May 23, 1972 R. J. NOVOTNY 3,664,584

CONCRETE TIES

Filed Feb. 9, 1970 4 Sheets-Sheet 1

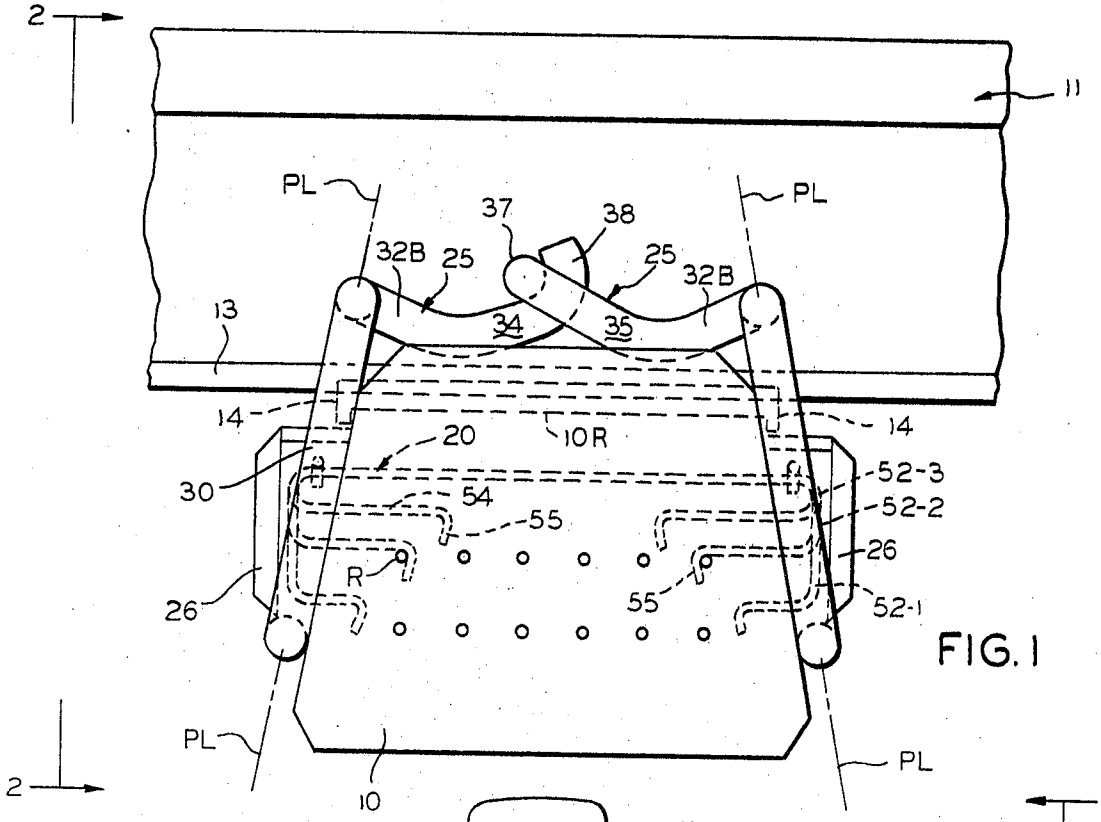

FIG. 1

