Jan. 15, 1957 L. SPENCER 2,777,642

RAILROAD SPIKE WITH SPACE COMPENSATING MEANS

Filed July 17, 1953

Fig. 1

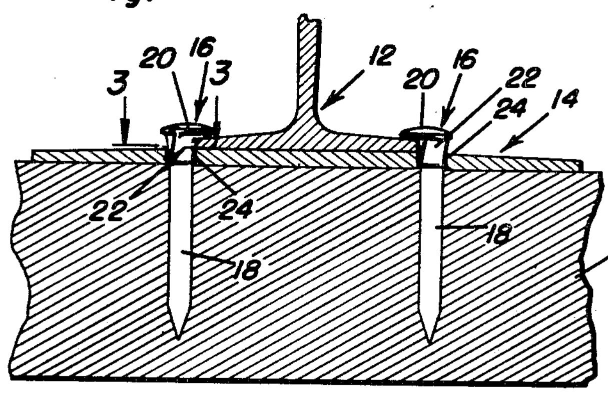


Fig. 2

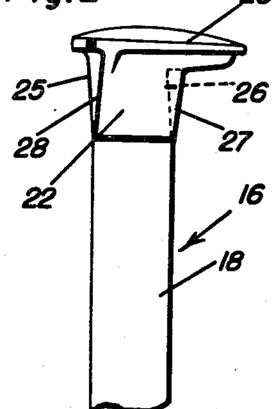
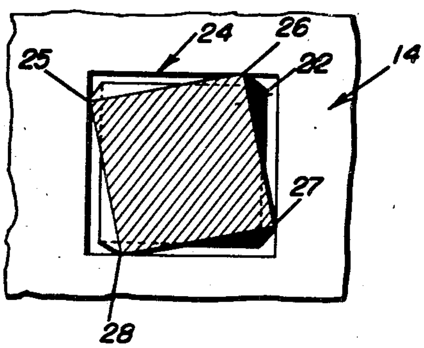


Fig. 3



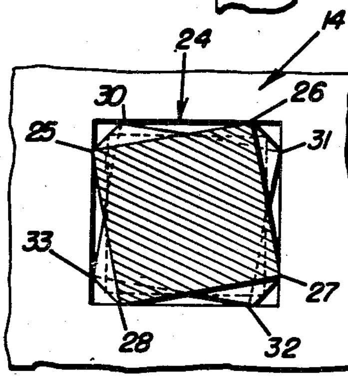


Fig. 5

Fig. 7

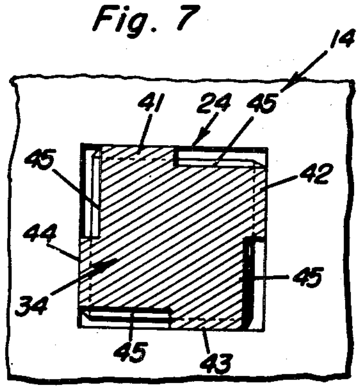


Fig. 4

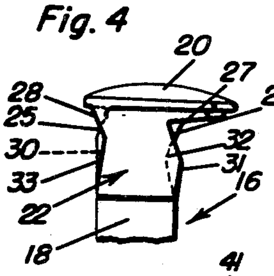
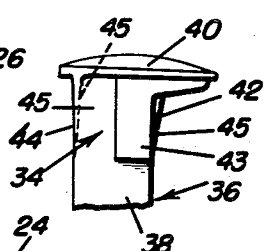


Fig. 6



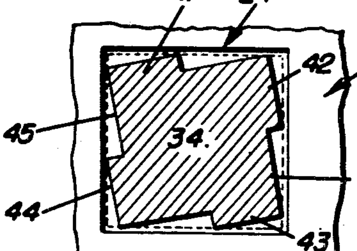


Fig. 8

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United States Patent Office

2,777,642

Patented Jan. 15, 1957

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2,777,642

RAILROAD SPIKE WITH SPACE COMPENSATING MEANS

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Application July 17, 1953, Serial No. 368,722

8 Claims. (Cl. 238—375)

This invention relates to the ever existing problem of properly spiking and reliably retaining track rails on regulation wooden cross-ties, this with the idea of effectually minimizing tie abrasion and destructive wear and taking into account that spikes fitting too loosely in spike holes in the plates permit undesirable deviation in line and gage. In order to cope with the recognized problem and especially to reduce the wear of the rails on the cross-ties it is now the practice to interpose metal tie plates between the cross-ties and rails. Because, however, presently used tie plates have oversizes holes for the relatively smaller spikes, this poses the further problem of how best to solve it. Naturally, it is essential to cause the spikes to fit properly in their holes because, otherwise, loose fitting spikes permitting the tie plates to shift causes excessive stress and consequent destruction of the tie surfaces, displacement of the rails and loss of the required track gage.

