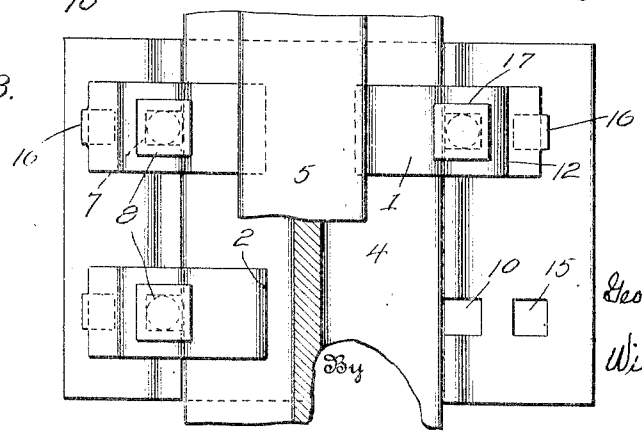


Fig. 3.



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Filed April 15, 1931 2 Sheets-Sheet 2

Fig. 4.

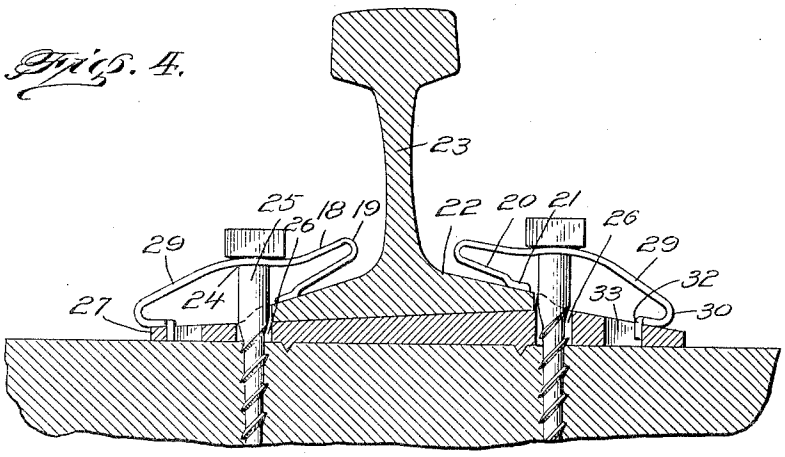


Fig. 5.

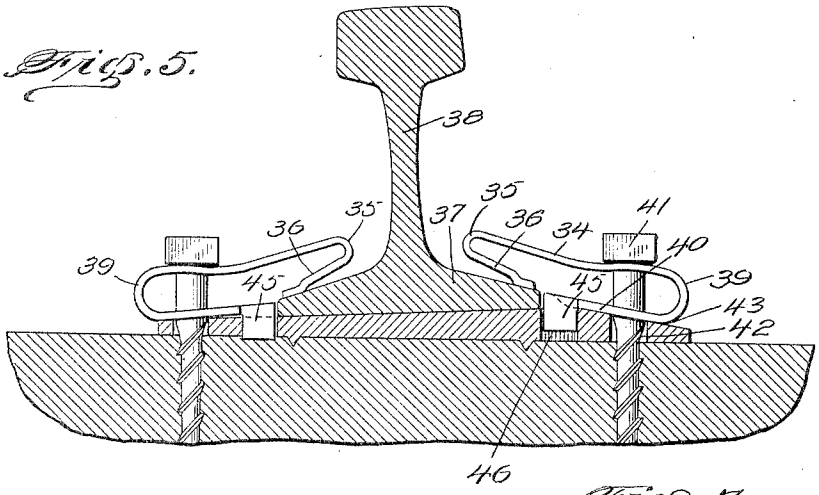


Fig. 6.

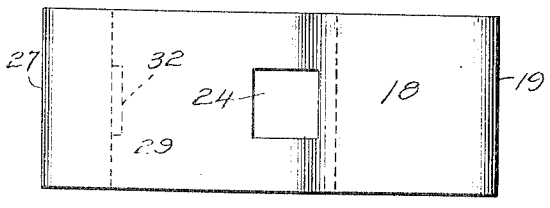
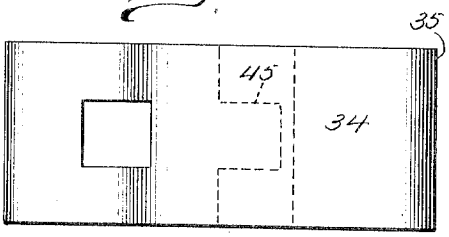


Fig. 7.