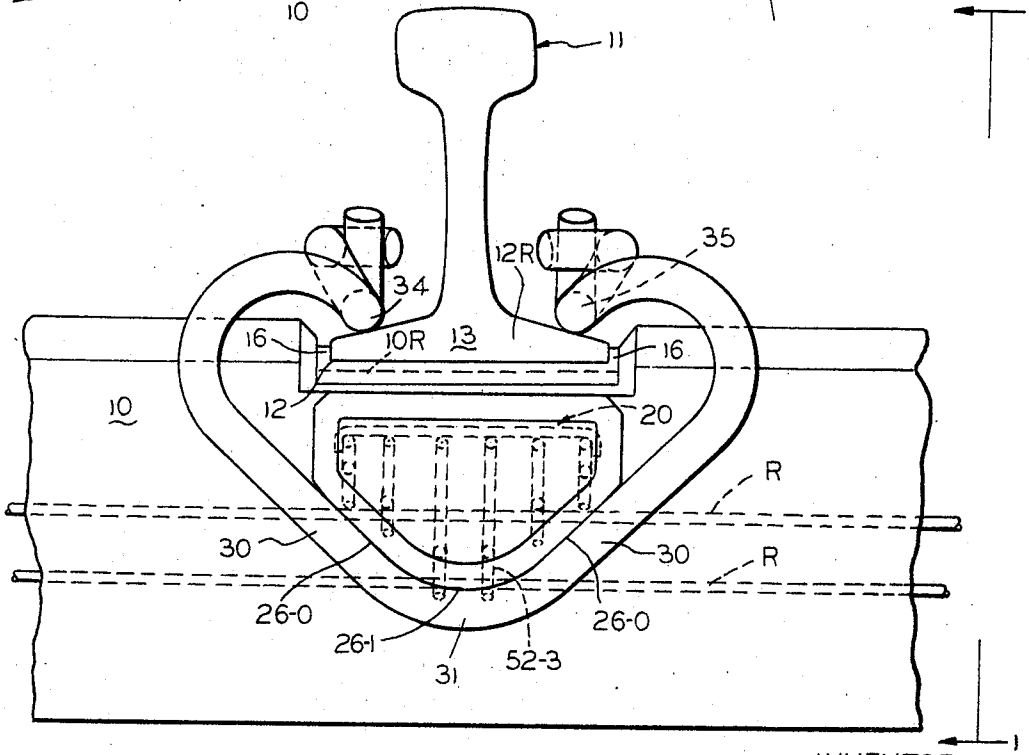

FIG. 2

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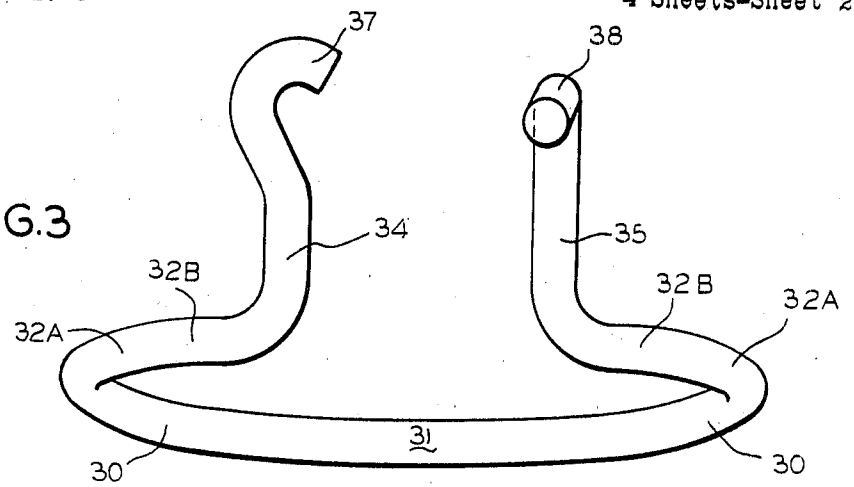
FIG.3