The principal object of the instant invention is to provide specially improved standard-type spikes which, because they fit firmly and properly in the tie plate spike holes results in the tie plates staying put and insures the desired positions of the rails to be thus maintained at all times.

It is generally well known that the tolerances permitted in the manufacture of standard tie plates and also the manufacture of standard spikes are invariably such that the spike, when driven through its particular hole, will usually be loose in the hole even if driven down to take advantage of the usual tapered compensating neck or throat. The allowed tolerance is generally 1/32". This results in a minimum of 11/16" holes in the plates coupled with 3/4" maximums. Spike shanks allowed over the standard 5/8" spike will just slip into the smallest hole in the plate. If the hole in the plate is 3/4", as is usual, and the greatest cross-section of the spike is 5/8", as usual, and the spike is driven exactly on center through the hole, there will be a clearance of 1/16" all around the spike surfaces. Often, however, such a spike may be accidentally driven crooked or may be in some manner bent with the result that it will unintentionally jam in the hole and fairly well hold the tie plate. Ordinarily, however, the slack mentioned above exists and so the permitted tolerance requirements provide the problem to be solved; namely, the undesirable play which results in the tie plate shifting from its intended position and the attending difficulties above mentioned.

It is a matter of common knowledge that an invention, to be acceptable to the railroad industry, particularly in relation to ties, tracks, tie plates and spikes, must take into account the ever-pressing likelihood that, almost universally, railroads are not likely to change their standards to meet the diversified concepts of inventors. Railroads use such vast numerical units of these items that they virtually admit that they will not change their own standards. Consequently, it is an objective in the instant matter to utilize sandard American Railway Engineering Association materials now in use on the railroads in this country. It follows, therefore, that the subject matter herein revealed has to do with the common 5/8" square shank standard cut spike and standard tie plates. With this in mind it will be clear that it is one of the essential aspects of this invention to improve upon commonly used spikes and to do this in such a way that it will, in a highly satisfactory, simple and effective manner, cope with the present tolerances necessary in the manufacturing of currently used plates and spikes.

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Stated otherwise, the invention has to do with a spike characterized by a shank, a head and a neck or throat portion joining the head and shank and wherein the neck is specially designed so that when the spike is driven through the oversize hole in the standard tie plate the specially provided surfaces on the neck wedge and jam themselves firmly into binding contact with the four marginal edge portions of the hole and do this in such a way that the tie plate is effectively anchored against movement on the tie and when all spikes are in place they cooperate in unison in preventing the pie plate from shifting from its intended spiked position.

Taken from a combination point of view, keeping in mind that there are several forms of the invention herein revealed, and generically construed, the invention may be briefly summarized as having to do with a wooden tie, a metal tie plate superimposed thereon, said plate having customary rail shoulders and the usual oversize spike holes, a rail resting on said tie plate between said shoulders, and hold-down spikes driven through said holes into said tie, said tie, tie plate, rail, and each spike, each being of standard construction with the latter embodying a shank, head and a tapered neck joining the head and shank, said shank embedded in the tie at right angles to the plane of the tie plate, said neck having like equidistant circumferentially spaced surface portions in direct binding contact with each of the respective four marginal edges of the spike hole so that said neck is thus firmly lodged in said hole, whereby said tie plate is prevented from shifting on the tie once it is properly spiked to said tie.

Then, too, novelty is predicated on terminating the lower end portion of the special deformed neck flush with the bottom of the tie plate so that virtually no portion thereof is actually driven into the tie and so that the essenial retaining surfaces of the neck are confined more or less within the encompassing confines of the spike hole.

