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RAIL FASTENING

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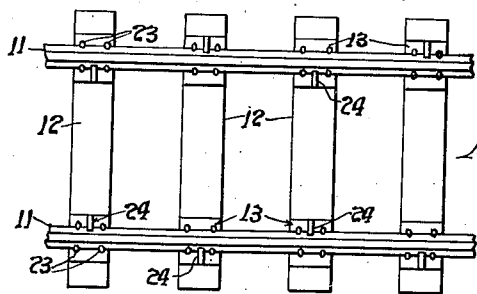
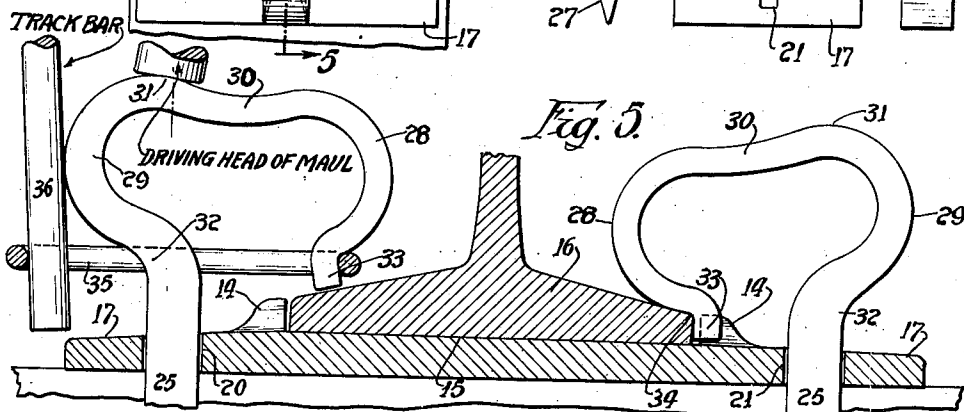
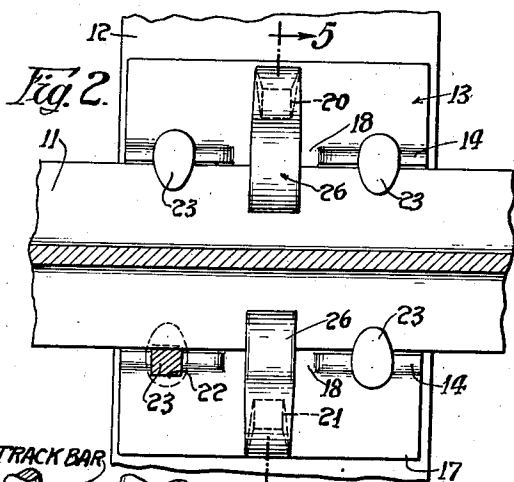
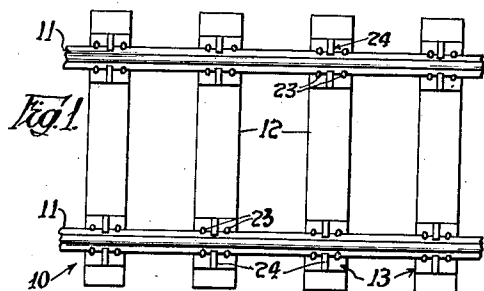
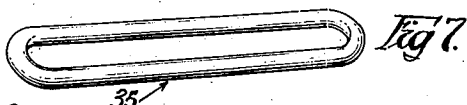


Fig. 6.



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RAIL FASTENING

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6 Claims. (Cl. 238—349)

This invention relates to improvements in rail fastenings and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

Many changes have occurred within the last decade in railway transportation which have brought about a material increase in weight and traction power of locomotives, the size and capacity of cars and the length and speed of numerous trains. As a natural consequence of these changes it has been necessary to progressively strengthen the track structure over which such rolling stock is operated.

With a reasonable sub-grade the rail joint continues to be the most common weakness in the track structure. Certain factors combine to produce this undesirable condition, one of which is the heretofore prevalent belief that expansion of the rails is an irresistible force that must permit such movement in every joint in the track. Owing to the wedging effect of joint bars in the fishing space of a rail, the bolts employed at such joints cannot be tightened up as fully as they might be. Additionally, wave motion of rail produces creepage. Anti-creeper devices of numerous kinds have been used for many years but they do not function efficiently enough in holding rails as it is desired they should be so held, particularly as they afford resistance against creepage only in one direction.

