Oct. 5, 1954 J. R. SNYDER 2,690,876

FASTENING FOR RAILS

Filed Sept. 3, 1948 3 Sheets-Sheet 1

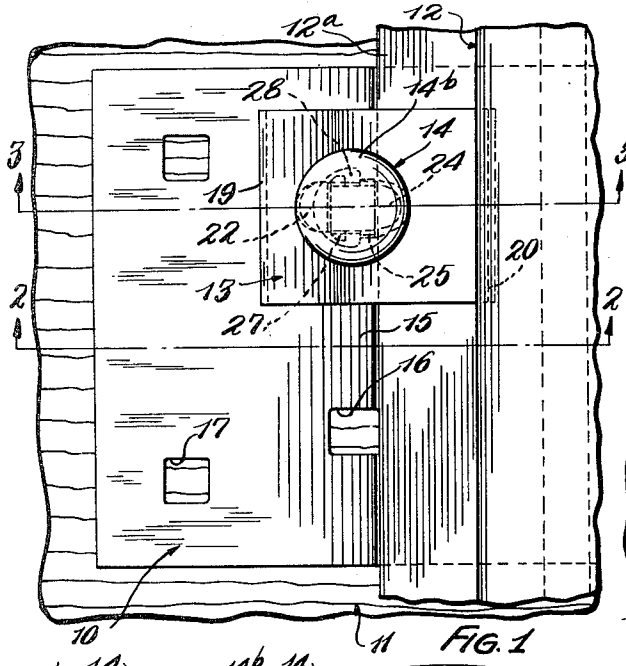


FIG. 1

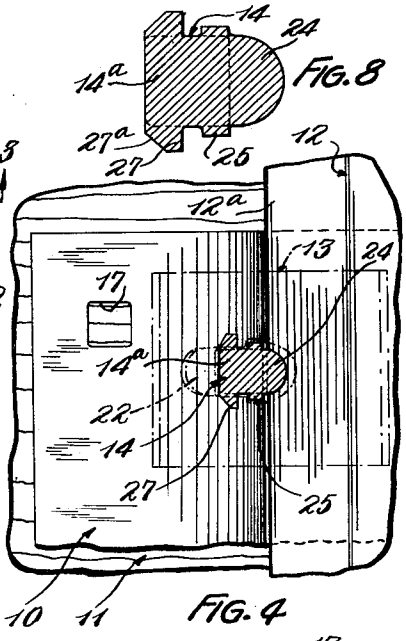


FIG. 8

FIG. 4

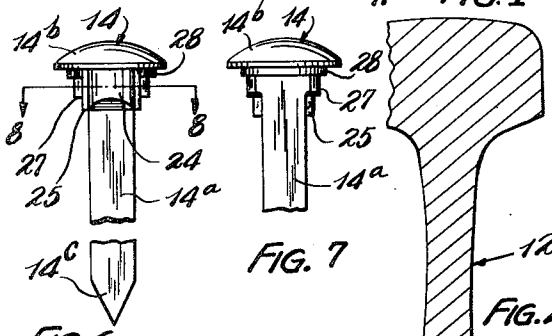


FIG. 7

FIG. 6

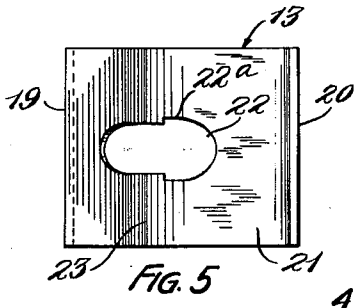


FIG. 5

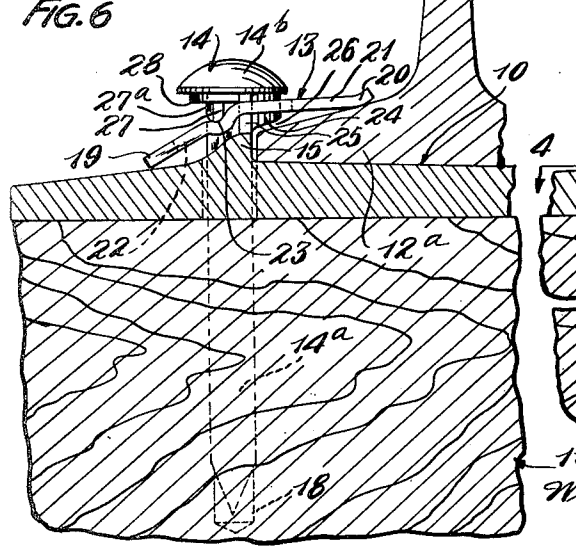


FIG. 2

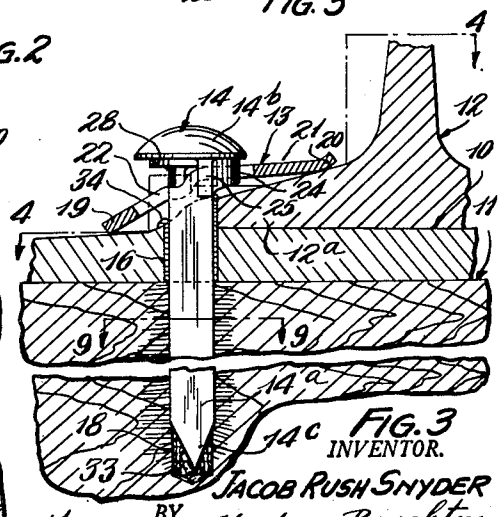


FIG. 3

INVENTOR.
JACOB RUSH SNYDER
BY Hudson, Boughton, Williams, David & Koffmann.
ATTORNEYS