More specifically, the invention, in one of its specific forms, has to do with a neck which is forcibly wrenched into a torsional twist wherein the inherent resilient forces then existing or stored up in the neck tend to spring back and recover original position so as to in this manner impose an incessant strain against the edge portions of the hole in a resulting metal-to-metal-contact of the cooperating plate and spike surfaces preventing the plate from shifting its given position on the tie.

Another form of the invention has to do with a spike for use in conjunction with a standard tie plate in which manufacturing tolerances allow certain maximum and minimum dimensions of the spike holes relative to the cross sectional dimension of the spikes used therewith, wherein the yieldable but nevertheless resilient metal constituting the neck is deformed by prominent relatively broad longitudinally extending extrusions or extruded abutments providing considerable contact with the cooperating edges of the oversized hole and thus obtaining the desired locking effect much in the same manner as is attained from the neck which incorporates the aforementioned space compensating twist, or double-twist, as desired.

Objects, features and advantages in addition to those so far revealed will become more readily apparent from the following description and the accompanying sheet of illustrative drawings.

In the drawings, wherein like numerals are employed to designate like parts throughout the views:

Fig. 1 is a view showing a fragmentary portion of the cross-tie, tie plate and rail in section, with the spikes cooperating therewith and appearing in elevation, the latter constructed in accordance with one phase of my inventive concept.

Fig. 2 is an enlarged fragmentary elevational view of the spike showing the single twist adaptation thereof.

Fig. 3 is an exaggerated view in section and elevation, taken on the line 3—3 of Fig. 1 looking in the direction of the arrows showing, of course, the single twist spike.

Fig. 4 is a view like Fig. 2 showing a modification wherein the double twist and wherein the twists are from left to right, or vice versa.

Fig. 5 is an enlarged sectional and elevational view based on Fig. 3 but showing the double twisted spike of Fig. 4.

Fig. 6 is a third modification of the enlarged spike per se wherein the single twist principle is achieved by deforming the relatively soft metal and thus defining the axially twisted or offset corners:

Fig. 7 is a view along the lines of Figs. 3 and 5 but showing the spike of Fig. 6 and its manner of use; and

Fig. 8 is a view based on Fig. 7 showing the multiple abutment neck axially wrenched or twisted to get the two-point contact result at each corner of the spike opening, as illustrated.

Reference is had first to the form of the invention appearing in Figures 1, 2 and 3 respectively. Concerning Figure 1, the conventional wooden cross-tie is denoted by the numeral **10** and the rail is denoted at **12** while the intervening tie plate is denoted at **14**. The base flange of the rail rests upon the tie plate and against the usual parallel shoulders (not detailed) where it is held in place by the hold-down spikes denoted generally by the numerals **16**. As shown in Figure 2, each spike may be said to be standard in form except and insofar as the improved retaining neck is concerned. Therefore the spike may be described as embodying a shank **18**, a head **20** and a jointing neck between the shank and head which neck is here improved to obtain the desired results. The improved neck is denoted generally speaking, by the numeral **22**. It is the form of the neck which has been already described as a space compensating torsionally twisted neck the tendency of which is to spring back and recover its true and axial or original position, that is, the position prior to distortion. This neck is tapered, as usual, and is square in cross section and the difference is that it is twisted and thus off-set so that it presents four distinct retaining shoulders or corners which are shown in Figure 3 to perform the desired space takeup and retaining result. That is to say, after the spike is driven home through the regular ¾" spike opening **24**, the four corners **25, 26, 27** and **28** wedge themselves into friction-binding or so-called locking engagement with the four marginal edges of the spike hole **24** at circumferentially spaced equidistant points. Therefore what would otherwise be a space existing between the neck and marginal edges of the spike opening is taken care of by this unique binding and locking and effectively fitted result. This neck **22** is the single twisted form of the invention.

