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RESILIENT RAILWAY SPIKE

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This invention relates to a resilient spike for use in association with railway ties to fasten tie plates and rails to the tie. The application herein is a continuation-in-part of my pending application Serial No. 32,975, filed June 12, 1948, now abandoned.

The general advantage of using a resilient spike for the above-mentioned purpose has been recognized because of the fact that a resilient spike is capable of reducing the mechanical force tending to provide a fastening of superior sort. Resilient spikes for fastening tie plates and rails in position, as used or proposed for use, have assumed various forms. Such prior art spikes have, however, each of them lacked some or more of the advantageous features which are combined in the resilient railway spike of the present invention. Thus in use of certain of the prior art resilient spikes, it has been necessary to prepare holes in the ties and tie plates which are of specialized form or position in order that the resilient nature of the spike may be effective, or in order that the tie should not be split when the spike is driven. Also certain of the resilient spikes used for fastening tie plates have been difficult to drive into place because of the fact that they do not present a solid striking head for driving, and also certain of the resilient spikes of the prior art are so formed that a specially shaped tool is required for their withdrawal when driven into place. Certain resilient spikes of the prior art are incapable of exerting a downward resilient pressure as well as a lateral pressure of the tie plate, and others which provide such feature are capable of exerting the pressure only when placed in a certain position, which may be undesirable with respect to a tendency to split the tie, or for other practical reasons.

A primary object of my invention is to provide a resilient tie plate spike capable of exerting lateral pressure against the walls of a tie plate hole which in its driven position exerts not only such lateral pressure, but also exerts a downward pressure on the tie plate at the spike hole therein, firmly and closely to engage the tie plate to the tie.

Another object of the invention is to provide a resilient tie plate spike having a head portion so formed that it limits bodily movement of its resilient members toward each other when the head of the spike is compressed laterally by driving.

Another object of my invention is to provide a spike of the above-mentioned sort which is formed to present a solid head for driving the spike and a gripping surface for a drawing tool which allows the spike to be pulled from the tie by means of a tool of usual and common construction.

Further objects of the invention will hereinafter appear.

Briefly to describe the primary features of the preferred form of railway spike embodying my invention, the spike is constructed of a resilient metal band, preferably a steel band, arranged at the rearward end to provide a driving head and forming a two-part shank. In the region along the length from its entering end the two legs of the spike extend in approximate parallelism and close relation with each other to a point of relatively slight divergence and then stand parallel to each other to the base of the head portion or driving head. Above a transverse line at the base of the head portion one or both of the legs flare outwardly at a substantial angle and then are bent inwardly and reversely across the longitudinal axis of the spike one of the said terminal regions overlying the other to present an effectively solid driving head, having a striking face in line with the longitudinal axis of the spike and the point of convergence at the base of the head. With appropriate relations between the dimensions of the spike hole in a tie plate and the spike, the spike when driven thus exerts a pressure on the tie plate a downward pressure holding the tie plate firmly against the rail. In one form of the spike the band of resilient metal of which the spike is formed is a one-piece band bent at its entering end into the approximate parallelism of the legs above noted and providing a curved driving point. In another form of the spike the band is initially formed in two pieces integrated as by welding after the pieces have been individually so shaped as to form a spike head and shank in the manner above described but with the terminals of the shank legs brought together as a two-part structure to form the penetrating or entering end of the spike.

In the accompanying drawings exemplary of an embodiment of my invention:

Fig. I is a side elevation of one form of my resilient railway spike.

Fig. II is a plan view of the resilient railway spike shown in Fig. I.

Fig. III is a fragmentary plan view showing a tie plate anchored to a railway tie utilizing the resilient spikes of my invention.

Fig. IV is a vertical sectional view taken in the section line IV—IV of Fig. III through the tie plate at the points of spike engagement and showing the said resilient spikes in elevation.

Fig. V is a fragmentary elevation view partly in section showing the spike driven through the tie plate and partially into the tie, the view illustrating a position of the spike during the early stages of driving.

Fig. VI is a view similar to Fig. V showing the final stage after the spike has been fully driven.

Fig. VII is a cross sectional view taken on the line VII—VII of Fig. V.
Fig. VIII is a cross sectional view taken on the line VIII—VIII of Fig. VI.

