Sept. 5, 1944. M. L. CANTRELL ET AL 2,357,629

RAIL FASTENING

Filed Aug. 1, 1941 2 Sheets-Sheet 1

Fig. 1,

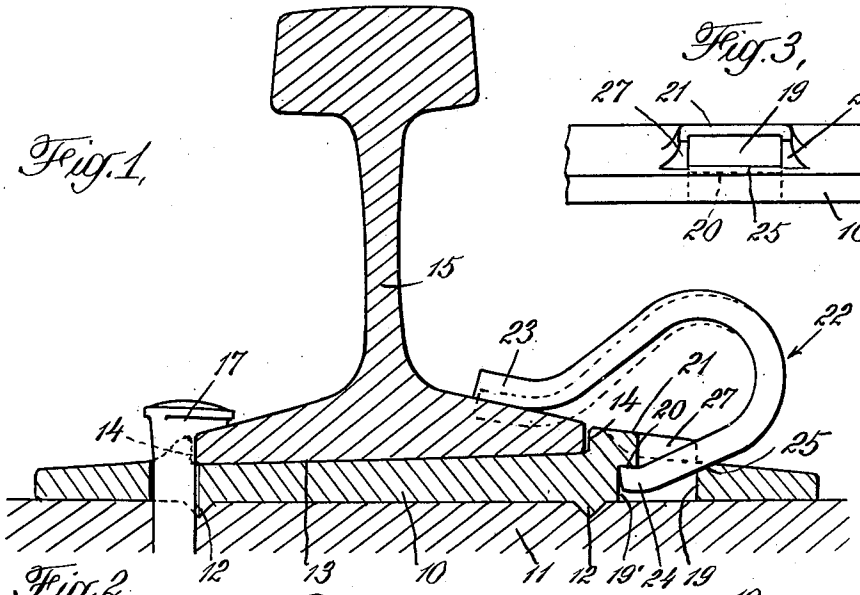


Fig. 3,

Fig. 2,

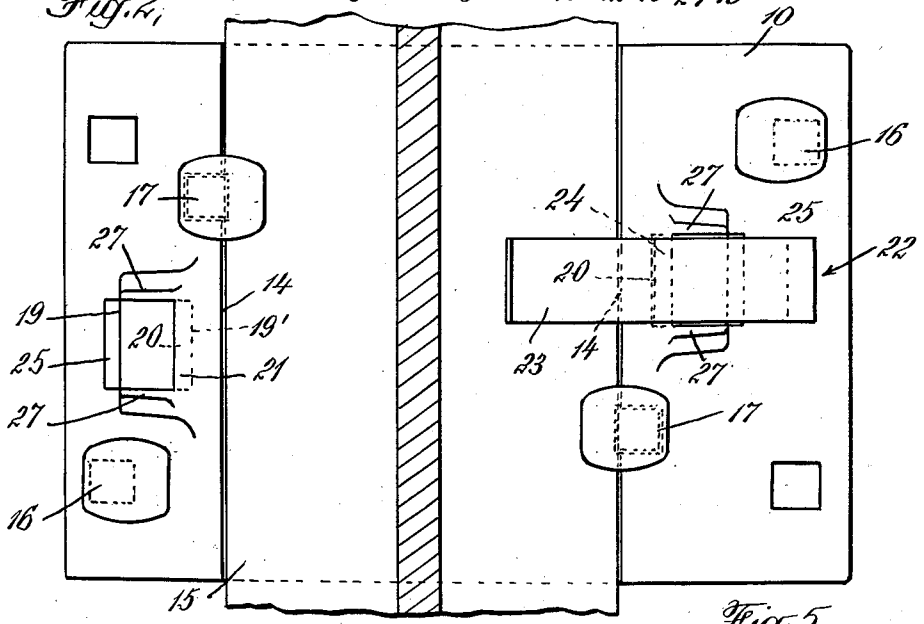


Fig. 4,

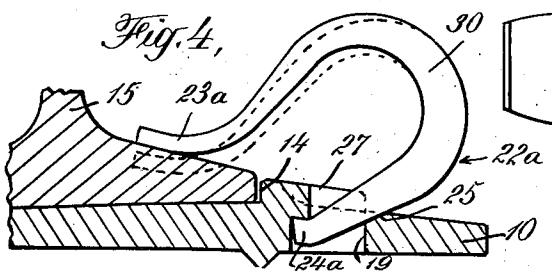
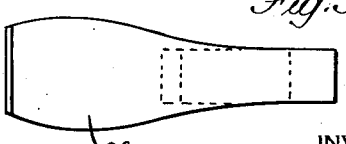