It has been found desirable, as shown in Figures 4 and 5, to also use what may be called a double-twist-neck and in either instance the neck as an entity is more or less confined within the limits of the spike hole **24** so that it does not extend below the bottom of the tie plate. Under this double twist idea four more corners are had and these four corners are denoted by the numerals **30, 31, 32** and **33**. Thus, we have four corners to the right, or clockwise, and four corners to the left, or counter-clockwise, sufficiently close together so that all eight corners engage the edges of the hole **24** in the manner shown in Figure 5. Actually, this means that the first set of corners **25, 26, 27** and **28** engage (Figs. 3 and 4) two on the left and two on the right sides of the corners of the hole **24** while the other corners **30** and **31** and **32** and **33** engage on what may be alternatively described as the other right-left sides of the same corners. This eight-point contact achievement insures a more effective "twin" locking result between the double twisted neck and the four marginal edges of the spike hole **24**. Thus, we have a single-duty torsional twist construction in Figures 1 to 3 and a double-duty torsional twist construction (right to left or left to right) in Figures 4 and 5.

Instead of using the torsional twists to accomplish the desired result, if one so prefers, the modification of Figures 6, 7 and 8 may be resorted to. Here, the improved self-adapting neck is denoted by the numeral **34**. This neck is a part of the spike denoted at **36** in Figure 6 which spike includes the usual standard shank **38**, and the head **40**. The neck as is clear, is the improvement here. This neck is brought into being by compressing the metal at four equidistant circumferentially spaced points and thus expressing the intervening portions of the metal, or, stated otherwise, the neck is characterized by four circumferentially spaced extrusions or relatively broad longitudinally extending abutments which are denoted by the numerals **41, 42, 43** and **44** and the intervening receding or inset surfaces denoted at the four points, all designated by the numerals **45** (see Fig. 7).

These spikes having improved deformed or distorted necks serve the intended purposes well. It might be pointed out here that the expressions "distorted" and "deformed" are used to generically cover either the twisted neck Figures 1 to 5 inclusive or the abutment-equipped neck **34** in Figures 6, 7 and 8.

In the form of the invention wherein the metal is squeezed to displace portions and to define the abutments, the ⅝" square bar of the common spike shank can be made to contact the edges of the hole in the tie plate even without any twists. But preferably I find the best result with the axial or slight twist or a twist sufficient to put the spike neck under slight axial stress, as brought out for example in Figure 8. Actually, the squeezed shape in most of the holes the neck is driven into assumes the slight twist by itself in the mere matter of driving it but, of course, it would not do so under the worst set of tolerances, where for example the hole is ¾" exactly and the spike is ⅝" exactly.

It is to be kept in mind that the success of these spikes revolves around putting the soft spike steel in the shank under slight strain as the spike is driven, its resistance to this unwinding or unraveling axial twist accomplishes the desired binding and holding result.

By utilizing a spike having a double twist, as herein shown and described, provision is made for the requirement wherein a tie plate is used which is much thinner out near the end and where the spikes are used as anchor spikes away from the rail base. The double twist establishes contact in either rail holding position or in anchor spike hole as will be evident to the reader.

In further reference to Figures 6 and 7, it is to be pointed out that while this form of the shank will contact the sides of the hole of largest tolerance within practical limits, if driven into a hole of smaller size the protruding abutments, will cause the shank to rotate or twist slightly to the left or counter-clockwise.

Although I would not want to confine myself to any exact measurement or degree of twist, in general, I have found ⅛" twist sufficient in every case. Such a slight twist is easy to manufacture with the now ordinarily used spike making dies and in the soft steel these standard area cut spikes are made of, still offer sufficient resistance that all the plurality of spikes driven in this plate combine and resist any movement of the plate with complete unity. Whereas with the common ⅝" cut spike driven perfectly centered in the common square hole punched in the tie plate allows about 1/16" of movement because of these tolerances. The slight twist of the shank of this same common cut spike in my design overcomes this perfectly and simply.

In the special shaped shank within this same tie plate hole area, I have simply displaced a slight amount of the metal on all four sides of the spike shank. Assuming I displaced 1/16" on all four sides as my drawing indicates (can be more or less), a 5/8" square bar then measures 3/4" wide on its over-all basis, yet retains the same amount of metal within this area. I also plan on giving this type of shank a slight twist as well, finding that the torsion in the metal insures any plurality of these spikes to react as a unit in holding the plate against movement on the tie. Heavily applied force or any shearing of the metal is not needed. And, only standard materials of the railroads own accepted design are used to gain my objectives.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. In combination, a wooden tie, a metal tie plate superimposed thereon, said plate having rail shoulders and oversize spike holes, a rail resting on said tie plate between said shoulders, and hold-down spikes driven through said holes into said tie, said spike embodying a shank, head and a tapered neck joining the head and shank, said shank embedded in the tie at right angles to the plane of the tie plate, said neck having four equidistant extruded flat-faced abutments and intervening receding surfaces, the latter spaced from the adjacent edges of the cooperating spike hole and the abutments each having tight-binding engagement with its respective edge, said abutments being longitudinally disposed and terminating at their lower ends substantially flush with the bottom of the tie plate, whereby said neck is wedged at four points in the hole and is thereby so firmly lodged in the hole that, despite the oversize tolerance dimension of the hole, the tie plate cannot shift relative to the tie or the spike.