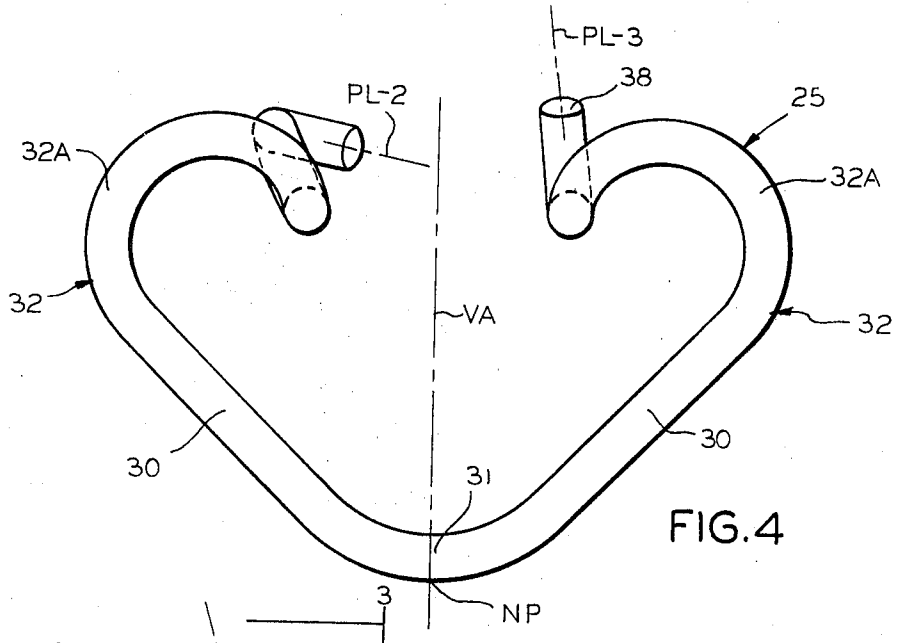


FIG.4

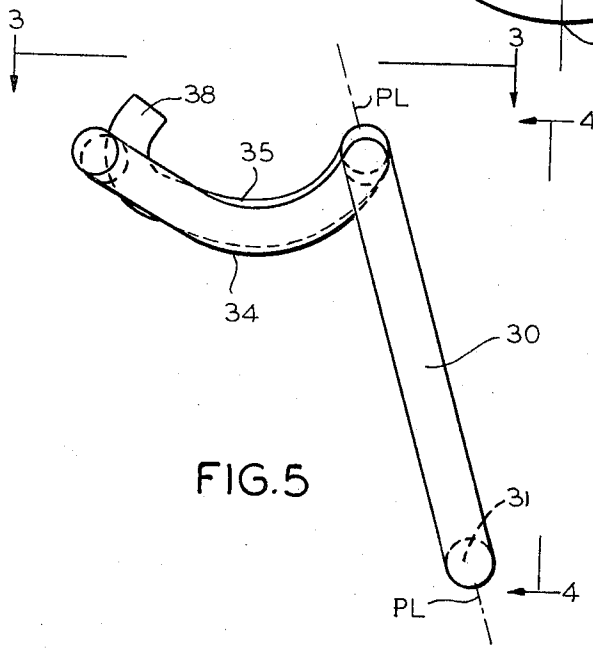


FIG.5

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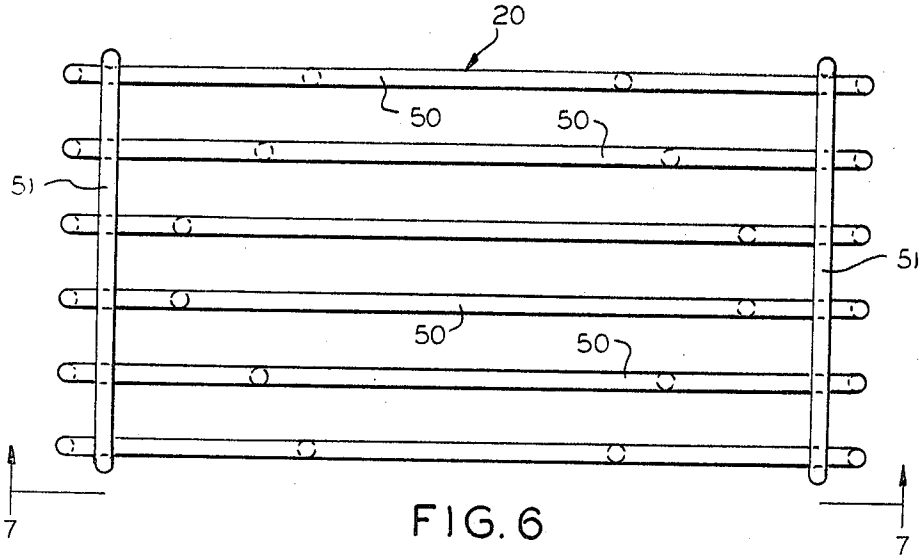