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UNITED STATES PATENT OFFICE

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SPRING PLATE HOLDER FOR RAILROAD ROADBED CONSTRUCTION

Application filed April 15, 1931. Serial No. 530,379.

This invention is directed to a spring plate designed for use in maintaining unit connection between the tie and rail or tie, tie plate and rail in railroad track construction, without interfering with the necessary flexibility of the rail under the strains of the moving train.

The construction of railroad roadbeds are substantially standardized, involving as the holding element the spike driven directly into the tie, or into the tie through the tie plate, with the head of the spike overlying the flange of the rail. Under the strains of heavy fast moving trains there is a decided wave motion in the rail, incident to the leverage of the rail on the tie or tie plate under the moving weight on the rails between the ties. This well recognized rail movement is not at all compensated for in the usual spike holding, with the result that the spikes are withdrawn to some extent, with consequent looseness between rail and tie or between rail tie plate and tie. Thereafter there is a continuous pounding of the rail during train travel, with undue wear on the tie, loosening of the latter in the ballast, with eventual non-level trackage, tie displacement, and great liability of rail spreading.

It is well understood that the ideal condition for such construction is the provision of simple means which will at all normal conditions hold the tie and rail, together with the tie plate, if used, as a rigid relatively immovable unit, while yet permitting the independent movement of the rail under heavy train travel, though at the same time holding the remaining parts substantially fixed. Any means to this end must take into consideration the standard equipment, and must not require any material change, disregarding substitution, of any standard part.

The primary object of the present invention is, therefore, to provide a holding means of the desired type in the form of a spring plate, which requires no change in standard equipment, though applied as a substitute for the usual spike, and which in place will rigidly hold the rail, tie, and tie plate, if used, as a relatively fixed unit under normal conditions while at the same time permitting, under train travel stresses, the necessary movement of the rail, the very rails movement being utilized through the form and application of the spring plate, as a means for increasing the holding effect of the spring plate on the tie and tie plate.

A further object of the invention is the provision of a spring plate, which, while maintaining its inherent advantages, lends itself to special forms and arrangements, to thereby permit its use in connection with any special form of tie plate or other equipment used in special constructions.

A further object is the provision of a spring plate which is particularly designed to be positioned as a substitute for the usual spike, thereby permitting the improvement to be used in spike replacement in old work, as well as a spike substitute in new work.

Another object is the provision of a spring plate which by maintaining unit relation between the rail, tie, and tie plate, and permitting necessary rail movement under train load, additionally insures that any rail movement is under gradually-increasing resistance of the spring plate, thus insuring that the rail, when free of the train stress will return to its normal relation to the tie and tie plate, hence avoiding any possibility of rail creeping, and the corresponding requirement of rail-creepers locks, heretofore necessary to prevent rail creeping.

A further object is the provision of a spring plate designed to be secured to the tie by means applied as easily as the usual spike, but which, when applied is secure against upward displacement under usual train stresses, with such fasteners occupying the usual spike positions relative to the rail and tie plate.

The invention consists in a spring plate designed to be secured directly to the tie, or to the tie through the usual spike opening in the tie plate, if a tie plate is used, with such plate formed to present independent bearing portions for the rail and tie or tie plate, the securing means being threaded or bolt run into the tie or tie plate and creating sufficient initial pressure on the spring plate to hold the tie, tie plate, and rail as a unit. The

spring provisions of the plate permit the necessary movement of the rail under train travel, but the relation of the plate to the fastener is such that the tension on the plate, incident to the rail movement increases the pressure of the spring plate on the tie or tie plate, and thus more rigidly holds these parts immovable. The rail movement is increasingly resisted by the spring plate, hence, when free of the strain, the rail returns to its normal relation to the tie and tie plate, and the spring plate again holds all parts in relatively fixed relation.

The invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a view in section, partly in elevation, showing one form of spring plate, the parts being in normal relations.