Recently spring spikes have been tried for holding rails against creeping and while good results have been obtained in European countries under light weight traffic conditions, such spikes are not nearly efficient as they should be adequately to anchor the rail against the heavier traffic conditions and somewhat inferior sub-grades in this country.

Incidentally as the weight of the rail increases, wave motion relatively decreases and vice versa.

That expansion and contraction of rails, as an assumed irresistible force, as well as creepage resulting from wave motion, can be controlled by anchoring the rails to every tie and compelling such force to take the line of least resistance, has been demonstrated by welding abutting ends of the rail sections to provide continuous stretches of rails of desired length. However, the cost of the welding and the joint finishing operations has handicapped the more general use of such continuous length rails.

One of the objects of the present invention is to provide a railroad track construction including tensioned devices at opposite sides of each rail so as to impose both a downward pressure

and opposed lateral pressures on the base of both rails to hold the same in a semi-suspended condition whereby a restricted amount of wave motion is permitted while holding the rail against longitudinal movement in either direction.

A further object of the present invention is to provide a rail fastening of an improved kind that includes an elastic or spring spike like element among the parts thereof, which is so formed as to impose a laterally inward pressure against the edge of the base of the rail as well as a downward pressure against the top surface of the rail base, the said pressures combining to hold the rail against undesired movement.

Another object of the invention is to provide a rail fastening which does not rely solely upon a downward pressure upon the rail to produce a large area of frictional engagement and attending resistance between the rail and tie plate, for holding the rail against movement.

Still a further object of the invention is to provide a novel form of elastic spike like element for use in rail fastenings, which when driven home in a tie, functions to impose a duplex pressure upon the rail, one of which is laterally inward and the other of which is downward.

The above mentioned objects of the invention, as well as others, together with the advantages thereof, will more fully appear as the invention proceeds.

In the drawing:

Fig. 1 is a top plan view of a fragment of railroad track to which the improved rail fastenings have been applied.

Fig. 2 is a top plan view on an enlarged scale, of one end of a tie provided with the improved rail fastening.

Fig. 3 is a view in side elevation, on an enlarged scale, of a certain elastic or spring spike like element forming a part of the improved rail fastening.

Fig. 4 is a view in front elevation of the element appearing in Fig. 3.

Fig. 5 is a vertical sectional view through the improved fastening, on a further enlarged scale, as taken on the line 5—5 of Fig. 2 and shows one of the spike like elements as driven into an initial position and before a part of the head of the element is sprung or stressed inwardly prior to its being driven into its final rail fastening position and shows the other spike like element in its final rail fastening position.

Fig. 6 is a view similar to Fig. 1 and illustrates a modified arrangement of the fastener

elements in a railroad track construction to be mentioned later on.

Fig. 7 is a perspective view of a certain link that is employed in connection with a track bar for springing a part of the head of the spike like element toward the shank prior to being driven into its final rail-holding position.

Fig. 8 is a plan view, on a reduced scale, of a modified form of tie plate which may be embodied in the improved rail fastening.

In general, one form of the improved rail fastening includes a tie plate having shoulders, each slightly spaced from opposite edges of the base of a rail, and spike like elements each adapted to be driven through a hole in the tie plate into the tie slightly outwardly from the side edges of the base of the rail, and each having a somewhat elastic head which is sprung or stressed into a position to engage an edge of said base of the rail. The free end of the head of the spike-like element is so formed that when it is in its final rail holding position, it imposes a downward pressure on the rail base as well as a laterally inward pressure on the edge thereof. The combined action of these two pressures is to anchor the rail substantially in semi-suspension so as to permit only a restricted amount of wave motion, but to prevent creeping movement of the rail in either direction.

Referring now in detail to that embodiment of the invention illustrated in Figs. 1 to 5 of the drawing, 10 indicates as a whole a length of a railroad track that includes the usual rails 11 and supports therefor in the form of the conventional wooden ties 12. Between each rail and its associated end of the ties is located a tie plate 13. The bottom of said plate is herein shown as flat for engagement upon the tie. Transversely extending shoulders 14 respectively are formed in spaced relation upon the top surface of the tie plate and said surface between said shoulders provides a rail seat 15. This seat slopes toward the center of the track as a whole. The seat 15 of the tie plate is a trifle wider than the base 16 of the rail so that normally there is a clearance between the shoulders 14 and the edges of the rail base. Those portions 17 of the tie plate outwardly from the shoulders 14 may taper in thickness toward the respective end edges of the plate.