FIG. 6

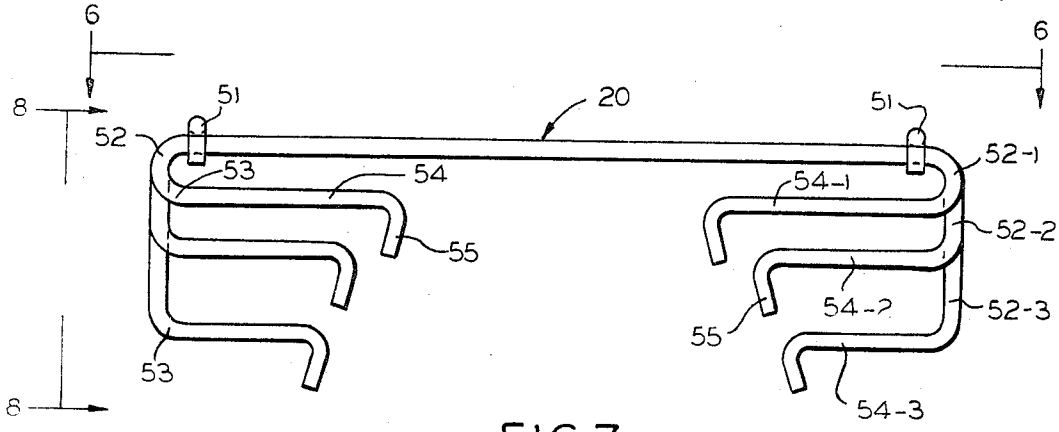

FIG. 7

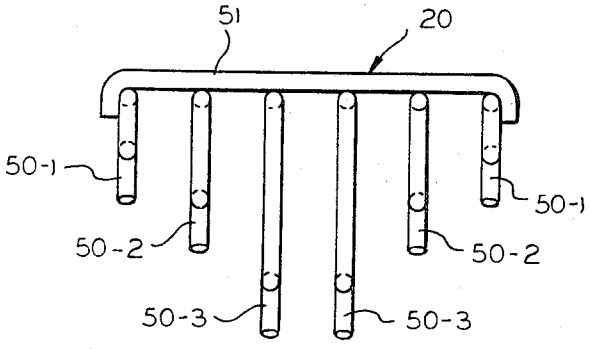

FIG. 8

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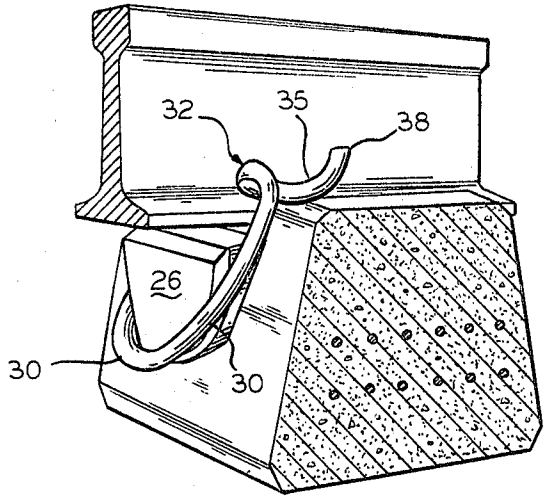

FIG.9

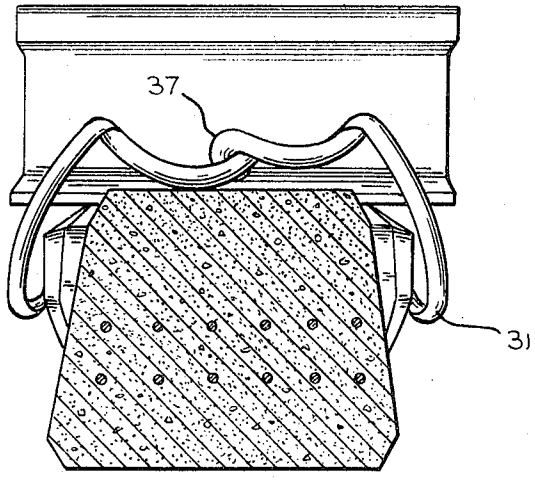

FIG.10

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United States Patent Office 3,664,584 Patented May 23, 1972

3,664,584

CONCRETE TIES

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Filed Feb. 9, 1970, Ser. No. 9,852
Int. Cl. E01b 9/30
U.S. Cl. 238—349 3 Claims

ABSTRACT OF THE DISCLOSURE

A concrete tie is provided with protuberances on opposite sides thereof serving to anchor a pair of one-piece spring-type rail fasteners. Each fastener has a bight tensioned on the protuberance, and a pair of legs extend upward from the bight. The upper ends of the legs are bent to afford extensions which overlie the base of the rail, and bends therein engage the base of the rail with a spring force. The free ends of the fasteners end in hooks, one hook being the complement of the other so that a pair of such fasteners may be complementally jointed at the free ends and tensioned one on the other.