Fig. 2 is a similar view, showing the rail responding to the strain of train travel in raising from the tie plate with consequent additional strain on the spring plate.

Fig. 3 is a plan of the same.

Fig. 4 is a view in section, partly in elevation, showing another form of spring plate.

Fig. 5 is a similar view, showing another form of spring plate.

Fig. 6 is a plan view of the form of spring plate shown in Fig. 4.

Fig. 7 is a plan view of the form of spring plate shown in Fig. 5.

In the form of spring plate shown in Figs. 1, 2, and 3, such plate is made up of spring metal of appropriate thickness for the particular work, and includes a plate section 1, formed at one end with a return bend 2 to provide a toe portion 3, which latter is designed to overlie the base flange 4 of the rail 5. The toe portion of the plate has a terminal section 6, shaped to bear squarely on the rail flange, the remaining portion of the toe section being spaced from the rail flange. The plate 1 is formed with an opening, preferably rectangular, as at 7 to receive a spring-plate fastening means, here shown in the form of a threaded member 8, designed to be threaded into the tie 9, through the usual spike opening 10 in the tie plate 11.

Beyond the opening 7, the spring plate is formed with a bend 12, from which the plate extends downwardly and inwardly toward and approaching contact with the fastener 8, this downwardly extended portion 13 bearing on the tie or tie plate, as the case may be, and being then extended away from the fastener 8 as a heel portion 14, which bears directly on the tie or tie plate. The terminal of the heel portion 14 is formed as a depending spur of appreciable width, which seats in an opening 15 in the tie plate, or, in the absence of the tie plate is forced into the tie. The spur 16 of the spring plate acts as a means for preventing turning of the tie plate in use.

That portion of the spring plate at that side of the fastener 8 toward the rail is of much greater length than the opposite length of the plate, and is further inclined upwardly, as shown. This insures that the spring tension of that portion of the plate overlying the rail is somewhat less than that portion overlying the tie or tie plate, thus providing for the rail movement under a less pressure than that necessary to move the tie or tie plate. The fastener 8 is of course designed to be seated to maintain a predetermined and fixed pressure on the tie plate, which pressure, through the spring bearings of the toe and heel, is to be sufficient to hold the tie, tie plate, and rail against relative movement under normal conditions. The head of the fastener is spaced well above the rail flange, and as the fastener occupies the usual spike opening, such fastener is close to the edge of the rail flange. Furthermore, the plate portion 1 of the spring plate is so shaped that under normal pressure of the fastener, the plate engages the head of the fastener at one edge only. This is indicated at 17^a, and provides for utilizing the plate portion 1 as a lever under rail movement for more tightly holding the tie and tie plate to place, as will later appear.

The relation of the parts under that rail movement responsive to train travel is indicated in Fig. 2, from which it will be noted that the movement of the rail is sufficient to appreciably space it from the tie plate. Under these conditions the spring toe portion 3 permits this rail movement upward, but in such movement the leverage of the plate portion 1 about the fulcrum 17 of Fig. 2, tends to exert a greater pressure on the heel portion 14 of the spring plate, and thus hold the tie and tie plate fixed against movement, either as a unit or relatively. The greater length of the forward portion of the spring plate as compared with the rear portion, naturally tends to a greater spring pressure on the tie plate and tie than on the rail, and as this is increased under upward rail movement, it is at once apparent that the tie and tie plate cannot move. As the rail moves upward at the particular spring plate as indicated in Fig. 2, the resistance of the plate to such movement obviously increases, hence the tendency of the spring plate is to quickly return the rail into contact with the tie or tie plate, on release of train stress, and during this full movement of the rail and rail engaging portion of the spring plate, the pressure of the latter is continually increased over normal. This insures that the spring plate will maintain its grip on the rail during movement, and will return it to normal position without releasing this grip. The rail therefore returns to normal relation to the tie or tie plate, and the spring plate resumes its normal function of holding all parts against relative movement.