The shoulders 14 are cut away on the median line of the plate, transversely of the rail engaged thereon, as indicated at 18, for a purpose to appear later. Instead of the cutaway portions 18, openings 19 may be formed in the tie plates and such openings are shown in Fig. 8. The cutaway shoulder is preferred for tonnage production. Also in said line said cutaway portions 18 or openings 19 but spaced a suitable distance from said shoulders, square holes 20—21 are formed in the end portions 17 of said plate, as best appears in Fig. 2.

It is through both of said holes that certain novel spike elements, later to be described, are driven into the tie. Pairs of square holes 22 are formed in the plate to pass through the shoulders 14 and it is through these holes that one or more conventional type of headed railroad spikes 23 may be driven to more rigidly secure the tie plate against side thrusts of wheel loads.

One of the novel spike like elements before referred to is illustrated on an enlarged scale in Figs. 3 and 4 and bears the numeral 24. Such a spike element includes a relatively long straight shank 25 of a square cross section, which has a peculiar crook shaped elastic head 26 at one end

and has a wedge shaped driving point 27 at the other end, the edge of said point extending transversely of the plane of said head.

The head includes two oppositely curved front and rear portions 28—29 respectively connected together by a reversely curved intermediate portion 30. The approximate junction of the portions 29 and 30 is disposed substantially in line with the axis of the shank 25 and forms the driving face 31 for the element. By "driving face" is meant that part of the element which is intended to be struck with a track maul when driving the element into the tie. The portion 29 is connected to the top end of the shank by a reversely curved neck or throat 32 so that said portion 29 is disposed in a plane to the rear of the shank. The portion 28 terminates in a downwardly extending substantially straight rail base edge engaging portion 33, the junction of said curved portion and said straight portion forming a shoulder 34 at the front bottom end of the curved portion 28. It is pointed out that the bottom end extremity of the rail base edge engaging portion 33 is disposed in substantially the plane of the top end of the shank 25 proper.

The spike is made from a piece of stock having the square cross section of the shank. This stock tapers in thickness starting at the neck 32 to about the middle of the reversely curved intermediate portion 30 where it is of the least thickness. From this point on to the extremity of the rail base edge engaging portion 33 substantially the same thickness is maintained. This tapering in thickness of the metal of the head of course displaces said metal laterally so that the width of the stock gradually increases from the neck 32 to the middle of the portion 30 where the head is the widest and this width is then maintained to the extremity of the rail base edge engaging portion. This increasing width in the neck and head appears best in Fig. 4. One advantage gained by this formation is that the head is elastic whereby the rail base edge engaging portion 33 may be sprung or stressed toward the plane of the shank so as to induce a tension or a tendency of said portion to swing away from the plane of the shank. When the portion 33 of the head is thus sprung inwardly toward the shank 25, both portions 28 and 29 are somewhat reduced in curvature radii. As the portion 33 is located a greater distance from the curved portion 29 than from the curved portion 28, the tendency of the portion 33 is to swing outwardly away from the shank about the curved portion 29 as one axis and to swing outwardly and downwardly away from the shank about the curved portion 28 as another axis. Thus, it is to be noted that a dual action is afforded by the portion 33 so that it swings outwardly and downwardly from the shank about the two portions 28 and 29 as axis. The position of the part 33 when sprung inwardly toward the shank 25 appears in dotted lines in Fig. 3.

In applying each element 24 to its place in track, assume that the tie plates 13 have been positioned upon the ties so that the base 16 of the rail 11 engages upon the seats 15 of said tie plates and which seats slope inwardly and downwardly toward the center of the track. Therefore, the rails themselves are canted slightly inwardly from the perpendicular. In this instance this canting of the rails is incidental to the structure illustrated. However, the seat 15 may be flatly horizontal. Holes are then bored in the ties in line with the holes 20 and 21.

A spike element 24 is then driven through say

the outer hole 21 in the tie plates on each tie and then another element 24 is driven through say the inner hole 20 in the tie plates on each tie.

5 When positioning an element 24 prior to driving the same, the head 26 is faced toward the rail. By means of a maul, the driving head of which appears in Fig. 5, the spike element is driven into a somewhat smaller hole provided therefor in the tie, by striking blows upon the face 31. It is pointed out at this time that by reason of the position of said face as before described, the driving blows are delivered to the element directly in line with the axis of the shank. As this face is located adjacent the curved portion 29 which has the shorter radius and has the greater width and thickness compared to the portion 28, the impact of the blows cannot bend the head out of shape. Another advantage gained in this respect is that the face is disposed at such a distance away from the rail as to avoid striking the rail in driving the element into the tie as with a track maul.