The protuberances of the tie are under a great deal of compression and are reinforced by bends in a plurality of rod-like stringers embedded in the tie to extend between the protuberances.

This invention relates to a reinforced concrete tie and a spring-like fastener to be tensioned on the tie for holding the rail to the tie with a spring force.

The advent of concrete ties in the railroad industry has prevailed for some time, and there have been constant efforts concerned with developing specialized rail fasteners in that the conventional spike, so familiar in the instance of wooden ties, cannot possibly be used anchoring a rail to a concrete tie. It is of course highly desirable to avoid a rail fastener for a concrete tie which involves drilling a tie or otherwise forming an opening therein in which the fastener is to be anchored. Not only does such alteration of the tie involve a great deal of equipment and labor, it also may cause localized weakening of the tie. Collectively, the various proposals for physically embedding or anchoring a fastener part within a tie may be viewed as involving a screw or stud which itself may present the rail fastener or which is used to secure in place a separate member presenting the rail fastener.

It is the primary object of the present invention to develop a fastener which in no way requires a physical alteration of a concrete tie incidental to anchoring a fastener to the tie, and more specifically the primary object of the present invention is to develop a rail fastener capable of being tensioned on the tie incidental to being operatively mated to a fastener of like form also tensioned on the tie, the two fasteners in their tensioned state presenting parts bearing with great spring force on the base of the rail.

As another statement of the invention, it is an object thereof to hold a rail to a concrete tie by means of two fasteners of spring form having a pair of free ends in complemental hook engagement, statically loading the rail with a spring force produced by tensioning the fasteners on protuberances cast integral with the tie.

Other and further objects of the present invention will be apparent from the following description and claims

and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principle thereof and what I now consider to be the best mode in which I have contemplated applying that principle. Other embodiments of the invention embodying the same or equivalent principle may be used and structural changes may be made as desired by those skilled in the art without departing from the invention.

In the drawings:

FIG. 1 is an end elevation showing two fasteners, constructed in accordance with the present invention, securing a rail to a tie, and taken on line 1—1 of FIG. 2;

FIG. 2 is a side elevation on line 2—2 of FIG. 1;

FIG. 3 is a top plan view on the line 3—3 of FIG. 5;

FIG. 4 is an elevation on line 4—4 of FIG. 5;

FIG. 5 is a side elevation of a fastener constructed in accordance with the present invention;

FIG. 6 is a top elevation on line 6—6 of FIG. 7;

FIG. 7 is an elevation on line 7—7 of FIG. 6;

FIG. 8 is an end elevation on line 8—8 of FIG. 7; and

FIGS. 9 and 10 are perspective views showing stages of assembling the fasteners to hold a rail in place.

Referring to FIGS. 1 and 2, a railroad tie **10** of concrete supports a traffic rail **11**, the tie having a recess **10R** therein in which is disposed a resilient tie pad **12** on which the base **13** of the rail sets. The tie pad may be of any preferred, essentially elastomeric composition, but is advantageously provided with depending or downwardly directed end lips **14** which overlap marginal portions of the outer faces of the concrete tie at the end limits of the recess **10R**, whereby endwise movement of the tie pad is limited.

The tie pad itself is provided with an upwardly opening recess **12R** characterized by a pair of longitudinal side lips **16** which neatly embrace the edges of the rail base. Accordingly, the recess **10R** in the tie may be of some standard dimension, and in the event that the railway is characterized by rails having bases with unusual width, it is only necessary to vary the thickness of tie pad lips **16** to neatly fit the base of the rail.

It may be noted additionally that the concrete tie is reinforced with rods R of the usual kind, and as will be explained in more detail below, a reinforcing grill **20** of unusual construction is also provided.

In accordance with the present invention, the rail is secured to the tie by a pair of one-piece fasteners or clips **25**, each of identical construction, having free ends in complemental hooked engagement with one another as shown in FIGS. 1 and 2, and in accomplishing this, the fasteners are preferably of silico-manganese spring steel, tensioned on protuberances **26** projecting outwardly from the front and rear faces of the tie, the protuberances **26** being molded integrally with the tie.