Oct. 5, 1954 J. R. SNYDER 2,690,876

FASTENING FOR RAILS

Filed Sept. 3, 1948 3 Sheets-Sheet 2

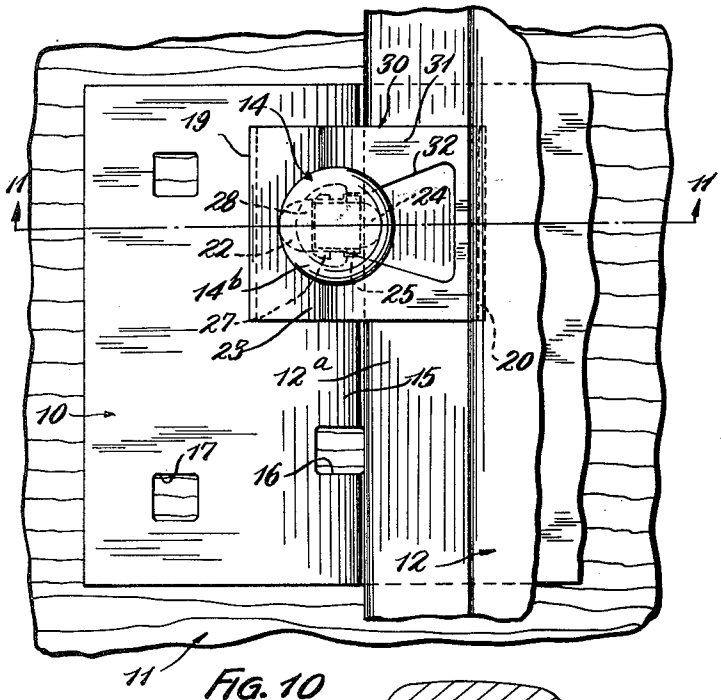


FIG. 10

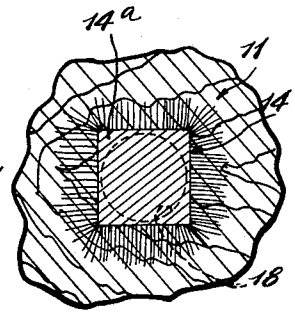


FIG. 9

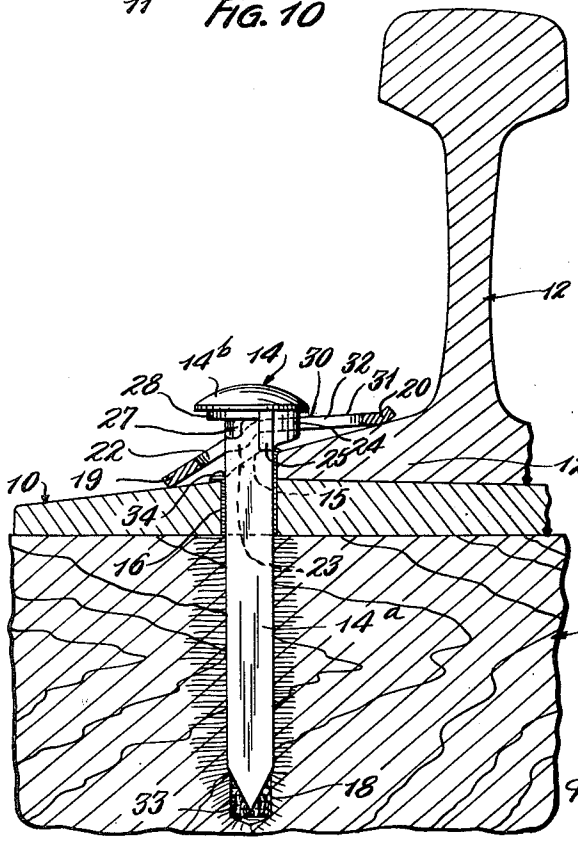


FIG. 11

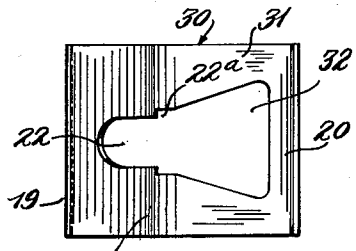


FIG. 12

INVENTOR.
JACOB RUSH SNYDER
BY Hudson, Boughton, Williams, David & Hoffmann.
ATTORNEYS