Fig. 5,



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Filed Aug. 1, 1941 2 Sheets-Sheet 2

Fig. 6,

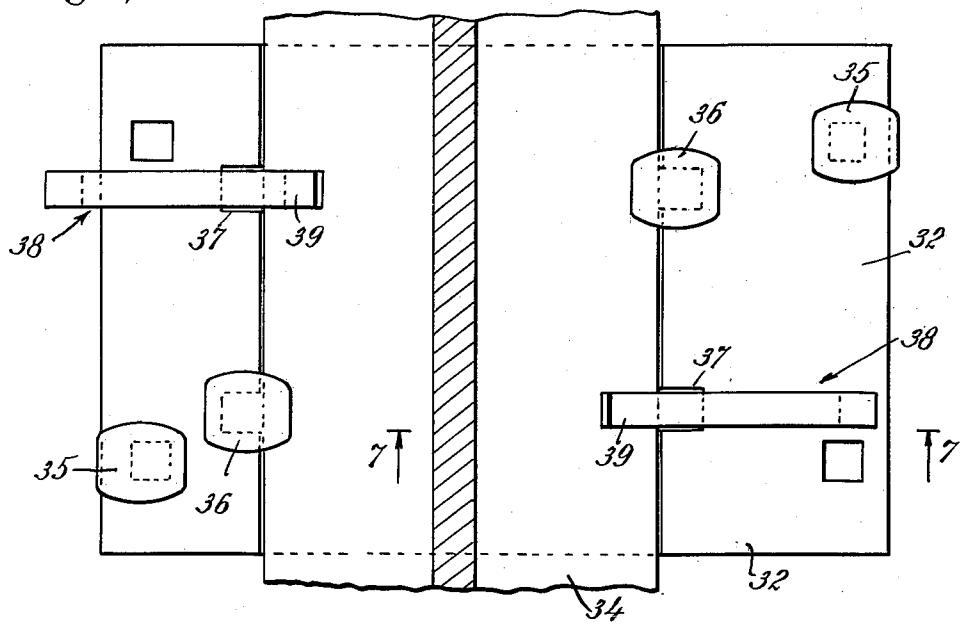


Fig. 8

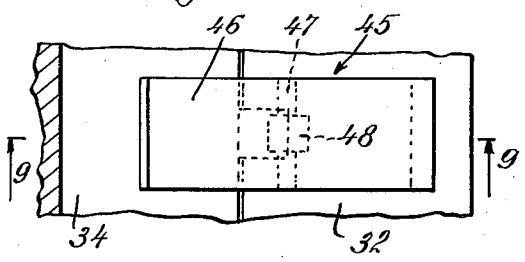


Fig. 9,

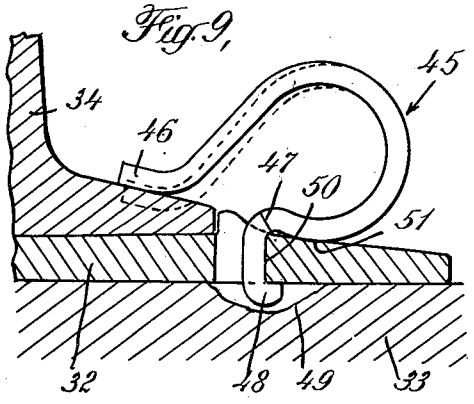
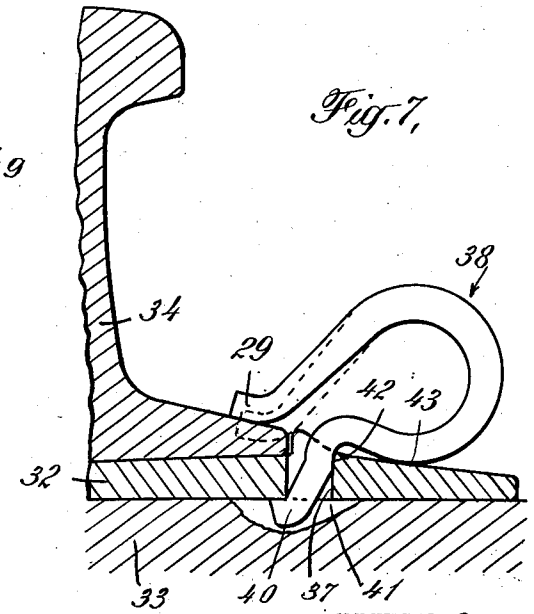