In the form shown in Fig. 4, the spring plate is of a somewhat different form, including a plate portion 18, having a return bend 19 at one end and projected beyond or below such bend to form a toe portion 20. The latter has a terminal 21 to bear on the base flange 22 of the rail 23, the remaining portion of the toe portion being spaced from the rail flange. The plate is formed at substantially its mid length with an opening 24 to receive a fastener 25, similar to fastener 8 of the first form, which is designed to be passed through the usual spike opening 26 of the tie plate 27, and is threaded into the tie 28.

Beyond the fastener opening 24, the spring plate is projected downwardly and outwardly as at 29, and formed with a return bend 30 to provide a short heel portion 31, terminating in a spur 32, to seat in an opening 33 in the tie plate, or to be driven into the tie in the absence of the tie plate. The relation of the plate 18 and the head of the fastener 25 is similar to the first form providing for a lever action of the plate 18 under rail movement. The spur 32 acts to prevent turning movement of the spring plate, and the fastener holds the parts under the spring tension of the plate with sufficient force to maintain the rail, tie, and tie plate against relative movement, while of course permitting the necessary rail movement under train travel.

In this form the rail movement upward tends to materially increase the pressure on the heel portion 31, and through the latter on the tie plate and tie.

In the form shown in Fig. 5, the spring plate is of a still different form, and includes a plate portion 34, formed at one end with a return bend 35, projected to form a spring toe portion 36, terminally bearing on the base flange 37 of a rail 38, and being otherwise spaced from such flange. The opposite end of the plate portion is formed with a return bend 39, extended beneath the plate portion in the form of a heel 40, which extends toward the toe portion. A fastener-receiving opening is formed in both the plate portion 34 and heel portion 40, the fastener 41 in this instance being identical with the fasteners previously described, but passing through both the plate portion and heel portion and taking through a special opening 42 in the tie plate 43 and being threaded into the tie 44. The heel portion 40 extends into close proximity with the edge of the rail flange 37, is formed with a depending lug 45, and is interlocked against turning by engagement of such lug into the usual spike hole 46 in the tie plate.

The relation of the head of the fastener and of the plate portion 34 provides for the previously-described lever action of the plate portion in the movement of the spring plate under rail movement, hence the increased holding effect of the spring plate on the tie and tie plate, under this rail upward movement, is also an inherent detail of this particular form. As that portion of the spring plate beyond the fastener toward the rail is of greater length than the opposite portion, it follows that the spring resistance of the rail contacting portion of the spring plate is less than that of the tie plate contacting portion. Thus under rail movement, the spring resistance of the toe portion not only permits such portion to yield under a pressure which, will not disturb the holding contact of the heel portion, but increases such heel pressure through the leverage provided. The passage of the fastener through two lengths of the spring plate insures rigidity of the tie plate and the tie holding contact, so that under no circumstances of normal conditions will the tie plate or tie be permitted to move relative to each other.

In all forms the spring plate acts to hold the rail, tie plate and tie in relatively fixed relation under absence of train travel, and under train travel permits the incidental rail movement under increasing spring resistance of the spring plate, while at the same time increasing the holding contact of the spring plate on the tie and tie plate. Thus the tie and tie plate are not permitted movement under normal conditions, and this holding contact is materially increased under upward rail movement incident to train travel. The normal pressure on the rail is sufficient to hold the rail in the absence of train stress, and under train stress this hold effect on the rail is increased, thereby insuring that the rail is in effect gripped by this spring pressure, and is compelled, on cessation of train stress to return to its original relation to the tie plate and tie. Thus any possibility of rail creeping is prevented.

The fasteners employed, being threaded into the tie and under the tension of the spring plate when in place, will be thus protected against shocks and jars tending to upwardly or laterally dislodge the fastener, and this presents an important advantage over the usual spike. The relative looseness of the rail, tie plate and tie under the usual spike holding when subjected to train stresses permits a continual pounding of the rail and tie plate on the tie, and this most expensive detail of roadbed construction is rapidly worn, and under the incident vibration soon displaced or so loosened in the ballast that the entire track level and uniformity is lost. This is the reason for the high maintenance cost of trackage, and as the improved spring plate entirely obviates any relative movement of the tie and tie plate, this important item of expense is so materially reduced as to become comparatively negligible.

A further obvious advantage of the im-

proved spring plate is that fact that it is a substitution of the usual spike, thus enabling it to be used in repair of old work, as well as in new installations.

