

No. 728,675.

PATENTED MAY 19, 1903.

I. COPELAND.

METHOD OF FASTENING RAILS TO WOODEN TIES UPON RAILROADS.

APPLICATION FILED, OCT. 17, 1901.

NO MODEL.

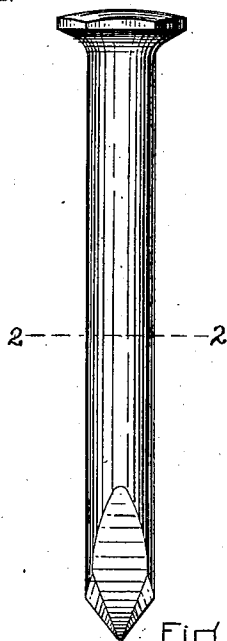


Fig. 1.



Fig. 2.

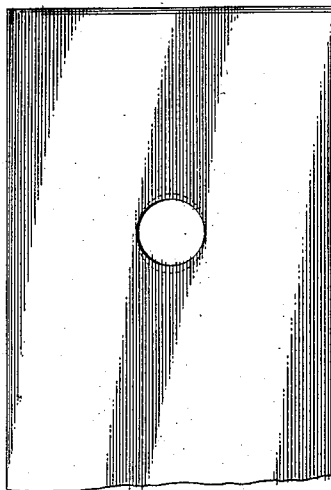


Fig. 3.

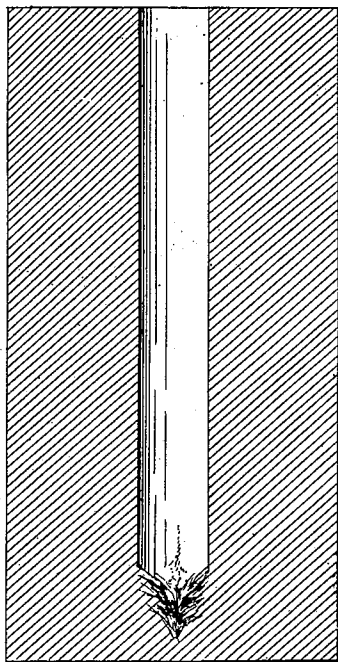


Fig. 4.

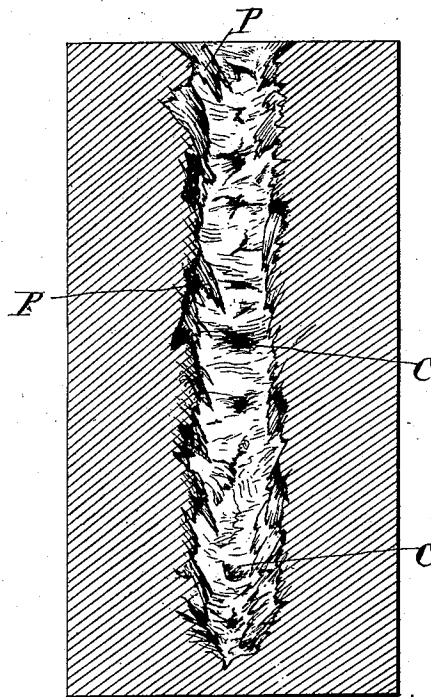


Fig. 5. INVENTOR=

WITNESSES:
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UNITED STATES PATENT OFFICE.

IRA COPELAND, OF NEWTON, MASSACHUSETTS.

METHOD OF FASTENING RAILS TO WOODEN TIES UPON RAILROADS.

SPECIFICATION forming part of Letters Patent No. 728,675, dated May 19, 1903.

Application filed October 17, 1901. Serial No. 78,903. (No model.)

To all whom it may concern:

Be it known that I, IRA COPELAND, of Newton, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Methods of Fastening Rails to Wooden Ties upon Railroads, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to a method of fastening the rails to the wooden ties upon railroads.

It consists in using spikes of an oval cross-section, in making round holes for their reception, and in forcing them into said holes in a particular way.

The object is to so perform the spiking that the ties will last much longer than has hitherto been the case and that the spikes shall have greater tenacity than is obtained by the method generally employed, thus materially reducing the cost of maintenance and increasing the safety of railroad operation.

My method is illustrated by the accompanying drawings, in which—

Figure 1 shows one of the spikes in elevation. Fig. 2 is a cross-section of the same, taken on line 2 2 of Fig. 1. Fig. 3 shows a piece of wood having a spike-hole. The full line indicates a round hole as bored for the spike. The dotted line bounds the space occupied by the spike when driven. Fig. 4 shows half a spike-socket such as is formed in the wood by employing my method. Fig. 5 shows half a spike-socket such as is formed by driving the ordinary rectangular spike into solid wood.