Blows are then delivered upon the element until the extremity of the portion 33 engages upon one side of the base of the rail slightly inwardly from the associated edge and in line with the cutaway portion 18 or the opening 19 provided in the shoulder 14 at the sides of the rail base. Thereafter a link 35 shown in Fig. 7 is slipped over the head of the element as appears toward the left hand side of Fig. 5 and then one end of a track bar 36 is inserted in one end of the link, the other end of the link engaging the portion 33 of the element at this time. Using the portion 29 at the back of the element as a fulcrum, and swinging the long leverage portion of the bar 36 inwardly toward the plane of the rail, the head 26 of the element 24 is sprung or stressed inwardly until the portion 33 is disposed in the plane of the recess 18 or 19. Thereafter the maul is again used to drive the element home into its final position at which time the shoulder 34 engages the top corner of the rail base as appears in Fig. 5. When the tie plates have the cutaway portions 18, the end extremity of the portion 33 has clearance with respect to the top surface of the tie plate. When the tie plates have the recesses 19, said extremity may extend to a plane below the top surface of the tie plate. After the element has been driven into its final position, the bar 36 and link 35 are removed. The element 24 for the other side of the rail is then driven into position in the same manner.

When both elements are in their final position, the rear side of the top end of the shanks thereof engages against the outer side of the holes 20—21. This gives a firm backing for the elements at a point below the neck or throat. It is pointed out at this time that the pressure on the shank of the elements against the back of the holes 20—21 is as great as the pressure exerted against both edges of the rail base. This will create a binding effect on the tie that will prevent mechanical abrasion of the contact surface of the tie upon which the tie plate is secured.

At this time the stressed condition or spring action of the heads of both elements tends to return them to their normal condition and thus the heads function jointly with a downward pressure and with an inward pressure toward each other to effectively grip both edges of the rail base and hold the rail in substantially a

semi-suspended condition. With the elastic heads functioning with the pressures mentioned, the rail base becomes centered on the seat 15 of the tie plate between the shoulders 14—14 so as to there leave a slight clearance.

The pressures exerted by the heads of the elements of course are continuous and practically uniform against the edges of the rail base and against the back of the holes 20—21 so that no appreciable wear will develop at these points.

This uniform pressure also decreases the possibility of breakage of the elastic portions of the head and such portions are guarded against being overstrained by the shoulders 14 on the tie plate that limit the side thrust of the rail against said elastic portions to an amount equalling the clearance space between said shoulders and rail base edges as before mentioned.

By reason of the semi-suspended condition by which opposite sides of the rail base are gripped, there is no heavy pressure to rigidly hold the rail base down on the seats as provided by the tie plates and therefore the rail may accommodate itself to wave motion by yielding to permit a limited amount of the same but the rail cannot creep by reason of the inward pressures imposed against both edges of the base of the rail.

It is pointed out at this time that the distance between the axis of the shank and the vertical median line of the portion 33 of both fastening elements is a trifle less than the distance between said axis and either end edge of the rail base edge engagement face of the portion 33. Thus should rail movement tend to twist or turn the spike element about the axis of the shank, the tendency of the portion 33 would be to impose a turning binding effect and greater inward pressure against the edge of the rail base to check rail movement in either direction.

Should it be necessary to remove an element, the gradually increasing width of the element beginning at the neck or throat 32 affords a convenient place for engagement with a spike pulling claw bar, the head of the bar fulcruming under a block or the like of desirable thickness placed at or on either end of the tie plate.

In Fig. 6 I have illustrated a modified form of the distribution of the fastening elements, which under some conditions of the sub-grade upon which the track is laid, would be quite practical and result in a considerable saving in expense.

As before stated with respect to the track construction shown in Fig. 1, four elements 24 are employed for each tie, with two of such elements used in connection with each tie plate. In Fig. 6, is shown an arrangement which in some instance of track construction, it should be quite practical to employ only two fastening elements to each tie, with one used in connection with each tie plate. With the last mentioned arrangement, on each alternate tie, the fastening elements are disposed to the outside of the rail and on each intermediate tie the fastening elements are disposed to the inside of the rail. It is to be understood, however, that in no instance does the rail base edges engage either shoulder 14 on the tie plates. Thus the forces of the elements 24 on alternate and on the intermediate ties, join to hold the rail against creepage by reason of the engagement of the portions 33 of said elements on both edges of the rail base.

The improved fastening makes "freezing" the abutting rail ends at the joint together, feasible.