Fig. 7,



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RAIL FASTENING

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Application August 1, 1941, Serial No. 405,020

2 Claims. (Cl. 238—349)

This invention relates to rail fastenings and more particularly to a novel rail fastening for retaining a rail in its operative position on a tie plate with a spring action through the medium of a spring lock which is held in an opening in the tie plate without the use of a separate retaining means. The new fastening is of a simple construction adapted for manufacture at low cost, and the spring lock of the fastening may be easily installed by a suitable tool, such as that shown in our copending application Ser. No. 359,618, filed October 3, 1940, now Patent No. 2,312,026, dated February 23, 1937, of which this application is a continuation-in-part.

Rail fastenings have been devised heretofore in which a spring lock for the rail is held in an opening in the tie plate without the use of separate retaining means, such as a spike or a key. However, in these prior fastenings, either the spring lock is difficult to install or remove from the tie plate, or both, or it is not sufficiently stable and secure to prevent its accidental displacement. For example, in one form of fastening proposed heretofore, the spring lock is provided with a reversely-turned spring portion disposed in an under-cut opening in the plate. Normally, the overall width of the reversely-turned portion is greater than the width of the opening exclusive of the under-cut so that the reversely-turned portion is contracted as it is forced into the opening and then suddenly expands into the under-cut portion of the opening. With this construction, it is impossible to remove the lock from the opening for replacement, repair, etc., without cutting or breaking the lock. Another form of the prior fastenings includes a spring member which is locked to the plate by turning the member ninety degrees to engage it with the rail base after inserting in an under-cut opening in the plate an enlarged reversely-turned portion of the member. Fastenings of this construction are objectionable because the spring member may be easily loosened and turned back to its initial inoperative position in which the reversely-turned portion is ineffective to prevent withdrawal of the member from the opening.

The present invention, therefore, is directed to the provision of a novel rail fastening including a spring lock engaging the rail and held securely in position on the tie plate at all times as a result of its own spring action on the rail, without the use of separate retaining means, and which, in addition, may be readily installed or removed by the use of an appropriate tool. A rail fastening made in accordance with our invention comprises a tie plate having a rail seat and an opening on at least one side of the seat. Mounted in the opening is a spring lock which is generally U-shaped and is preferably made of a single strip of spring metal. The lock is normally disposed with one arm above the other, and the lower arm extends into the opening and is provided with a hook-like portion engaging an overhanging part of the tie plate. From the plate opening, the lock extends away from the rail and into engagement with a bearing surface of the tie plate outwardly of the opening, from which it curves upwardly and inwardly into engagement with the top of the rail base. Normally, the two arms of the lock are relatively close together, but in installing the lock the arms are forced apart a substantial distance to insert the hook-like portion under the under-hanging part of the plate, and the parts are so proportioned that when the arms are released the upper arm remains distorted and exerts a downward thrust on the top of the rail base.

With this construction, the spring lock resists upward movement of the rail from its seat incident to passing wheel loads and resists this movement with a yielding force which increases as the upward movement proceeds. Accordingly, the lock effectively opposes longitudinal creeping of the rail and tends to dampen the vibrations caused by passing loads. Due to the normal thrust of the lock on the rail base, a reactive force is produced which tends to fulcrum the lock outwardly from the rail about the hook-like portion as a pivot, with the result that the part of the lock bearing on the tie plate outwardly of the opening is thrust downwardly with considerable force against the plate, thereby stabilizing the lock and preventing displacement thereof in the opening. By reason of the hook-like portion at the lower end of the lock, the latter is positively held against withdrawal from the opening. If desired, the seat for the spring lock outwardly of the opening may be provided with lateral abutments to prevent displacement of the lock due to the tendency for the rail to creep longitudinally, and these abutments may be provided by building up portions of the plate on opposite sides of the seat or by cutting the seat in the surface of the plate. Also, if desired, the end of the spring lock engaging the rail base may be distended, as by flattening it, to provide a relatively large contact surface between the lock and the rail base, whereby the frictional force opposing longitudinal creeping of the rail is increased.