2. In combination, a wooden tie, a metal tie plate superimposed thereon, said plate having rail shoulders and oversize spike holes, a rail resting on said tie plate between said shoulders, and hold-down spikes driven through said holes into said tie, said spike embodying a shank embedded in the tie at right angles to the plane of the tie plate, said neck being square in cross-section and having a torsional twist wherein the inherent resilient forces thus stored therein tend to constantly return the same to its original position axially aligned with the shank, whereby the respective four corners of the neck are constrained to forcibly bear directly against their respective marginal edges of said spike hole and thus resulting in overcoming the usual disparity between the smaller cross-section of the neck and allowed tolerance of said oversize spike hole and serving to spike-lock the tie plate against undesirable shifting on the tie.

3. The structure defined in claim 2, wherein said torsional twist is confined to and substantially within the depth limits of said spike hole and is made up of a right-hand twist and also a left-hand twist so that the respective sets of upper and lower corners thus presented positively engage the cooperating marginal edges of the spike hole to the right and left of the respective corners of the spike hole.

4. In combination, a tie plate having an oversize spike hole, and a spike having a shank, head and tapered neck joining the head and shank, said neck being smaller in cross-section than the larger tolerance size of said spike hole, said neck having a torsional twist wherein the inherent resilient forces thus stored therein tend to constantly return the same to its original position axially aligned with the shank, whereby the respective four corners of the neck are constrained to forcibly bear directly against their respective marginal edges of said spike hole and thus resulting in overcoming the usual disparity between the smaller cross-section of the neck and allowed tolerance of said oversize spike hole and serving to spike-lock the tie plate against undesirable shifting on the tie.

5. For use in conjunction with a tie plate in which manufacturing tolerances allow certain maximum and minimum dimensions of the spike holes relative to spikes used therewith; a spike comprising a square shank with a pointed lower end, usual overhanging head at the upper end and a neck joining said head to said shank, said neck having a torsional axial twist wherein the inherent resilient forces stored therein tend to constantly return the neck to its original position axially aligned with the shank, whereby the respective four corners of the neck are constrained to forcibly bear directly against their respective marginal edges of said spike hole and thus resulting in overcoming the usual disparity between the smaller cross-section of the neck and allowed tolerance of said oversize spike hole and serving to spike-lock the tie plate against undesirable shifting on the tie.

6. The structure defined in claim 5, wherein said torsionally twisted neck is of an over-all restricted length approximately equivalent to the depth of the spike hole so that when located in said hole it is substantially confined to the encompassing limits of the hole, and said neck having a double twist with one twist to the right and the other twist to the left.

7. In combination, a tie plate in which manufacturing tolerances allow certain maximum and minimum dimensions of the spike holes relative to spikes used therewith, and a complemental spike comprising a shank having a regulation head and a neck joining said head to the upper end of said shank, said neck having four distinct circumferentially spaced extrusions providing flat-faced lengthwise abutments and four intervening receding surfaces, the over-all cross-section of said neck, including said abutments, being smaller than the allowed tolerance of the spike hole in the above stated tie plate, said neck being of an over-all restricted length approximately equivalent to the depth of the spike hole so that when the neck is properly located in said spike hole it is substantially confined to the encompassing marginal limits of said spike hole.

8. The structure defined in claim 7, wherein said neck is torsionally twisted and said abutments are thus axially distorted so that each abutment spans and straddles the cooperating corner of the spike hole in such a manner that the lengthwise edges of each abutment are thus located to bear against two adjacent edges of the holes on opposite sides of said cooperating corner.

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