What is claimed as new, is:—

1. The combination with a rail, a tie plate, and a tie, of a spring plate including a plate portion formed with a fastener opening, a fastener passing through said opening and through the tie plate and threaded into the tie, that portion of the plate at one side of the opening being formed to provide an underlying spring toe portion for bearing contact with the base flange of the rail, the opposite length of the plate portion being of less length and turned downwardly and inwardly toward the fastener, and then projected outwardly relative to the fastener to provide a heel portion to bear on the tie plate.

2. The combination with a rail, a tie plate, and a tie, of a spring plate including a plate portion formed with a fastener opening dividing the plate portion into unequal lengths, a fastener secured to the tie and passing through the opening to maintain a predetermined pressure on the plate portion, that portion of the plate of greater length being formed with an underlying toe portion for bearing contact on the base flange of the rail, that portion of the plate of less length being formed to provide an outstanding heel portion to bear on the tie plate, and a spur on the heel portion to interlock with the tie plate to prevent turning of the spring plate in use.

3. The combination with a rail, a tie plate, and a tie, of a spring plate including a plate portion formed with a fastener opening, a fastener passed through said opening and taking into the tie, one part of the plate portion being formed with an underlying toe portion to bear on the base flange of the rail, the remaining part of the plate portion being projected outwardly and downwardly relative to the fastener and terminally formed to provide a relatively short heel portion for bearing contact on the tie plate.

4. The combination with a rail, a tie plate, and a tie, of a spring plate formed at one end with a spring toe portion to bear on the base flange of the rail, the opposite end of the plate being formed with an underlying heel portion to bear on the tie plate, the spring plate having a fastener opening at about its midlength a fastener passing through said opening and taking into the tie, said fastener maintaining a constant pressure on the toe and heel, the terminal of the heel being formed for interlocking with the tie at a point immediately adjacent the edge of the rail flange to prevent turning of the spring plate in use.

5. The combination with a rail, a tie plate and a tie, of a spring plate presenting a relatively broad bearing face, a fastening member passed through said face, through the tie plate, and removably engaging the tie, said spring plate at one end of the bearing face being formed as a return bend to overlie the base flange of the rail and free of contact therewith, the free terminal of the return bend underlying the bearing face adjacent the fastening member and having bearing contact with the base flange of the rail adjacent the free edge thereof, the opposite end of the bearing face being projected downwardly and inclined toward the fastening member and then outwardly to provide a broad bearing face to overlie the tie plate, the juncture of the downwardly projected portion and the tie plate engaging face being substantially in contact with the fastening member.

6. The combination with a rail, a tie plate and a tie, of a spring plate presenting a relatively broad bearing face, a fastening member passed through said face, through the tie plate, and removably engaging the tie, said spring plate at one end of the bearing face being formed as a return bend to overlie the base flange of the rail and free of contact therewith, the free terminal of the return bend underlying the bearing face adjacent the fastening member and having bearing contact with the base flange of the rail adjacent the free edge thereof, the opposite end of the bearing face being projected downwardly and inclined toward the fastening member and then outwardly to provide a broad bearing face to overlie the tie plate, the juncture of the downwardly projected portion and the tie plate engaging face being substantially in contact with the fastening member, the length of the bearing face beyond the fastening member toward the return bend end being materially greater than the opposite end.

7. The combination with a rail, a tie plate and a tie, of a spring plate presenting a relatively broad bearing face, a fastening member passed through said face, through the tie plate, and removably engaging the tie, said spring plate at one end of the bearing face being formed as a return bend to overlie the base flange of the rail and free of contact therewith, the free terminal of the return bend underlying the bearing face adjacent the fastening member and having bearing contact with the base flange of the rail adjacent the free edge thereof, the opposite end of the bearing face being projected downwardly and inclined toward the fastening member and then outwardly to provide a broad bearing face to overlie the tie plate, the juncture of the downwardly projected portion and the tie plate engaging face being substantially in contact with the fastening member, and means for interlocking one end of the spring plate with the tie plate.