Oct. 5, 1954 J. R. SNYDER 2,690,876

FASTENING FOR RAILS

Filed Sept. 3, 1948 3 Sheets-Sheet 3

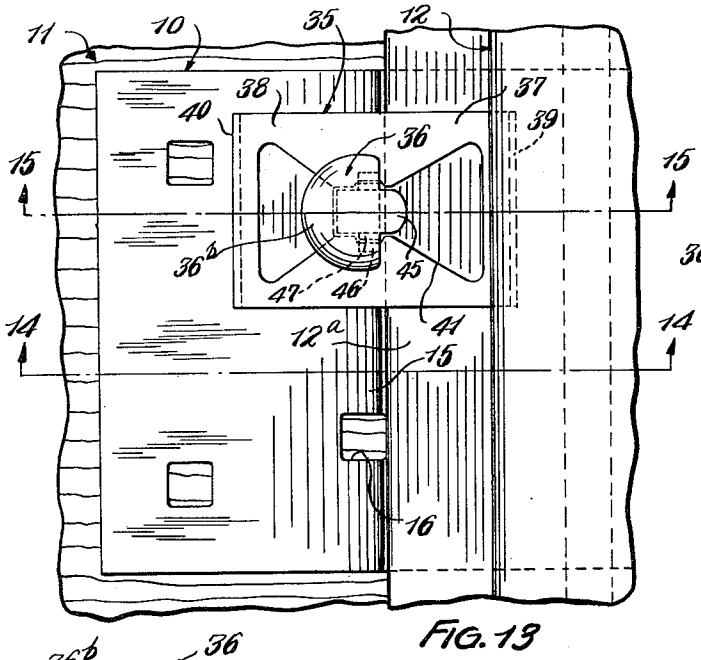


FIG. 13

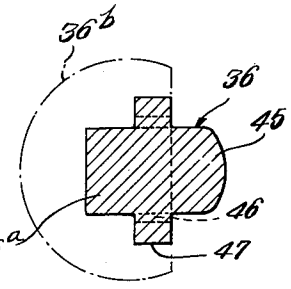


FIG. 18

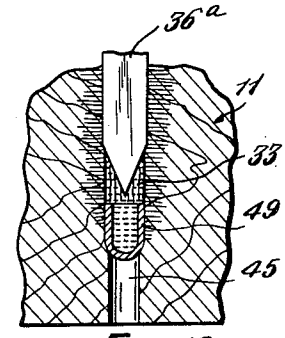


FIG. 19

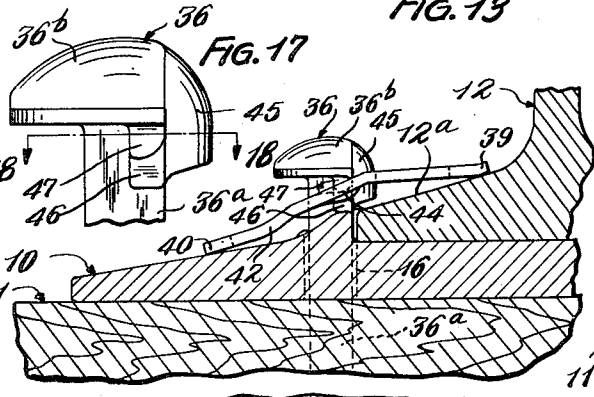
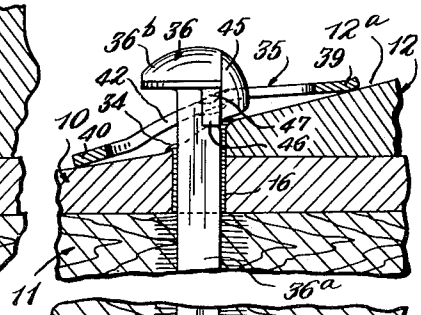


FIG. 17



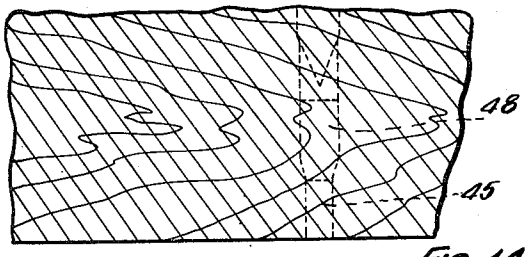


FIG. 14

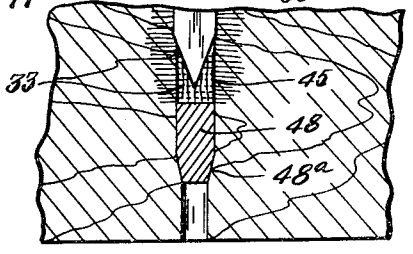


FIG. 15

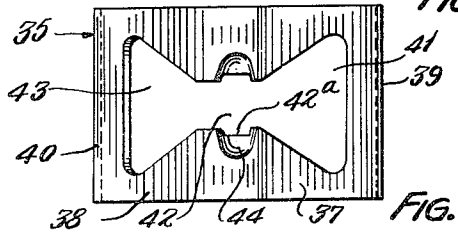


FIG. 16

INVENTOR.
JACOB RUSH SNYDER
BY Hudson, Boughton,
Williams, David & Hoffmann,
ATTORNEYS

Patented Oct. 5, 1954

2,690,876

UNITED STATES PATENT OFFICE

2,690,876

FASTENING FOR RAILS

Jacob Rush Snyder, Cleveland, Ohio

Application September 3, 1948, Serial No. 47,653

8 Claims. (Cl. 238—349)

1

This invention relates to rail fastenings of the kind in which a railway rail is yieldingly held against a tie plate supported on a wood tie and, as one of its objects, aims to provide an improved fastening of this kind requiring only a relatively few parts which are adapted to be economically manufactured and installed.

Another object of the present invention is to provide an improved rail fastening which, although of a simple and inexpensive construction, will safely hold a rail in its proper position for a prolonged period of service and in a manner which will reduce to a minimum the longitudinal creepage of the rail and the cutting or crushing of the tie by the tie plate.

A further object is to provide an improved rail fastening of this character embodying a rail-holding clamp which is connected with the tie by the use of a spike driven into a preformed bore thereof and in which the spike has increased holding power in the tie by reason of the fact that the portion of the tie surrounding the bore has been chemically treated and hardened and such tie portion thereby rendered resistant to shearing, crushing, fraying or rotting, and also by reason of the fact that the chemical establishes an adhesive bond between the spike and the tie.

Still another object is to provide an improved rail fastening of the character mentioned in which the spike is a so-called cut spike, that is a spike having a plain or unthreaded stem as distinguished from a screw spike, and which can be very economically manufactured and installed.

Yet another object is to provide an improved rail fastening of the kind referred to in which the clamp is a resilient metal plate adapted to yieldingly hold the rail against the tie plate with a pressure sufficient to substantially prevent longitudinal creeping of the rail.

As a further object this invention provides an improved fastening of this kind in which the spike holds the clamp in a flexed condition and has one portion engageable with the tie plate through an opening of the clamp for limiting the initial deflection of the clamp and the extent to which the spike is initially driven into the tie, and another portion adapted to limit the lifting of the rail relative to the tie plate so as to prevent

2

excessive flexing of the clamp during the passage of trains over the track.

Still another object is to provide an improved fastening of the character mentioned in which the portion of the tie surrounding the preformed bore is impregnated by pressurization of the chemical into the tie, preferably during the driving of the spike, and in which the chemical is a cold-setting water-insoluble glue, preferably a potentially thermosetting glue, for example a synthetic resin of the aldehyde class or a mixture of such an aldehyde resin and a vinyl resin, and which glue is rendered thermosetting by the addition of a hardener or catalyst thereto such as formaldehyde and in its set condition imparts increased hardness and durability to the wood impregnated thereby.

An additional object of this invention is to provide an improved rail fastening in which a cut spike used in conjunction with a resilient clamp and whose plain stem has increased holding power with a wood tie by reason of the chemical treatment of the portion of the tie into which the spike is driven, is provided with a head of such form as to cooperate in a novel manner with the other elements of the fastening and to permit the spike to be readily removed from the tie by means of conventional pulling tools when such removal is desired.

