

1,062,350.

A diagram of a bullet with labels *a*, *b*, *c*, and *d*. Label *a* points to the center of the bullet. Label *b* points to the right side of the bullet. Label *c* points to the left side of the bullet. Label *d* points to the tip of the bullet.

FIG. 2.

WITNESSES.

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RAILWAY-SPIKE.

1,062,350.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CLARENCE G. METZGAR, a citizen of the United States, residing in the borough of Kane, county of McKean, and State of Pennsylvania, have invented a new and useful Improvement in Railway-Spikes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

The object of my invention is to produce a rail spike which, when driven into place, will embed or anchor itself in the tie in such manner that it will be effectually held from either lateral or upward movement, and therefore cannot be worked or shaken loose, either by ordinary repeated vibrations of moving trains or by any sudden strains or shocks to which the rail may be exposed.

Another object of the invention is to so construct the spike that it may be withdrawn from the tie with as little difficulty, and with as little injury to the tie, as in the withdrawal of an ordinary spike.

Another object of the invention is to so construct the spike that it is adapted equally well for use either in substitution for the ordinary spike, in substitution for chairs and tie plates, or in connection with chairs and tie plates.

Another object of my invention is to so construct the spike that it may be manufactured without any special tools or appliances, and at an expense not substantially exceeding the cost of manufacture of an ordinary spike.

In the drawings: Figure 1 shows a side elevation of my improved spike applied to a rail and tie, the rail and tie being shown in section. Fig. 2 is a plan view of the spike.

In the ordinary operation of railway trains, the rail is subjected to varied strains, the chief of which are, first, outward pressure upon the rail due to the pressure of the wheel flanges against the inner side of the rail head, which tends to swing the rail upwardly on the outer edge of its base flange and to slide the same laterally; and secondly, downward pressure upon the rail due to the weight and momentum of the passing cars, which causes the rail to vibrate in a vertical direction. The resultant of these strains, which is transmitted to the spike, is to tend to move the spike laterally in the

tie as well as to work it upwardly; and as the wood of the tie is more or less yielding and resilient, the ultimate effect is to enlarge the spike-hole and loosen the spike. I have found by experiment and observation that the spike at its upper end tends to move upwardly and outwardly, which motion, being resisted by the material of the tie, in turn tends to move the lower end of the spike upwardly and inwardly; so that in fact the ultimate lateral movement that the spike tends to have is not a mere upward and outward movement but a swinging movement on an axis above the lower end or point of the spike combined with a vertical movement, which combined movement tends to wear away the spike-hole at its lower end as well as its upper end. The spike illustrated in the accompanying drawings is adapted to so engage the wood, and at such points, that all of these various tendencies to displacement will be effectually resisted, whether the strain be normal and prolonged or abnormal and sudden.

a is the shank of the spike, which is beveled at its lower end on its outer and inner faces, the angle of the bevel being somewhat greater on the outer face than on the inner face. The upper end of the spike is provided with a head composed of two parts. The rail engaging part *b* is located at one side of the shank and is adapted to overlie the base flange of the rail and is beveled on its lower side so as to adapt it to such flange, this part *b* corresponding to the rail engaging part of the head of an ordinary spike. The part *c d* of the head extends on the opposite side of the shank and is bent downward at its extremity and beveled to a fairly sharp edge to form a claw, spur, or prong adapted to be driven into the tie. The rail-engaging part *b* of the head, as well as the part of the head immediately above the shank *a*, is of substantially greater width than the shank, while the sides of the part *c* of the head converge toward the spur *d*, where the head is somewhat narrower than the spike. The upper face of the head of the spike is somewhat convex from side to side, although the upper faces of both parts of the head are on substantially the same level, and as the rail engaging part *b* is somewhat undercut, the part *c* is of substantially greater thickness than the part *b*. The outer face of the spur *d* extends at sub-

stantially right angles to the head, or parallel to the shank, while the inner face of the spur is inclined upwardly and inwardly.

In the inner face of the spike is formed or cut a notch *e* and in the outer face a notch *f*. These notches each are so shaped as to form a shoulder, facing upward, which connects with the normal face of the tie by a wall inclined with respect to said face at a comparatively small angle. The notch *e* is located relatively near the lower end or point of the spike, and the notch *f* is located relatively near the head of the spike.

The features hereinbefore specifically enumerated are not all absolutely essential to the attainment of the functions sought, but certain of them are essential and others are of importance, as will be hereinafter pointed out, particularly in the claim.

The rail *g* being laid upon the ties, the spike is driven into the tie in the ordinary way; that is, in close proximity to the base flange of the rail so that when the spike is driven home the under side of the part *b* of the head will come in contact with the rail flange and bind it rigidly to the tie. At the same time, the spur *d* will be driven into the tie until nearly or quite its whole length will be embedded therein. The thickness of the part *c* of the spike should not exceed the thickness of the part *b* by an amount exceeding the thickness of the rail flange, as it is of more importance that the part *b* shall firmly abut against the rail flange than that the lower face of the part *c* shall abut against the tie. As soon as the spike is driven home, the wood will immediately tend to resume its original condition and will expand and engage the notches *e* and *f*, thereby holding the spike from upward displacement, but not so firmly as to prevent the withdrawal of the spike, as it is possible to withdraw the same with comparative ease and without damage to the tie, which would not be the case if there were a number of notches in one or more sides of the shank. The spur *d* of the tie coöperates with the notches *e* and *f* to effectually hold the spike from lateral or upward displacement.

From what has been hereinbefore stated, it will be appreciated that the spike, under the stresses and strains to which it is subjected, tends to move, at the different parts thereof to which arrows have been applied, in the several directions in which such arrows respectively point. It will therefore be understood that such supposed movement

of the spike, to the extent that it occurred, would force the spur portion of the head deeper into the tie. This would be of advantage, but would not of itself prevent, except possibly in degree, the movement of the spike within its hole; but in my improved spike, this tendency is resisted by the shoulders of the notches *e* and *f*, which are so placed as to resist said movement; or if such movement, in minor degree, should nevertheless occur, the notches are so disposed as to compress the wood at precisely the points where the hole tends to enlarge and thus maintain or even increase the grip of the spike.

I do not claim any novelty in the use of a spur on the outside of a spike head, nor broadly in the employment of a notch or shoulder, but these features have never heretofore been so combined and arranged as to coöperate to effectually resist the stresses and shocks tending to loosen the spike.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

A railroad spike comprising a head having a flat under surface terminating at its forward end in an undercut portion, said undercut portion terminating in a plane above the flat under surface of the head and adapted to engage a rail flange, a main shank formed integral with said head and depending from the under surface thereof and at the point of juncture of the flat under surface and the undercut portion, an auxiliary shank formed integral with the head and depending therefrom and in parallel relation with the first-named shank, said auxiliary shank being arranged at the rear of the said head relative to the undercut portion, said head being formed at its longitudinal edges to provide shoulders, said shoulders projecting laterally relative to the said shanks, and merging into said undercut portion, said under surface and shoulders adapted to bear directly upon the tie, and said undercut portion adapted to be spaced from the tie and to conform to the contour of the rail flange whereby to securely hold the same in position.

In testimony of which invention, I have hereunto set my hand, at Philadelphia, Pa., on this 22nd day of October, 1909.

CLARENCE G. METZGAR.

Witnesses:

FRANK S. BUSSER,
M. M. HAMILTON.