The spring lock may be easily installed by the

use of a suitable tool for separating its spring arms, and because of the spring action of these arms due to their distortion after the lock is installed, the lock can be removed readily only by the use of a tool for spreading the arms to permit withdrawal of the hooked portion from under the over-hanging part of the plate. This feature is of particular advantage for the reason that it prevents accidental loosening of the spring lock due to vibration of the rail, corrosion, etc., the spring action of the lock automatically taking up any looseness which might otherwise develop, and also for the reason that it makes it considerably more difficult for unauthorized persons to remove the spring lock or tamper with it effectively.

For a better understanding of the invention, reference may be had to the accompanying drawings, in which

Fig. 1 is a cross sectional view of one form of the new rail fastening;

Fig. 2 is a plan view of the fastening shown in Fig. 1;

Fig. 3 is an end view of the fastening shown in Fig. 1, with parts broken away;

Fig. 4 is a cross sectional view of part of a modified form of the new fastening;

Fig. 5 is a plan view of the spring lock shown in Fig. 4;

Fig. 6 is a plan view of another form of the invention;

Fig. 7 is a cross sectional view on the line 7—7 in Fig. 6;

Fig. 8 is a plan view of part of still another form of the new fastening, and

Fig. 9 is a sectional view on the line 9—9 in Fig. 8.

Referring to the drawings, the rail fastening shown in Figs. 1, 2 and 3 comprises a tie plate 10 of any desired construction mounted on a tie 11. The tie plate, as shown, includes a pair of pointed ribs 12 extending along its bottom surface transversely of the plate and embedded in the tie to hold the plate to the proper gage. On the top of the tie plate is a canted rail seat 13 and a pair of shoulders 14 extending transversely of the plate along the sides of the seat to hold the rail 15 in position. The tie plate may be secured to the tie in any suitable manner, as, for example, by spikes 16 driven through openings in the plate into the tie. If desired, additional spikes 17 may be driven through openings in the plate adjacent the rail seat so that the heads of the spikes engage the rail base.

On each side of the rail base, the tie plate is provided with an opening 19 having an under-cut portion 19' in the wall adjacent the rail so as to form an over-hanging surface 20 sloping downwardly and outwardly away from the rail. Preferably, the under-cut opening 19 is formed in a single punching operation, as described in an application of Marvin L. Cantrell and Oscar A. Hed, Ser. No. 295,204, filed September 16, 1937, now Patent No. 2,323,499 dated October 26, 1943 whereby some or all of the metal displaced in the formation of the undercut portion 19' is used to form a buttress 21 above the over-hanging surface 20.

Mounted in each of the plate openings 19 is a generally U-shaped spring lock 22 made of spring metal or the like, one of the arms being bent outwardly, as shown at 23, and engaging the top of the rail base near the adjacent edge of the base. The other arm of the lock is provided at its end with a hook-like, plate-engaging portion 24 which is formed complementary to the over-hanging plate surface 20 and engages this surface when the lock is in position. From the part 24, the lower arm of the lock extends upwardly and outwardly across the opening 19 to a beveled seat 25 on the tie plate outwardly of the opening, the seat, as shown, being depressed below the top surface of the plate.

In the normal condition of the lock 22, before it is installed on the plate, its two arms are relatively close together, as indicated by the dotted lines in Fig. 1. However, in installing the lock on the plate, the arms are forced apart a substantial distance so that the hook-like portion 24 may be inserted in the opening under the over-hanging surface 20. Accordingly, when the arms of the lock are released they tend to move together but are prevented from doing so by the wedging action of the rail base and the inclined surface 20. Thus, the upper arm of the lock normally exerts a spring action of considerable force on the top of the rail base and yieldingly resists upward movement of the rail from its seat incident to the passage of wheel loads over the rail, whereby longitudinal creeping of the rail is reduced or prevented. In addition, the lock acts to dampen the rail vibrations of relatively high frequency common to track structures, because each lock is adapted to be vibrated itself by the source of vibration but with a lower amplitude than the rail, thereby producing vibratory overtone which, being out of step with the frequency and amplitude of the rail vibrations, tend to break up the rhythm of the latter and reduce the amplitude. Dampening of these vibrations is also effected by the opposition of the spring lock to the upward or rebound movement of the vibrating rail. By thus dampening the vibrations, the spring lock tends to reduce harmful molecular oscillation in the rail and thereby prolong the life of the assembly.