A further object is to provide an improved rail fastening of the type embodying a resilient clamp formed from metal plate and in which one or both end portions of the clamp have increased flexibility by reason of the fact that they have openings of a certain shape extended thereinto.

The invention can be further briefly summarized as consisting in certain novel combinations and arrangements of parts hereinafter described and particularly set out in the claims hereof.

This application is related to copending applications Serial No. 29,132, filed May 25, 1948, and Serial No. 47,654, filed September 3, 1948, in which metal-to-wood fastenings embodying a wood-hardening glue are disclosed and claimed.

In the accompanying sheets of drawings,

Fig. 1 is a partial plan view showing a rail fastening embodying the present invention;

Fig. 2 is a vertical transverse section taken through the rail and tie plate at a point adjacent the clamp, as indicated by section line 2—2 of

Fig. 1, and showing the clamp in side elevation;

Fig. 3 is a vertical section taken through the fastening in a direction transversely of the rail, as indicated by section line 3—3 of Fig. 1;

Fig. 4 is a sectional plan view taken through the fastening substantially on the irregular section line 4—4 of Fig. 3, the clamp being shown only in construction lines;

Fig. 5 is a plan view of the clamp showing the same in detached relation;

Fig. 6 is an elevation of the spike in detached relation and showing the side thereof which is nearest the rail;

Fig. 7 is a similar elevation of the spike but showing the opposite side thereof;

Fig. 8 is a transverse section on a larger scale taken through the spike on line 8—8 of Fig. 6;

Fig. 9 is a transverse sectional detail taken on line 9—9 of Fig. 3; and showing the relation of the stem of the spike to the preformed bore;

Fig. 10 is a partial plan view similar to Fig. 1 but showing a modified form of the improved rail fastening;

Fig. 11 is a partial vertical section taken through the modified fastening in a direction transversely of the rail, as indicated by line 11—11 of Fig. 10;

Fig. 12 is a plan view showing the clamp of the modified fastening, the clamp being shown in detached relation;

Fig. 13 is a partial plan view similar to Fig. 1 but showing another modified form of the improved rail fastening;

Fig. 14 is a partial vertical section taken through the modified fastening of Fig. 13 substantially as indicated by section line 14—14;

Fig. 15 is another partial vertical section taken through the modified fastening of Fig. 13 substantially as indicated by section line 15—15;

Fig. 16 is a plan view showing the clamp of the modified fastening of Fig. 13 in detached relation;

Fig. 17 is a side elevation showing the head end of the spike of the modified fastening of Fig. 13, the spike being shown on a larger scale and in detached relation;

Fig. 18 is a transverse section taken through the spike of Fig. 17 as indicated by section line 18—18; and

Fig. 19 is a partial vertical section corresponding with a portion of Fig. 15 but showing another form of plug in the bore of the wood tie.

Proceeding now with a more detailed description of the invention, reference will first be made to the form of the improved rail fastening illustrated in Figs. 1 to 5, inclusive, and in which a tie plate 10 is shown supported on a wood tie 11 with a conventional rail 12 having its base flange 12*a* resting on the tie plate. The improved fastening also includes a clamp 13 and a fastening member in the form of a spike 14 driven into the tie through openings of the clamp and tie plate.

The tie plate 10 is a conventional metal tie plate preferably having an upstanding transverse shoulder 15 extending thereacross and adapted to be engaged by an edge of the base flange 12*a* for gauging or positioning the rail. The tie plate also has openings 16 extending therethrough adjacent the edge of the rail flange 12*a* and which, in this instance, extend through the rail-gauging shoulder 15. The tie plate may also be provided with one or more other openings 17 which extend therethrough at a point spaced outwardly from the shoulder 15.

The tie 11 is a wood member such as a conventional tie sawed or otherwise prepared from oak, pine or other suitable kind of wood timber. The tie may have its outer surface creosoted as is conventional practice in present day railroad construction. The tie 11 is provided with a preformed bore 18 which extends thereinto for an appropriate distance in a direction transversely of the grain of the wood. For a reason to be further explained hereinafter and as shown in Fig. 9, the diameter of the bore 18 is smaller than the minimum transverse dimension of the stem of the spike 14. For example, when the spike has a $\frac{5}{8}$ inch square stem, the bore would be $\frac{1}{2}$ inch or $\frac{9}{16}$ of an inch in diameter. The tie plate 10 is supported on the tie 11 with one of the openings 16 in overlying relation to the preformed bore 18.

The clamp 13 holds the tie plate 10 against the tie 11 and also yieldingly holds the base flange 12*a* of the rail 12 against the tie plate. The clamp 13 is here shown as being a resilient metal plate generally rectangular in shape and having its outer and inner end portions 19 and 20 in bearing engagement respectively with the tie plate 10 and the base flange 12*a* of the rail. The inner end portion 20 engages the top of the base flange 12*a* and is carried by the clamp portion or arm 21 which extends inwardly above the base flange.

As shown in Figs. 2 and 3, the clamp 13 is bowed longitudinally thereof so as to extend in arched relation over the rail-gauging shoulder 15 of the tie plate 10. The intermediate portion of the clamp is provided with an opening 22 through which the spike 14 extends and which is elongated longitudinally of the clamp. The intermediate portion of the clamp is also provided with a groove 23 formed in its upper side and extending partially or entirely thereacross transversely to the slot-like opening 22 and with portions of such groove located on opposite sides of this opening. For a purpose to be presently explained, the opening 22 of the clamp is provided at the sides thereof with side extension portions or recesses 22*a* resembling keyways.

The spike 14 has a stem 14*a* which, as indicated above, is driven into the preformed bore 18 of the tie 11 through the opening 16 of the tie plate and the opening 22 of the clamp 13. In this instance the stem 14*a* is a plain stem, as distinguished from the threaded stem of a screw spike, and is of a substantially square cross-section. The lower end of the stem is provided with a chisel point 14*c* which is conventional in railroad spikes of this character. The spike is provided at its upper end with an integral head 14*b*.