By "freezing" is meant, eliminating any relative movement between the rail and splice bars in a railroad track. Thus the improved fastening will result in splice bars lasting the life of the rails and will eliminate "low joints" and "battered rail ends" as well as doing away with the use of electric signal bonds. The improved fastening permits permissible tolerances in height of rail to be ground down uniformly so as to give a smooth riding track. Also the uniformed fastening prevents rail creepage in either direction and materially decreases expense of maintenance and prolongs the life of both the rails and the ties.

While in describing my invention I have referred in detail to the form, construction and arrangement of the parts, the same is to be considered only in the illustrative sense so that I do not wish to be limited thereto except as may be specifically set forth in the appended claims.

I claim as my invention:

1. A rail fastening element comprising a shank having a driving point at one end and having a crook-like head at the other end, said head comprising a portion curved in one direction and extending from and contiguous with said other end of the shank, a second portion curved in a direction opposite to the first curved portion and connected at one end thereto by an intermediate portion, the other end of said second portion terminating in a downwardly extending shoulder rail base edge engaging portion, said curved portion and said intermediate portion providing elasticity in said head whereby the rail base edge engaging portion may be sprung inwardly toward the shank.

2. A spike-like rail fastening device including a shank portion and an integral elastic head portion the head portion being of crook-like construction and terminating at its free end in a portion with a face surface disposed in a plane extending in the general direction of the spike shank and adapted to engage the side of the rail base, and a part offset therefrom in a direction away from the shank to provide a surface for overhanging the rail base, said head portion being connected to the shank by a portion of substantial curvature whereby in the driving of the spike the free end of the head portion may be sprung inwardly toward the shank to tension the elastic head portion and to cause the outer end thereof to impose a downward pressure on the rail base and a pressure laterally against the side of the associated rail base.

3. A spike-like rail fastening device including a shank portion and an integral elastic head portion the head portion being of crook-like construction and terminating at its free end in a portion with a face surface disposed in a plane extending in the general direction of the spike shank and adapted to engage the side of the rail base, and a part offset therefrom in a direction away from the shank to provide a surface for overhanging the rail base, said head portion being connected to the shank by a portion of substantial curvature and which is of gradually reduced thickness in a direction away from the shank whereby in the driving of the spike the free end of the head portion may be sprung inwardly

toward the shank to tension the elastic head portion and to cause the outer end thereof to impose a downward pressure on the rail base and a pressure laterally against the side of the associated rail base.

4. A spike-like rail fastening device including a shank portion and an integral elastic head portion the head portion being of crook-like construction and terminating at its free end in a portion with a face surface disposed in a plane extending in the general direction of the spike shank and adapted to engage the side of the rail base, and a part offset therefrom in a direction away from the shank to provide a surface for overhanging the rail base, said head portion being connected to the shank by a portion of substantial curvature and which is of gradually increased width in a direction away from the shank whereby in the driving of the spike the free end of the head portion may be sprung inwardly toward the shank to tension the elastic head portion and to cause the outer end thereof to impose a downward pressure on the rail base and a pressure laterally against the side of the associated rail base.

5. A spike-like rail fastening device including a shank portion and an integral elastic head portion the head portion being of crook-like construction and terminating at its free end in a portion with a face surface disposed in a plane extending in the general direction of the spike shank and adapted to engage the side of the rail base, and a part offset therefrom in a direction away from the shank to provide a surface for overhanging the rail base, said head portion being connected to the shank by a portion of substantial curvature and which is of a gradually reduced thickness and of an increased width in a direction away from the shank whereby in the driving of the spike the free end of the head portion may be sprung inwardly toward the shank to tension the elastic head portion and to cause the outer end thereof to impose a downward pressure on the rail base and a pressure laterally against the side of the associated rail base.

6. Rail fastening means comprising in combination with a tie and a rail, a tie plate between the tie and the rail and having a hole therein spaced away from the base of the rail, and a spike-like element including a shank portion extending through the tie plate hole into the tie, the spike-like element having an integral elastic head portion of open loop-like construction terminating at its free end in a portion with a face surface disposed in a plane extending in the general direction of the spike shank and a part offset therefrom in a direction away from the shank to provide a surface for overhanging the rail base, whereby in the driving of the spike the free end portion may be sprung inwardly toward the shank to tension the elastic head portion and to cause the outer end thereof to engage and impose a downward pressure on the rail base, a pressure laterally against the associated side of the rail base and to press the top end of the shank against the outer side of the wall surface defining the hole which accommodates the shank in the tie plate.

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