Fig. IX is a fragmentary elevational view partially in section showing the resilient spike used as a rail anchor.

X is a side elevation of a modified form of my resilient railway spike.

Referring initially to Figs. I to IX inclusive of the drawings, the railway spike designated generally by reference numeral 1 is composed of a one-piece band of resilient metal which is shown as approximately rectangular in cross section. The said band is bent upon itself to form a leading or entering end 2 and the shank members or legs 3 and 4 extend longitudinally from the entering end 2 closely adjacent and in approximate parallelism for a substantial distance, then diverge slightly through lengths, or regions, 3a and 4a and approximately parallel for lengths, or regions, 3b and 4b. These regions of divergence and approximate parallelism provide a gap 5 between the legs of the spike. The head portion or driving head of the spike is formed by a further divergence of the shank legs throughout lengths 3c and 4c to define an approximately V-shape gap 6 which is the region of maximum divergence between the legs or shanks. Terminally the spike legs 3 and 4 are bent reversely toward each other across the longitudinal axis of the spike with the terminal portion of one leg shown as the leg 3 underlying the bent terminal of the leg 4 and with its end edge in contact with or closely adjacent the inner surface of inclined portion 4c of that leg. The terminal portion 4d of leg 4 overlies portion 3d of leg 3 in its extent across the longitudinal axis of the spike. The leg portions 3d and 4d are in contact or at least closely adjacent each other and desirably are approximately parallel with each other and perpendicular to the longitudinal axis of the spike. Taken as a whole this head structure comprising flaring portions 3c and 4c and terminal portions 3d and 4d of the spike legs 3 and 4 provides an effectively solid driving head, having an approximately flat striking face upon which hammer blows may be delivered directly at and along the longitudinal axis of the spike and in line with the point of convergence between leg portions 3c and 4d at the base of the head.

Figs. V to VII inclusive illustrate the condition of the spike as it is driven through a spike hole a in the tie plate A and into a prepared hole b in the railway tie B. In forcing the spike through the hole a in the tie plate A and into the prepared hole b in the railway tie B the holes are brought into alignment and the spike 1 is driven through the hole in the tie plate and into the prepared hole of the tie. It is to be understood that at least as used by an individual transportation company, or in a particular section of a railway, there is a fixed dimension of tolerance in the head and accidental departure from such prescribed dimension is not great. It is therefore possible to make a spike in accordance with my invention regionally oversize in desired order with respect to the holes in the tie plate and railway tie that is to say, and into which the spike is driven through the aligned holes of the tie plate and tie by blows delivered on the effectively solid head of the spike. In the driving the forward portion of the spike in which the legs 3 and 4 are approximately parallel passes readily through the hole a of the tie plate and into the prepared hole b of the tie. With a desired relation between the dimensions of the tie plate hole and the spike, there is initial compression of the spike when the slightly tapered region, or length, of the spike lies in the spike hole a, with consequent decrease in the lateral dimension of the gap between the legs in that region. At this stage of driving the faces of the portions 3a and 4a of the spike legs do not lie squarely against the opposed faces of the spike hole in the tie plate, because the inclination of the spike legs in this region leaves gaps in the lower region of the spike hole, as is shown in Figs. V and VII. When, however, driving has progressed to such stage that the approximately parallel lengths or portions 3b and 4b of the spike legs lie within the spike hole of the tie plate, opposite outer faces of the spike in its compressed condition lie squarely in contact with and bear against the walls of the spike hole throughout the entire depth of the latter, as is shown in Figs. VI and VIII.

As driving progresses the lengths, or regions, 3c—4c, 3d—4d of the spike legs 3 and 4 enter the hole b in the tie B and this portion of the spike is compressed therein. Because of the compression of the spike shank against the walls of the hole in the tie the spike exerts a yielding force directed normal to the surface of the spike passing through the tie plate A, firmly and positively interengaging the tie plate and the tie. As an incident of this engagement the divergent legs 3c and 4c are to some extent forced into the hole a in the tie plate, the more firmly to engage it in the manner shown in Fig. VI of the drawings. As there shown, the gap 5 in what may be considered the primary locking portion of the spike is substantially decreased in its lateral, or transverse, dimension; and the gap 6 of approximately V-shape lying within the head portion of the spike is also inherently decreased in lateral dimension, with the interval between the legs of the spike in the region of the tie plate hole nearly closed in the uncompressed condition of the spike.