At the junction of the head 14*b* and stem 14*a* the spike is provided with a lateral projection or enlargement 24 which extends into and through the opening 22 of the clamp 13. The projection 24 is formed as a depending integral part of the head 14*b* and includes a pair of vertical or axially extending ribs 25 located on opposite sides of the spike and which engage in the extension recesses or keyways 22*a* of the clamp opening 22. The engagement of the ribs 25 in the extension recesses 22*a* enables the spike to hold the clamp in proper position by preventing the clamp from shifting toward or away from the rail and also from turning about the spike.

The integral lateral projection 24 of the spike 14 which, as mentioned above, extends through the opening 22 of the clamp 13, is an important feature because it constitutes a stop for limiting the extent to which the spike is driven into the tie 11 and hence limits the extent to which the clamp 13 is initially deflected. The projection 24 thus prevents damage to the clamp 13 by over-

flexing at the hands of an unskilled track laborer in driving the spike 14. To accomplish this purpose the ribs 25 are located so as to engage the shoulder 15 of the tie plate 10 when the spike has been driven into the tie for the desired distance.

When the improved rail fastening embodies a tie plate which does not carry the shoulder 15, the projection 24 still functions as a stop by engaging the flange 12a of the rail 12, or preferably, by engaging a removable shim or tool (not shown) of an appropriate thickness which is inserted between the head of the spike and the rail flange during the driving of the spike and which is withdrawn therefrom when the driving of the spike has been completed. The thickness of this shim or tool would be equivalent to the space 26 shown in Fig. 2 between the rail flange 12a and the lower edge of the projection 24.

Another important function for the projection 24 is that in the completed fastening it overhangs the rail flange 12a in spaced relation thereto and serves as a stop which permits a limited flexing of the clamp during lifting or springing of the rail away from the tie plate during the passage of trains over the track. Such lifting or springing of the rail relative to the tie plate is permissible and usually desirable because it tends to decrease the action known as "tie-pumping" and also tends to prevent pounding of the tie plate on the tie. When the rail flange 12a engages the projection 24 further lifting of the rail relative to the tie plate is prevented and clamp 13 is thereby protected from being flexed an excessive amount. The spike projection 24 also serves as a safety holding means for the rail in the event of failure of the clamp 13.

As shown in the drawings, the spike 14 is also provided with a second pair of vertical or axially extending ribs 27 which are located on opposite sides of the stem 14a and are formed as integral depending portions of the head 14b and whose lower ends constitute shoulders which are engageable in the transverse groove 23 of the clamp 13. The pressure of the spike in holding the clamp in its flexed condition is applied to the clamp through the shoulders formed by the lower ends of these ribs. The engagement of the ribs 27 in the groove 23 of the clamp enables the spike to hold the clamp against lateral shifting toward or away from the rail and against turning of the clamp around the spike. The ribs 27 also provide a fulcrum for the intermediate portion of the clamp when its inwardly extending portion 21 is flexed during the rising and falling movement of the rail.

At the junction of the ribs 27 with the head 14b, the spike is also provided with an integral portion forming a fixed washer or shoulder 28 against which pressure can be applied by the claw of a claw-type pulling tool for withdrawing the spike from the tie. The tool used for this purpose can be a conventional hand-operated spike pulling tool having claws which straddle the spike above the clamp 13 and bear against the shoulder 28. To facilitate the insertion of the claws of such a tool between the clamp 13 and the shoulder 28, the ribs 27 are preferably chamfered or beveled, as represented by the inclined faces 27a (see Fig. 8). The head 14b is preferably made of a size to overhang the projection 24 and the shoulder 28 for a substantial distance so as to permit the head to be suitably engaged by a power operated spike pulling machine.

In Figs. 10, 11 and 12 the drawings show a modified form of rail fastening which is similar to that of Figs. 1 to 5, inclusive and described above, but in which the clamp 30 is constructed so that the arm portion 31 thereof which extends over the base flange of the rail has increased flexibility. In other respects the modified fastening of Figs. 10 to 12, inclusive, is substantially identical with the fastening shown in Figs. 1 to 5, inclusive, and corresponding parts have been designated by the same reference characters. For obtaining such increased flexibility in the clamp 30, the opening 22 is extended into the arm portion 31 to a point adjacent the inner end bearing portion 20, as shown in Fig. 12. This extension portion 32 of the clamp opening 22 increases progressively in width toward the inner end bearing portion 20 such that the clamp portion or arm 31 will have a flexibility which increases progressively as the inner end of the clamp is approached.

It will accordingly be seen that when the clamp 30 is embodied in a rail fastening, as shown in Figs. 10 and 11, the clamp arm 31 which overlies the base flange of the rail 12 will have increased flexibility and the flexing therein will be distributed along such arm portion substantially in the manner that flexing occurs in a beam similarly supported and loaded. The diverging shape for the extension portion 32 of the clamp opening 22 preferably starts at a point inwardly of the side recesses or keyways 22a. These side recesses 22a could be omitted but are preferably provided in the clamp 30 for cooperation with the ribs 25 of the spike for holding the clamp against shifting as has already been explained above.

In accordance with an important feature of the present invention the spike 14 has increased holding power in the wood tie 11 and, as the result of which, a rail fastening of the type embodying a driven spike and a resilient clamping means becomes much more practical and satisfactory for use on railway track. This increased holding power also makes possible the above-described use of so-called cut spikes, having a plain or unthreaded stem, in rail fastenings in place of the more expensive screw spikes or hook bolts which have been required heretofore. In obtaining this increased holding power for the spike, the portion of the tie immediately surrounding the bore 18 into which the spike is driven, is treated with a chemical material indicated at 33 in the drawings and thereby reinforced and rendered resistant to crushing, fraying, shearing and rotting and which material also establishes an adhesive bond between the metal spike and the wood of the tie.