Each such fastener **25** embodies several different bends which are best defined by visualizing the fastener as disposed substantially in an upright position as shown in FIG. 5, and in terms of a plane PL, FIGS. 1 and 5, which includes the vertical axis VA of the fastener, FIG. 4. Referring for the moment to FIG. 4, each fastener includes a pair of legs **30** equally divergent from the axis VA and joined at their lower ends by a bend or bight **31** having a profile complemental to the underside of the protuberances **26**. In this instance, the underside of the protuberance **26** is convex, such that the bight **31** is curved upward-

ly uniformly on each side of its bisector point NP, with the legs **30** upwardly divergent therefrom, substantially of V-shape. All bends and curves in the fastener may be defined in terms of progressive movement upward and outward from the bisector point NP along the axes of the legs **30**.

In the installed state the bight **31** of the fastener, FIG. 2, embraces the corresponding convex curve **26–1** at the underside of the related protuberance **26**, and the legs **30** have the inner surfaces thereof in engagement with upwardly divergent side surface **26–1** of each related tie protuberance.

In the installed or operative state, the two legs **30** and the bight **31** which joins the legs lie in the plane PL, and this is equaly true of the fastener or clip in its free state, FIG. 5. As shown in FIG. 4, each of the legs **30** at the upper end thereof terminates in an intermediate bight **32** which commences well outboard of the base of the rail.

Each intermediate bight **32**, progressively, bends inward toward the axis VA at **32A**, FIG. 4, for about 90° of bend and then, at **32B**, FIGS. 1 and 3, extends both downwardly and rearwardly out of the plane PL for about another 90° of bend. The rear extension of each bight **32** merges into a terminal bight **34** and **35**, respectively. The terminal bights **34** and **35** extend generally along axes parallel to the rail, overlying respective sides of the rail base, FIG. 2, and as shown in FIG. 1 the low part of each bight **34** and **35** is adapted to engage the upper face of the rail base.

Each of the terminal bights **34** and **35** has a hook at the free end thereof, but the hooks are of slightly different configuration so that one will fit or clasp the other in a complemental fashion. Thus, and referring to FIGS. 3 and 4, the free end of the bight **34** is characterized by an inwardly bent arcuate hook **37**, bent inward toward the axis VA, whereas the free end of the bight **35** is characterized by an upwardly bent arcuate hook **38**. As shown in FIGS. 1 and 2 the hooks have concave faces which nest in one another.

In associating the fasteners **25**, and referring to FIG. 9, it should first be noted that the construction is such that one of the legs **30** of the fastener in its free state, say the near leg **30**, FIG. 9, may be held in the hand, and the far leg moved under the protuberance **26** to present the intermediate bight associated with the far leg to the base of the rail on the far side, just as the intermediate bight **35**, FIG. 9, is in engagement with the base of the rail on the near side.

This operation is repeated with the second fastener, FIG. 10, interlocking the hooked ends, except that the second fastener has its bight **31** displaced outward of the related tie protuberance **26**. Thus, at this stage of installation, the left-hand fastener **25**, FIG. 10, may be viewed as disposed in its ultimate operative position, anchored in its protuberance **26**, whereupon a sturdy prise or crowbar or similarly effective tool is interposed between the bight of the right-hand loose fastener and the underside of the tie protuberance **26**. Leverage is then applied to gradually move the loose or free bight **31** into locked engagement with the underside of its protuberance **26**, thereby anchoring the second fastener. A force of 800 to 1000 pounds is required to effect the lock, and in the course of final motion, anchoring both fasteners, the two fasteners are under such great tension as to cause the hooked ends to be distorted from their free state, FIGS. 4 and 5, substantially into a true horizontal position (hook **37**) and vertical position (hook **38**) shown in FIG. 2.

Thus, in the free state, hook **37** is inclined downwardly at a slight angle of about 10° toward axis VA and hook **38** converges toward axis VA at an angle of about 4°. However, in the installed state, each hook **38** is displaced from its free state plane PL–3 to be substantially vertical, and the other hook **37** is displaced from its free state plane PL–2 to be substantially horizontal. Resultantly, the rail is held to the tie by spring tension, the spring force being

exerted by the nadir or low points of the terminal bights of the two fasteners, and sufficient stressing of the tie protuberance is involved as to prompt an unusual way of reinforcing the protuberances, and the main body of the tie therebetween as well, as will now be explained.