Due to the distortion of the upper arm of the rail lock, a reactive force is produced which tends to move the lock clockwise about the hook-like portion 24 as a pivot, as seen in Fig. 1, and thereby press the lower arm of the lock against the bearing surface 25 outwardly of the plate opening 19. This pressure between the bearing surface 25 and the lock has a tendency to stabilize the lock and prevent loosening or displacement of the lock in the opening. Also, by reason of the spring action of the lock, the hook-like portion 24 is urged upwardly against the over-hanging surface 20, whereby the lock is retained in its operative position by the surface 20, which in effect forms a taper lock, and also by the frictional resistance between the hook-like portion 24 and the surface 20 and between the bearing surface 25 and the lower arm of the lock.

The pressure normally exerted by the upper arm of the spring lock against the rail base is determined in part by the position of the bearing surface 25 relative to the over-hanging surface 20 which, in turn, is dependent on the depth to which the surface 25 is depressed in the tie plate. The depressed surface 25 not only determines the normal pressure of the spring lock on the rail in accordance with the depth of the depression, but also provides lateral abutments (the sides of the depression) which prevent displacement of the lock transversely of the plate as a result of the resistance of the lock to longitudinal creeping of the rail. In addition, the depression 25 because of its beveled surface facilitates insertion of the spring lock in the opening 19. Preferably, these

lateral abutments at the sides of the depression 25 are supplemented by raised abutments 27 on the top of the tie plate at opposite sides of the opening 19, the abutments 27 extending inwardly to and merging with the adjacent rail abutment shoulder 14. The abutments 27 may be made in the same operation in which the under-cut opening 19 and abutment 21 are formed, as described in said application Serial No. 295,204. While we have shown the outer bearing surface 25 for the spring lock below the top surface of the plate, it will be understood that this bearing may be raised above the top surface. For example, in order to provide a uniform pressure of the spring locks against the rails, the top of each tie plate outwardly of the opening 19 may be raised to form an elevated seat, as disclosed in our said copending application Serial No. 359,618, preferably by indenting the plate bottom in the same punching operation which forms the under-cut opening.

The spring lock 22, as shown in Figs. 1 and 2, is made of a single strip of spring metal which is rectangular in cross section, and the lock is of substantially uniform thickness throughout its length. In Figs. 4 and 5, we have shown a rail fastening similar to that shown in Figs. 1 and 2 except that the spring lock 22*a* is of somewhat different form. The lock 22*a* may be made of square or round metal stock and is formed with a rail engaging end 23*a* which is flattened so as to provide a distended surface engaging the rail base. Because of this distended surface, the frictional resistance between the lock and rail base is increased so that the lock is more effective in preventing longitudinal creeping of the rail relative to the lock. From the distended portion 23*a*, the lock gradually increases in thickness to its intermediate portion 30 where the lock is subjected to the greatest strain, and from its intermediate portion, the lock gradually decreases in thickness to the hook-like portion 24*a*.

It will be observed that in the rail assemblies shown in Figs. 1 and 4, the rail locks lie entirely above the bottom surface of the tie plate, so that it is unnecessary to form any recesses in the tie to receive these locks. Also, the locks are held in position entirely by their own spring action, without the use of separate retaining means, such as a track spike or a key. Accordingly, there is no danger of the locks becoming accidentally loosened in the plate openings, and the locks will exert a uniform pressure on the rail base at all times when the rail is on its seat.

We have shown in Figs. 6 and 7 a modified form of the assembly wherein resilient rail locks are substituted for the usual spikes which are driven into the tie adjacent the rail base to hold the rail down on the tie-plate. The assembly there shown comprises a tie-plate 32 mounted on a tie 33 and having a rail seat on its upper surface for supporting the rail 34. The tie plate may be anchored to the tie by means of spikes 35, and, if desired, additional spikes 36 may be driven into the tie adjacent the rail base. Mounted in the usual spike openings 37 on opposite sides of the rail are resilient rail locks 38 which are similar to the locks 22 and 22*a* in that they are generally U-shaped. Each of the locks 38 has its upper arm engaged with the top of the rail base, the end of the upper arm being bent outwardly, as shown at 39, to provide a suitable rail bearing surface. The end of the lower arm extends through the opening 37 and is formed with a hook 40 engaging the bottom of the tie-plate inwardly of the opening, the tie being formed with a recess 41 under the opening to receive the hook 40. From the recess 41, the lower arm extends upwardly and outwardly so that it engages the outer edge of the opening near the top of the plate, as shown at 42, and from the top of the opening the arm curves outwardly and then downwardly to a bearing portion 43 seated on the top of the plate a substantial distance outwardly from the opening 37.