The object of this improvement is accomplished by driving a spike whose shaft has an elliptical cross-section of uniform size throughout its length (see Figs. 1 and 2) into a circular bored hole of proper dimensions, (see Fig. 3,) setting the long diameter of the spike in line of the grain of the wood.

In explaining the advantages of this method I will first state some defects of the method generally employed, which consists in driving spikes of rectangular cross-section into solid wood. Such spikes have a flattened point portion terminating in an edge which severs the wood across the grain for the full width of the spike. If these severing edges were razor-like in keenness, they might not create the havoc which they do in actual practice;

but the ordinary processes of manufacture fail to produce a razor-like cutting edge. Consequently when such spikes are driven into solid wood they depress and compress successive slivers of wood of much greater horizontal extent than the spike-socket until finally in case of each sliver the point breaks through the sliver. During this operation the sliver will have been broken from its adjoining wood at considerable distances outside the spike-socket. (See Fig. 5.) The result is that the spike is embedded in a socket whose walls are composed of alternations of portions of compressed wood and vacant spaces. It should be observed that the portion of wood which originally occupied the socket-space has been broken through centrally and each half compressed (by the wedge-shaped point portion of the spike) fore and aft against the end of the grain of the wood, while there has been no compression laterally. The lack of compression on the sides of the socket naturally results in an imperfect fit, which admits storm-water, which finds its way throughout the more or less porous socket, tending to produce rapid decay, necessity of repairs, and insecurity. My improved method remedies these defects to a great extent. It avoids disturbing the texture of the wood, except by compression, breaking no wood fibers, but bending them slightly downward and outward. This compression greatly improves the texture of the wood which forms the walls of the spike-socket in all desirable respects. There is compression throughout the circumference of the elliptical socket, but it is much greater in the direction of the long diameter, because the limit of safety is much greater in that direction. By the "limit of safety" I mean the amount of compression possible without danger of breaking wood fiber or of cracking the tie. Some compression is needed on the sides of the socket transversely with the wood fiber to give forceful impingement all around the spike, so as to increase tenacity and exclude storm-water.

In Fig. 3 the space between the circular solid line and the elliptical dotted line represents the amount of compression effected around the spike. It shows an amount gradually increasing from the sides in all four directions. Here an important question arises,

viz: What should be the amount of compression attempted? The results of numerous tests hitherto made seem to show that a difference between the diameter of the bored hole and the average diameter of the spike of one-eighth of an inch gives results of maximum tenacity. Much variation from this difference, either above or below, seems to reduce tenacity. As to depth of hole it appears that the deeper the better within the length of spike driven; but the major portion of the advantages of this method may be gained by making the hole of somewhat less depth—say three or three and one-half inches deep for a spike to be driven five inches in the wood. The hole should be deep enough to give accurate position and direction to the spike and to effectually close the spike-socket against water.

Fig. 4 illustrates a case where a hole was bored to a depth slightly less than the spike was driven, allowing the point of the spike to slightly enter solid wood. The spike-socket shown in Fig. 4 is smooth, hard, and firm, closely fitting the spike, leaving no interstices such as appear in Fig. 5, and showing no broken wood. Experimental tests have shown that such a spike driven into a hole of proper size had greater tenacity than when driven into the same stick without a hole, and also that it had greater tenacity than an ordinary rectangular spike of equal weight driven without a hole.

Another important purpose served by thus

embedding the spike in such a socket as is described above is that it increases the effect of a cement coating on the spike, (see United States Patent No. 362,940, issued to me May 17, 1887,) inasmuch as it provides a greater superficial cemented contact between the metal and the wood.

I have described the spike to be used as having an elliptical cross-section; but I do not confine myself to an exact ellipse, but would include all figures nearly approaching an ellipse, even though short straight lines should enter their periphery.

I claim—

A method of fastening railroad-rails to wooden ties, consisting of the following steps: first, boring a hole into the tie, whose diameter is slightly less than the short diameter of the spike to be used, second, driving a spike of elliptical cross-section into said hole, with its long diameter in the line of the direction of the grain of the wood, whereby the greatest amount of frictional holding strain on the spike is secured, consistent with the preservation of the structure of the wood, substantially as and for the purposes set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 15th day of October, A. D. 1901.

IRA COPELAND.

Witnesses:

FRANK G. PARKER,

WILLIAM EDSON.