The reinforce **20**, FIGS. 1 and 6, is in the form of a grid or grill of rod form and is defined by a plurality of stringers **50** joined by cross ribs **51** as by welding the cross ribs to the stringers **50**. The reinforcing grid is of symmetrical form at its ends, somewhat complemental to the protuberance **26**, and in keeping with this concept the stringers include end stringers **50–1**, FIG. 7, intermediate stringers **50–2**, and medial stringers **50.3**. The stringers are bent in an unusual way as will be described in detail, such that in their undeveloped or unbent form the cross ribs **51** are displaced considerably from the free ends of the stringers. Thus, each stringer has a downward bend **52** therein, FIG. 7, and a rearward bend **53** as well, such that the stringers have terminal extensions **54** lying beneath an extending parallel to the portions of the stringers **50** lying between the cross ribs **51**. Such multiple bending of the end portions of the stringers outward of the ribs **51** results in each stringer having a downwardly extending leg respectively identified as **52–1**, **52–2**, and **52–3**, FIG. 6, noting that the vertical legs thus presented are of progressively longer length proceeding inward from the end stringer **50–1** to the medial stringer **50–3**. In like fashion the terminal extensions **54** are of progressively shorter length, **54–1**, **54–2** and **54–3**.

The free end of each stringer is bent downwardly at **55** to afford a hook, and as shown in FIG. 1 selected ones of the hooks **55** may be associated in hooked engagement with the reinforcing rods R which extend at right angles to the stringers **50**.

As already noted, the portions of the stringers outward of the cross-bars or ribs **51** present something of the complement of each tie protuberance **26** to be reinforced thereby, so that the longest legs of the stringers, **52–3**, FIG. 2, occupy the thickest part of the protuberance, and the bends in the stringers, **52** and **53**, are within the protuberance.

While I have illustrated and described a preferred embodiment of the invention, it is to be understood that variations and modifications may be nonetheless made without departing from the principle of the invention.

I claim:

1. A rail fastener having two free ends to be associated in hooked engagement with the free ends of another fastener of like construction for holding a rail to a tie, being of one-piece spring metal and including, when positioned substantially upright: a pair of legs joined by a bight substantially in V-shape, said bight and legs being adapted to embrace a protuberance on one side of the tie, said legs and said bight lying substantially in a common plane and the legs diverging upwardly at substantially equal angles measured from a longitudinal axis lying in said plane and extended from the bisector point of the bight, each leg having an upper end to be outboard of the base of the rail on the tie and joined to an intermediate bight which, progressively, bends inward toward said axis then downward and rearward out of said plane to overlie the base of the rail, the rearward extension of each intermediate bight merging into a terminal bight having a low part engageable with the upper face of the base of the rail, and each terminal bight terminating in an upper bend presenting a free end of hook form.

2. A fastener according to claim **1** in which one of the hooks is characterized by an upright leg and in which the other hook is arcuate and substantially horizontal.

3. A rail fastener having two free ends to be associated in hooked engagement with the free ends of another fastener of like construction for holding a rail to a tie, being of one-piece spring metal and including, when positioned substantially upright: a pair of legs joined at their lower ends by a bight substantially in V-shape, said

bight and legs being adapted to embrace in tension a protuberance on one side of the tie, each leg having an upper end to be outboard of the base of the rail on the tie and joined to an intermediate bight which bends inward to overlie the base of the rail, each intermediate bight merging into a terminal bight having a low part engageable with the upper face of the base of the rail, and each terminal bight terminating in a free end of hook form, said hooks being of complemental shape so that the hooks of one fastener nest freely in the hooks of the other fastener.

References Cited

UNITED STATES PATENTS

1,440,062	12/1922	Costello	238—324
3,065,914	11/1962	Rigby	238—349

FOREIGN PATENTS

86,039	8/1965	Norway	238—349
1,130,461	5/1962	Germany	238—349

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U.S. Cl. X.R.

238—29, 91, 314