In installing the lock 38, the two arms are spread apart from their normal positions shown in dotted lines in Fig. 5, and then the lower arm is inserted through the opening 37 until the hook 40 moves under the bottom of the plate. Since the upper arm of the lock when released remains distorted by the rail base, it exerts a spring action on the top of the rail base, this spring action resulting in a reactive force which holds the bearing portion 43 down against the top of the tie plate and also urges the bearing portion 42 against the outer edge of the plate opening. Therefore, the hook 40 cannot be withdrawn from beneath the plate without spreading the arms of the lock apart a substantial distance. Since the lock is adapted to be inserted in the usual spike opening adjacent the rail base, it may be used as a replacement part to take the place of the usual spike in this opening.

The rail assembly shown in Figs. 8 and 9 is similar to that shown in Figs. 6 and 7, except that it includes a rail lock 45 of somewhat different form. The lock 45 is generally U-shaped, and the end of the upper arm is formed with an outwardly turned portion 46 engaging the top of the rail base. As shown in Fig. 8, the main body of the lock 45 is considerably wider than the opening 37 in the plate, but the lower arm is formed with a shoulder 47 and below the shoulder the lock is relatively narrow so that it fits into the plate opening. The reduced end of the lower arm is turned outwardly to form a hook 48 engaging the bottom surface of the tie-plate outwardly of the plate opening, the tie having a recess 49 for receiving the hook. From the hook 48, the lower arm extends upwardly in engagement with the outer wall of the opening, as shown at 50, and beyond the shoulder 47 the lock curves outwardly and downwardly to a bearing portion 51 seated on the top of the plate outwardly of the opening.

The lock 45 is installed by spreading the arms apart and inserting the end of the lower arm into the opening 37 until the hook 48 moves under the tie plate. The reactive force resulting from the spring action of the upper arm on the top of the rail base urges the bearing portion 51 against the top of the plate and holds the vertical portion 50 against the outer wall of the opening. Accordingly, the hook 48 is held in position at all times and prevents accidental withdrawal of the lock.

The rail lock in each of the fastenings illustrated is of simple construction and may be manufactured at low cost. Also, it is durable and may be easily installed. After the lock has been placed in position, it is held there positively by the hook portion underlying the tie plate or by the curved end engaging the taper lock 20 of the undercut opening, and any tendency to remove the lock by disengaging the hook or the curved end is opposed by the spring action of the lock. We have found that the spring lock of our invention may be readily installed with the use of the tool disclosed in our copending application Ser. No. 359,-

618, and because of the spring action exerted by the upper arm of the lock, it can best be removed by using the same tool to spread the arms apart so as to allow withdrawal of the hook-like portion. Preferably, this hook-like portion is relatively rigid as compared to the upper arm of the lock engaging the rail base, whereby it does not yield to permit upward movement of the lock due to the wave action of the rail. The desired rigidity of the hook-like portion may be obtained in any suitable manner, as by forging or heat treatment.

We claim:

1. A rail assembly comprising a tie plate having a rail seat and an opening adjacent the seat, a rail mounted on the seat, and a generally U-shaped spring lock having a flexible arm extending inwardly over the seat and engaging the base of the rail with a spring action, the other arm extending through said opening and having a rigid end portion movable freely into and out of the opening and projecting outwardly away from the rail and under an over-hanging part of the plate, the lock intermediate its ends engaging the outer wall of said opening and the top of the plate outwardly of said opening.

2. A rail assembly comprising a tie plate having a rail seat and an opening adjacent the seat, a rail mounted on the seat, and a generally U-shaped spring lock having a flexible arm extending inwardly over the seat and engaging the base of the rail with a spring action, the other arm extending into said opening and having a relatively rigid part underlying the surface of the plate at the side of the opening remote from the rail, said last arm extending upwardly through the opening in engagement with said remote side and then extending outwardly and downwardly into engagement with the top of the plate.

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