The chemical material used in treating the portion of the tie surrounding the bore 18 can be any material suitable for this purpose which will produce the results explained above. This chemical material is preferably a cold-setting water-insoluble glue which is initially plastic or fluid in character and can be readily introduced into the bore 18 and trapped therein for pressurization into the wood during the driving of the spike. As this treating material any one of various synthetic resins can be used, such as resins of the aldehyde or phenol aldehyde class, for example, phenol formaldehyde, urea formaldehyde, melamine formaldehyde or resorcinol formaldehyde. These materials are potentially thermosetting in character and are rendered actually thermosetting by the mixing of a hardener or so-called catalyst therewith, such as

formaldehyde, and the mixture formed by the resin and catalyst constitutes the treating material which is indicated at **33** in the rail fastenings shown in the drawings. The catalyst can be in either a powdered or liquid form and is added to the resin in suitable amounts such as 5 per cent to 50 per cent by weight to 95 per cent to 50 per cent by weight of the resin, but the amount of the catalyst to be used can be varied and will depend upon various factors including the specific resin employed and the setting characteristics desired for the treating material. Ordinarily an amount of the catalyst is employed which will produce setting of the resin in a period of from one to four hours at a normal temperature, that is to say a temperature ranging from 65 degrees to 90 degrees Fahrenheit.

It is important that the treating material **33** establish an adhesive bond between the wood tie and the spike as mentioned above. It is also important to prevent the treating material **33** from assuming a brittle state in which cracking or crazing might result in the material after it has become set. Both of these characteristics are obtained for the treating material **33** by incorporating a plasticizing agent, such as a suitable thermoplastic material, in the aldehyde resin prior to the mixing of the catalyst therewith. As this plasticizing agent a vinyl resin can be used such as vinyl acetate or vinyl butyral. The preferred plasticizing agent can be designated as a partially hydrolized polyvinyl acetate. Varying amounts of the plasticizer can be used depending upon the particular aldehyde resin employed and the setting characteristics desired for the material and, when the above-mentioned polyvinyl acetate is used as the plasticizer, 2 per cent to 20 per cent by weight is added to the resin. The treating material or glue **33** then comprises by weight approximately 93 to 30 per cent of the aldehyde resin, 2 to 20 per cent of the vinyl resin, and 5 to 50 per cent of formaldehyde as a hardener or catalyst.

It has been established by tests that when conventional cut spikes of the type commonly used in railroad track construction, such as a cut spike having a ⅝ inch square by 5½ inch long stem, are driven into creosoted new wood ties, such as red oak ties having preformed $\frac{9}{16}$ inch diameter by 6 inch long bores therein for the spikes, an average force of approximately 3,000 pounds will be required to pull the individual spikes out of the ties. As illustrative of the increased holding power of the spike **14** in the tie **11** by reason of the use of the treating material **33** with which the portion of the tie surrounding the bore **18** is impregnated, it is explained that when such a treating material was used in actual tests and consisted of approximately 95 to 50 per cent by weight of resorcinol formaldehyde resin and approximately 5 to 50 per cent by weight of formaldehyde as a catalyst or hardener and was pressurized into the wood during the driving of the spikes and had become set, an average force of 5,000 pounds was required to pull the spikes out of the ties. When the treating material comprised approximately 84 per cent by weight of resorcinol formaldehyde resin, approximately 4 per cent by weight of vinyl resin and approximately 12 per cent by weight of formaldehyde as a catalyst or hardener, an average force of 5,000 to 6,000 pounds was needed to pull the spikes out of the ties. When the treating material comprised approximately 75 per cent by weight of resorcinol formaldehyde resin, approximately 14 per cent by weight of vinyl resin and approximately 11 per cent by weight of formaldehyde as a catalyst or hardener, an average force of from 7,500 to 9,000 pounds was needed to pull the spikes out of the ties.

It should be explained further that when the portion of the tie surrounding the bore has been reinforced by chemical treatment, as explained above, and the treating material has become set the wood will be materially hardened and greatly strengthened and will also be rendered substantially non-absorbent and highly resistant to rotting.

The increased hardness of the portion of the tie surrounding the spike will cause the spike to be firmly held against lateral shifting during a prolonged period of service and loosening of the spike in the tie will thus be effectively prevented. In addition to this ability of the reinforced tie portion to firmly hold the spike against lateral shifting and to resist crushing, shearing and rotting of the wood fibers, the adhesive bond established between the spike and the wood particularly when the vinyl resin is incorporated in the treating material results in the spike being strongly held against axial movement out of the tie. It should also be explained that in forming this improved rail fastening the treating material or glue is preferably placed in the bore **18** in a bulk state although it can, if desired, be contained in a frangible capsule, and is forced into the surrounding portion of the wood tie during the driving of the spike. When the spike is initially started into the bore **18** some of the treating material will flow upwardly around the spike, as indicated at **34**, and will form a protective coating and seal at this point which will prevent brine, or the like, dripping from railway cars from corroding the spike at this point.

In Figs. 13 to 15 inclusive, the drawings show another modified rail fastening in which the clamp **35** and the spike **36** are of a somewhat different form than in the rail fastenings already described above. The clamp **35** is a resilient clamp of the plate type and is generally similar to the clamps **13** and **30** but is constructed so that its arm portions **37** and **38**, which extend inwardly and outwardly relative to the spike **36** and have ends **39** and **40** engaging the base flange **12***a* and the tie plate **10**, respectively, both have increased flexibility. The inner arm portion **37** has an opening **41** of progressively increasing width therein and which constitutes an inward extension portion of the clamp opening **42** through which the spike **36** extends. The outer arm portion **38** has a similar opening **43** of progressively increasing width therein and which constitutes an outward extension portion of the clamp opening **42**. By reason of the extension openings **41** and **43** the arm portions **37** and **38** of the clamp **35** have a flexibility which increases progressively as the ends **39** and **40** are approached from the clamp opening **42**.

For a purpose to be presently explained the intermediate portion of the clamp **35** is provided on the upper side thereof with groove means extending in a direction transversely of the clamp and which can extend entirely across the clamp, or preferably as here shown, may comprise short grooves **44** located immediately adjacent and on opposite sides of the opening **42**. The intermediate portion of the clamp **35** is also provided with side extensions **42***a* of the clamp opening **42**. These side extensions of the clamp opening **42**

resemble keyways and serve a purpose which will be presently explained.