8. In combination with a rail, tie plate and tie, a spring plate, a headed fastener passing through the spring plate and having its head spaced directly above the rail base, said fastener entering the tie, said spring plate having a return bend to form an underlying spring section to bear on the rail base, the plate in one direction beyond the fastener having direct bearing on the tie plate and provided with a projection formed as a pendent element of the tie plate engaging portion.

9. In combination with a rail, tie plate and tie, a spring plate, a fastener extending through the spring plate and tie plate and entering the tie, said fastener having a head spaced directly above the rail base, the spring plate being formed with a return bend to provide a spring terminal to bear on the rail base, said plate having a section to bear directly on the tie plate, said spring plate having integral means to prevent said plate from shifting out of a position transversely of the rail.

10. In combination with a rail, tie plate and tie, a spring plate, and a fastener passing through the spring plate and through the tie plate and having a head spaced directly above the upper surface of the base of the rail, the spring plate being formed with a return bend to provide a spring terminal to overlie the base of the rail and contact therewith adjacent the free edge thereof, said spring plate having a relatively broad direct bearing on the tie plate and being in direct contact with the underside of the head of the fastener.

11. In combination with a rail, tie plate and tie, a spring plate, and a fastener passing through the spring plate and through the tie plate, said spring plate having a yielding rail base bearing formed by a return bend at one end of the plate with the free terminal of such bend bearing on the rail base, said spring plate having an outwardly extending portion bearing directly on the tie plate with such portion terminating in a projection to seat in an opening formed in the tie plate.

12. In combination with a rail, tie plate and tie, a spring plate, and a fastener passing through the spring plate and through the tie plate and having a head spaced above the base of the rail, the spring plate having yielding rail base bearing, tie plate bearing and tie bearing members and itself being in bearing contact with the head of the fastener, the tie bearing member consisting of a loop connecting spring arms and extended beyond the body plate to constitute a bearing member.

13. In combination with the rail, tie plate and tie, a spring plate, and a fastener passing through the spring plate and through the tie plate and having a head arranged above the base of the rail, the spring plate having a return bend to overlie the rail base with the terminal of such bend providing a spring-bearing contact with the rail base, said spring plate having a tie plate bearing portion extended toward the rail base and engaged by the fastener, said tie plate engaging portion having interlocking cooperation with the tie plate.

14. The combination with a railroad rail and a supporting member therefor, of a spring plate having spring bearing on the rail and on the supporting member, that portion of the plate cooperating with the rail having contact with the rail adjacent the free edge of the rail flange and projecting inwardly free of such rail flange toward the web of the rail, that portion of the plate bearing on the supporting member presenting a broad, relatively flat contact with such member, and means for removably securing the spring plate to the supporting member.

15. In combination with a railroad rail and a supporting member therefor, a spring plate presenting a relatively flat bearing face formed at one end in a return bend, with the free terminal of such bend designed for spring contact with the base flange of the rail adjacent the edge thereof, the return bend projecting toward the web of the rail free of contact with the base flange, the opposite end of the flat face of the plate being directed downwardly and terminating in an outwardly directed part for contact with the supporting member, and a fastening means directed through the flat face and taking into the supporting member.

16. In combination with a railroad rail and a supporting member therefor, a spring plate presenting a relatively flat bearing face formed at one end in a return bend, with the free terminal of such bend having spring contact with the base flange of the rail adjacent the edge thereof, the return bend projecting toward the web of the rail free of the flange, the opposite end of the flat face of the plate being directed downwardly and terminating in a relatively broad area for contact with the supporting member, and a fastening means directed through the flat face and taking into the supporting member, said fastening means passing through that portion of the plate bearing directly on the supporting member.

17. The combination with a railroad rail and a supporting member therefor, of a spring plate presenting a relatively flat face, uniting means passed through said face and taking into the supporting member, the spring plate in one direction beyond the uniting means being formed as a return bend with the terminal projecting toward the uniting means and in contact with the base flange of the rail, the full length of the return bend extending toward the web normally free of contact with the flange of the rail, the opposite end of the spring plate being projected

downwardly toward the supporting member and then outwardly to provide a broad bearing face for engagement with the supporting member, the formation of the return bend portion of the plate providing an area of greater relative resiliency overlying the base flange of the rail.

In testimony whereof I affix my signature.

GEORGE W. MULLER.