An important functional feature of the spike is that under such conditions it exerts a vertically directed resilient force as well as a laterally directed resilient force on the tie plate. Thus referring again to Fig. VI of the drawings, it will be seen that when the spike is driven beyond the point at which the marked divergence between the legs to form the head portion begins, the compression of the spike exerts a downward wedging effect as well as a lateral binding effect on the tie plate.

The shaping of the spike head is such that the edge surface of the terminal portions 3d and 4d is bevel against the opposed surface of inclined leg portion 4c closely beneath the bend therein. This arrangement acts as a stop to limit bodily approach of the leg portions 3c and 4c toward each other when the spike is driven. This limitation of bodily movement of the legs toward each other above the tie plate tends to distribute the points of flexion throughout those regions of the spike in which its legs are separated. By thus distributing flexion along the legs of the spike and avoiding undue localized flexion in any region of the spike, or tendency that is to say, to put the on the assumption that such oversize relation exists, the spike is driven into the aligned holes of the tie plate and tie by blows delivered on the effectively solid head of the spike. The forward portion of the spike in which the legs 3 and 4 are approximately parallel passes readily through the hole a of the tie plate and into the prepared hole b of the tie. With a desired
against the tie plate and the sides of the tie plate
hole and the bounding surface of the hole in the
tie, insures maintenance of proper rail gauge by
forcefully maintaining a stationary position of the
tie plate, so that repeated slight shifting move-
ment of the tie plate cannot strike laterally
against the spike so to tilt the spike as to enlarge
the spike hole in the tie. Also this tight engage-
ment insures against abraison of the tie by re-
petted slight shifting movement of the tie plate.

It will be observed in Figs. V and VI of the
drawings that the resilient force exerted by the
driven spike on the tie is directed longitudinally
of the tie and does not tend to spread the grain of
the wood therein. This greatly decreases the
tendency for the driving of the spike to split the
tie. The simple structure of the spike with its
head region arranged in alignment with the lon-
gitudinal axis of the spike allows it to be driven
with its head in any position with respect to the
run of the rail and the position of the tie plate
and avoids the necessity of forming holes of spe-
cial alignment in the tie or tie plate, or in a special-
ized location in the tie plate, in order to obtain full
locking action of the spike.

It will be noted that not only is the head por-
tion of the spike adapted particularly to
by the transmission of hammer blows directly
along the longitudinal axis of the spike, but also
the bulge of the head above the tie plate when
the spike is driven provides for engagement by
a simple withdrawing tool such as a claw bar. Also
it will be understood that the bulge of the head
positions the spike for driving into one of the
"line" holes of a tie plate to exert laterally
and downwardly directed forces against the base
of a railway rail and thus serve as a rail anchor
in addition to the primary function of the spike
when driven through one of the "lag" holes of
the tie plate simply to secure the tie plate to the
tie. This use of the resilient spike to engage a
rail C to the tie plate and in measure to engage
the tie plate A to the tie B is shown in Fig. IX of
the drawings.

Referring to a modified form of the resilient
railway spike shown in Fig. X of the drawings it
may be explained that this modification has as its
specialized purpose increased facility in manu-
facturing the spike. As above shown and de-
scribed, the resilient railway spike made of a one
piece band of resilient metal both pieces of
which may be simply and individually shaped
in multiple and thereafter joined as by welding
to provide the shaped band of the resilient spike.

Referring to Fig. X it will be seen that the legs
8 and 9 of the spike are initially separately made
in the lower shank region of the spike, in which
they extend in approximate parallelism and co-
operate to provide a pointed leading or entering
end of the lower shank of the spike. Whereas these
separate pieces may be integrated in any suitable manner, Fig. X of the drawings shows them united by a spot weld 11 between the spike legs at the base of the regions 8a and 9a
at which the legs slightly diverge. It will be seen
in the drawing that the lower leg is formed in which
the legs extend in approximate parallelism above
their region of initial divergence and the head
forming portions 8c and 9c, 8d and 9d of the spike
are identical with corresponding portions of the
resilient spike shown in Fig. I of the drawings.