The spike 36 has a plain square stem 36*a* driven into the bore 45 of the wood tie 11 through the clamp opening 42 and the tie plate opening 16 and also has a head 36*b* which engages the intermediate portion of the clamp 35 for holding the clamp in a flexed condition with its ends 39 and 40 bearing respectively on the base flange 12*a* and the tie plate 10. The spike head 36*b* has a lateral projection 45 on the rail side thereof which corresponds with the projection 24 of the spike 14 and extends into the clamp opening in overhanging relation to the base flange 12*a*.

The spike 36 is also provided on two opposite sides thereof with pairs of axial ribs 46 and 47 which are formed as integral depending extensions of the head 36*b*. The ribs 46 are longer than the ribs 47 and extend through the clamp opening 42 and engage the tie plate shoulder 15 for limiting the extent to which the spike is driven into the tie. The ribs 46 engage in the side extensions or keyways 42*a* of the clamp opening 42 and hold the clamp against turning about the spike but do not prevent flexing of the clamp.

The ribs 47 project laterally beyond the ribs 46 and their lower ends engage in the grooves 44 of the clamp 35. The ribs 47 form shoulders through which the pressure of the spike 36 is applied to the clamp and also hold the clamp against lateral shifting toward or away from the rail. The ribs 47 also form a fulcrum for the intermediate portion of the clamp during flexing of the inner arm portion 37.

In the modified rail fastening of Figs. 13 to 15, inclusive, the bore 45 is shown extending entirely through the wood tie 11 instead of only part-way through as in Figs. 3 and 11. When the bore extends entirely through the tie it is plugged adjacent its lower end by means of the plug 48 which is preferably made of wood although it could be made of any other suitable material. Fig. 19 shows another plug 49 for the same purpose and which is a cup-shaped member drawn or otherwise formed from sheet metal.

The plug 48 is cylindrical in shape and of a diameter somewhat larger than the bore 45 so that it will have a tight fit in the latter when driven thereinto. The plug preferably has a tapered end 48*a* to facilitate entry thereof in the bore 45. In forming the above described rail fastening, the plug 48 is driven into the bore 45 from the upper end thereof so that as the plug moves downwardly in the bore it will clean the portion of the bore which it traverses by scraping and pushing therefrom any foreign matter contained therein, such as free creosote, water, stones, cinders, wood shavings or the like. This leaves the upper portion of the bore 45 in a clean and substantially dry state to receive the chemical material or glue 33 which is introduced into the bore from its upper end for the purpose already explained above.

From the foregoing description and the accompanying drawings it will now be readily understood that this invention provides an improved rail fastening which is simple in construction and very durable and reliable in service and which requires the use of only relatively few parts which are adapted to be economically manufactured and installed. It will now also be understood that the increased holding power and durability, derived from the use of the chemical material with which the tie portion surrounding the bore is impregnated, permits the use of a cut spike having a plain or unthreaded stem in place of the more expensive screw spike or hook bolt which has heretofore been required in rail fastenings of this type. Additionally, it will be seen that the improved fastening provided by this invention will contribute greatly to the longer life of the wood tie because the tie plate will always be firmly held against the tie and pounding of the tie plate, which has heretofore resulted in cutting of the tie, will be substantially prevented. Moreover, it will be seen that in addition to yieldably holding the rail in place on the tie plate, the improved fastening provides an inexpensive means for preventing longitudinal creepage of the rail.

Although the improved rail fastening provided by this invention has been illustrated and described herein to a detailed extent it will be understood, of course, that the invention is not to be regarded as being limited correspondingly in scope but includes all changes and modifications coming within the terms of the claims hereof.

Having thus described my invention, I claim:

1. In rail fastenings, a wood tie, a tie plate on said tie and having an opening therein, a rail having a base flange resting on said tie plate, an upstanding shoulder on said tie plate and adapted to be engaged by an edge of said base flange, a clamp comprising a resilient metal plate having end bearing portions resting on said base flange and tie plate respectively and also having an opening in its intermediate portion overlying the opening of said tie plate and extending over a portion of said base flange, and a spike having a stem driven into said wood tie through the openings of said tie plate and clamp and also having a head on said stem, said head having one portion in holding engagement with the upper side of the intermediate portion of said clamp and other portions extending down through the opening of said clamp with one of said other portions being an overhanging portion overhanging said base flange in adjacently spaced relation thereto and another of said other portions being a stop portion engaging the tie plate shoulder for locating said overhanging portion in said adjacently spaced relation to said base flange.

2. A rail fastening of the character described comprising, a wood tie having a bore therein, a tie plate having an opening overlying said bore, a rail having a base flange resting on said tie plate, a clamp comprising a resilient metal plate having portions bearing on said base flange and tie plate and also having an opening overlying the opening of said tie plate, the portion of said tie surrounding said bore being impregnated with and hardened by a wood-hardening glue, and a headed fastening member driven into said bore through the openings of said clamp and tie plate and holding said clamp against said base flange and tie plate, said fastening member having increased holding power in said tie by reason of the hardened characteristic of said portion of the tie surrounding said bore, said glue being initially contained in said bore in a fluid but settable condition and the bore being of a transverse dimension such that said fastening member has a relatively close-fitting direct metal-to-wood engagement with said surrounding tie portion when driven into said bore and such that during the driving of said fastening member said glue is substantially trapped and pressurized thereby in said bore and forced into said surrounding tie portion.

3. A rail fastening of the character described comprising, a wood tie having a bore therein, a tie plate having an opening overlying said bore, a rail having a base flange resting on said tie plate, a clamp comprising a resilient metal plate having portions bearing on said base flange and tie plate and also having an opening overlying the opening of said tie plate, the portion of said tie surrounding said bore being impregnated with and hardened by a wood-hardening glue, and a fastening member having a head engageable with said clamp for holding the same in a flexed condition and a plain stem driven into said bore through the openings of said clamp and tie plate, said plain stem having increased holding power in said tie by reason of the hardened characteristic of said portion of the tie surrounding said bore, said glue being initially contained in said bore in a fluid but settable condition and the bore being of a smaller diameter than the minimum transverse dimension of the stem of said fastening member such that said stem has a relatively close-fitting direct metal-to-wood engagement with said surrounding tie portion when driven into said bore and such that during the driving of said fastening member said material is substantially trapped and pressurized in said bore by said stem and forced into said surrounding tie portion.

4. A rail fastening of the character described comprising, a wood tie having a bore therein, a tie plate having an opening overlying said bore, a rail having a base flange resting on said tie plate, a clamp comprising a resilient metal plate having portions bearing on said base flange and tie plate and also having an opening overlying the opening of said tie plate, and a headed fastening member driven into said bore through the openings of said clamp and tie plate and holding said clamp against said base flange and tie plate, the portion of said tie surrounding said bore and substantially coextensive therewith being impregnated with a water-insoluble cold-setting synthetic resin glue which in its set condition imparts increased hardness and durability to said tie portion, said fastening member having a relatively close fit in said bore and a direct metal-to-wood engagement with said coextensive surrounding tie portion and also having increased holding power in said impregnated tie portion.

5. A rail fastening of the character described comprising, a wood tie having a bore therein, a tie plate having an opening overlying said bore, a rail having a base flange resting on said tie plate, a clamp comprising a resilient metal plate having portions bearing on said base flange and tie plate and also having an opening overlying the opening of said tie plate, the portion of said tie surrounding said bore and substantially coextensive therewith being impregnated with a thermosetting resin which in its set condition imparts increased hardness and durability to such tie portion, and a headed fastening member driven into said bore through the openings of said clamp and tie plate and holding said clamp in a flexed condition, said fastening member having a relatively close fit in said bore and a direct metal-to-wood engagement with said coextensive surrounding tie portion and also having increased holding power in said tie by reason of the increased hardness of said tie portion and said resin also forming an adhesive bond between said fastening member and said tie portion.

6. A rail fastening of the character described comprising, a wood tie having a bore therein, a tie plate having an opening overlying said bore, a rail having a base flange resting on said tie plate, a clamp comprising a resilient metal plate having portions bearing on said base flange and tie plate and also having an opening overlying the opening of said tie plate, the portion of said tie surrounding said bore being impregnated with a thermosetting resin which in its set condition imparts increased hardness and durability to such tie portion, and a headed fastening member driven into said bore through the openings of said clamp and tie plate and holding said clamp in a flexed condition, said fastening member having increased holding power in said tie by reason of the increased hardness of said tie portion and said resin also forming an adhesive bond between said fastening member and said tie portion, said resin being initially contained in said bore in a fluid condition and the bore being of a smaller diameter than the minimum transverse dimension of said fastening member such that the latter has a relatively close-fitting direct metal-to-wood engagement with said surrounding tie portion when driven into said bore and such that during the driving of said fastening member said resin is trapped and pressurized thereby in said bore and forced into said surrounding tie portion.

7. A rail fastening of the character described comprising, a wood tie having a bore therein, a tie plate having an opening overlying said bore, a rail having a base flange resting on said tie plate, a clamp comprising a resilient metal plate having portions bearing on said base flange and tie plate and also having an opening overlying the opening of said tie plate, and a headed fastening member driven into said bore through the openings of said clamp and tie plate and holding said clamp against said base flange and tie plate, the portion of said tie surrounding said bore being impregnated with a thermosetting resin comprising a mixture of a potentially thermosetting resin material of the aldehyde class and a catalytic hardener material and which mixture when set imparts increased hardness and durability to said tie portion and said fastening member having increased holding power in said impregnated tie portion, said mixture being initially contained in said bore in a fluid condition and the bore being of a smaller diameter than the minimum transverse dimension of said fastening member such that the latter has a relatively close-fitting direct metal-to-wood engagement with said surrounding tie portion when driven into said bore and such that during the driving of said fastening member said mixture is substantially trapped and pressurized thereby in said bore and forced into said surrounding tie portion.

8. A rail fastening of the character described comprising, a wood tie having a bore therein, a tie plate on said tie and having an opening overlying said bore, a rail having a base flange resting on said tie plate, a clamp comprising a resilient metal plate having portions bearing on said base flange and tie plate and also having an opening overlying the opening of said tie plate, and a headed fastening member driven into said bore through the openings of said clamp and tie plate and holding said clamp against said flange and tie plate, the portion of said tie surrounding said bore and substantially coextensive therewith being impregnated with a water-insoluble cold-setting glue comprising a mixture of a synthetic resin of the aldehyde class and a

vinyl resin and said mixture being rendered thermosetting by the addition thereto of formaldehyde as a hardener and which glue in its set condition imparts increased hardness and durability to said tie portion and also forms an adhesive bond between said fastening member and said wood tie, said fastening member having a relatively close fit in said bore and a direct metal-to-wood engagement with said coextensive surrounding tie portion and also having increased holding power in said impregnated tie portion.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,599,392	Willet et al.	Sept. 7, 1926
1,604,806	Cheney	Oct. 26, 1926
1,621,027	Reynolds et al.	Mar. 15, 1927
2,057,963	Maney	Oct. 20, 1936
2,114,784	Maisch	Apr. 19, 1938
2,119,512	Peskin et al.	June 7, 1938
2,154,931	Gailor	Apr. 18, 1939
2,158,771	Beckwith	May 16, 1939
2,162,604	Clow	June 13, 1939
2,251,196	Muller	July 29, 1941
2,324,135	Chidester et al.	July 13, 1943
2,376,200	Smidth	May 15, 1945
2,389,464	Snyder	Nov. 20, 1945
2,394,373	Gibbs	Feb. 5, 1946
2,417,385	Tilly	Mar. 11, 1947

FOREIGN PATENTS

Number	Country	Date
500,109	Great Britain	Jan. 30, 1939