A relatively slight region of weld between the
two pieces of band structure usually is sufficient
to provide integration in handling and driving the
modified form of spike and for its withdrawal
when that becomes necessary or desirable. In
driving the action is compressive and the tend-
ency is therefore to preserve rather than to dis-
rupt the integration of the elements. It should
be understood that the modified form of spike
shown in Fig. X of the drawings have been driven
all the several effects illustrated in Figs. V to VIII inclusive of the drawings with respect
specifically to the form of spike shown in Fig. I.

In both structural modifications of the spike it
provides a resilient, self-locking railway spike
while providing an effectively solid driving head
upon which hammer blows may be delivered di-
rectly at and along the longitudinal axis of the
spike. Likewise the spike exerts on a tie plate
through the spike hole of which it is driven a
resilient force directed along the longitudinal
axis of the spike and exerted on the tie plate at
the spike hole therein, firmly to hold the tie plate
to the tie.

It is to be understood that the cross-sectional
shape of the band may be other than rectangular,
if it is so desired. The size of the railway spike
is substantial, the actual size of the spike ap-
proximating the dimensions of the drawings, and
it is important that it be made of a metal which
combines strength and resilience in order to meet
the conditions of its use. I have found a spring
steel bar stock suitable for the purpose, but any
other metal having those indicated properties in
adequate order may be used.

I claim as my invention:

1. A resilient railway spike formed of a band of
resilient metal having an inverted approximately
U-shaped driving head, the said driving head
comprising two free ends of the said band bent
transversely to extend in opposite directions and
both approximately perpendicular to the longi-
dudinal axis of the spike with one of the said
transversely extended ends lying immediately be-
nest the other said end to form with it an ef-
fectively solid driving structure and to present a
striking face in alignment with the longitudinal
axis of the spike, the two legs of the said driving
head converging to a region of relatively close
spacing below and in line with the striking face
of the head to exert a force directed axially of
the spike upon compression of the lower region
of said driving head in the spike hole of a tie
plate, from the said driving head the two legs
extending as the shank of the spike to a point
of convergence in a region removed from the
said driving head and then extending in close ap-
proximately parallel relation to the entering end
of the spike.

2. A resilient railway spike in accordance with
the definition of claim 1 in which the spike is
formed of a one-piece band of resilient metal and
the entering end of the spike is formed by a band
of the said one-piece band.

3. A resilient railway spike in accordance with
the definition of claim 1 in which the spike is
symmetrical about its longitudinal axis.

4. A resilient railway spike formed of a band
of resilient metal having an inverted approxi-
A resilient railway spike in accordance with the definition of claim 8 in which the region of maximum divergence between the legs of the spike is immediately adjacent the driving head of the spike.

9. A resilient railway spike in accordance with the definition of claim 8 in which the region of maximum divergence between the legs of the spike is immediately adjacent the driving head of the spike.

10. A resilient railway spike in accordance with the definition of claim 8 in which the underlying end forming the backing element of the driving head of the spike has its edge closely adjacent the opposed surface of the other leg to limit bodily compression of the spike structure in the region of leg divergence thereof when driven into an orifice of lesser lateral dimension than the lateral dimension of the spike in the said region and to distribute flexion of the spike legs.

11. A resilient railway spike in accordance with the definition of claim 8 in which the region of maximum divergence between the legs of the spike is immediately adjacent the driving head of the spike and the underlying end of one leg has its edge closely adjacent the opposed surface of the other leg in the said region of maximum divergence to limit bodily compression of the spike structure when driven into an orifice of lesser lateral dimension than the lateral dimension of the spike as defined by divergence of the legs thereof and to distribute flexion of the spike legs.

12. A resilient railway spike formed of a single length of resilient metal doubled on itself to form a continuous bend at the entering end of the spike, two legs extended in close approximately parallel relation from said bend for a portion of the spike length, divergent portions of said legs in a region progressively removed from the entering end of the spike, and a driving head at the striking end of the spike comprising the free ends of the said two legs bent transversely to extend in opposite directions and both approximately perpendicular to the longitudinal axis of the spike, one of the said transversely extended ends lying immediately beneath the other said end, to back the said other end and to form with it a substantially solid blow-receiving structure.