To all whom it may concern:

Be it known that I, FRANKLIN E. ABBOTT, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Hook-Shoulder Tie-Plates, of which the following is a specification.

My invention relates to tie-plates for railroad rails and consists in a new form of plate, so constructed that the spikes do not engage with the rail-base but are maintained out of direct contact therewith and to the rail is allowed a certain, but limited, freedom of up and down movement. By this arrangement disturbance to the ties and tendency to loosen the spikes is much reduced, so that the rail is secured in position with great and enduring firmness.

The essential features of my tie-plate are the base having on its upper surface two shoulders, one straight and one hooked, arranged parallel and spaced to receive between them the rail-base. The hook overhangs the rail base on one side but is spaced from therewith, so as to permit the aforesaid up and down movement which is due to the motion of the rails under the wheels. The spike holes on one side are outside of the hooked shoulder, on the other are through the straight shoulder or rib. This rib is of such a height as to hold the spike head, even when turned inwardly, out of contact with the rail so that there will be a limited amount of clearance between the rail flange and the over-hanging spike-head.

In the drawing hereof the various features and advantages of my invention are shown embodied in a desirable form of tie-plate. The reference numerals of this description indicate the corresponding parts in all the figures.

Figure 1 is an isometric view of my tie-plate. Figs. 2 and 3 are vertical cross sections of the tie-plate with the rail in place, showing respectively driven spikes and screw spikes. Fig. 4 is a plan of a section of track showing the best arrangement of my tie-plates. Fig. 5 shows a slight modification in the form of the rib and the arrangement of the spike holes.

In the figures 1 indicates the flat base of the tie-plate adapted to set snugly on the ties. The lower surface may be smooth as shown, or roughened, or corrugated, or having flanges to engage with wooden ties, all as well understood. The upper surface of the tie-plate is provided with the bed 2 for receiving the rail 3. On one side of the base are arranged the straight shoulder or rib 4, and on the other side, the hooked shoulder 5, provided with the hook 7 to overhang the rail flange.

The spike hole, or holes, 10 on one side are outside of the hooked shoulder; on the other side the hole or holes 11 are arranged entirely within the limits of the rib. This rib is made wide to strengthen the tie-plate and also entirely to surround the spike hole, or holes, leaving a sufficient rim of metal on all sides of the hole to provide backing for the spike when driven home, and particularly on the inner side to maintain the spike head clear of the rail flange as indicated in dotted lines in Fig. 2. This clearance between the rail-flange and the hook on one side and the flange and the spike head on the other is the important feature of my invention, and I believe it to be broadly new, for by my tie-plate thus peculiarly formed, the rail is not only secured firmly in position on the ties, but much more firmly than with any other form of tie-plate with which I am acquainted, and the securing is more nearly permanent. The reason for this is that in the operation of the rolling stock there is a certain "wave motion" of the rails, and where the rails are secured in position by direct engagement therewith of the spike-head (either with or without tie-plates) the constant up and down movement of the rails due to this "wave motion" is applied constantly and directly to the spikes whereby the ties are disturbed and more particularly the spikes, or other rail fastenings, loosened. But with my tie-plate, there is no such direct engagement with the spikes and there is sufficient clearance at the hook, to permit a certain freedom of the up and down movement. Therefore the aforesaid disturbances are largely or entirely avoided. At the same time the securing of the rail in place is very firm and enduring. For a similar reason the straight rib is made enough thicker than the edge of the flange to maintain a sufficient clearance between the flange and the spike head, when screw-spikes are used as in Fig. 3 or the spike heads turned in as shown in dotted lines on the left of Fig. 2.
By this arrangement "throat cutting" of the hook and spikes is avoided. I recommend a clearance of about \( \frac{1}{16} \) inch between the hook and the rail flute but do not limit myself thereto. The clearance between the spike head and the flute is desirably slightly greater than that between the hook and the flute thus avoiding the possibility of the flute coming in contact with the spike.

In most tie-plates, the spikes both secure the tie-plate to the tie and engage with the rail-flange. My tie-plate is attached to the ties independently of the rail, that is, the main or only function of the spikes is to secure the tie-plate in place. The tie-plate secures the rail. I believe this also to be broadly new.

When driven spikes are used I prefer the arrangement shown in full lines on the left of Fig. 2, for with such arrangement there is equal firmness in securing the rail in position, without possibility of its coming in contact with the spike. This result is also attained by the slightly modified form shown in Fig. 3, where the rib 4 is rather narrow and the spike holes 13 are outside of the rib, but I prefer the form shown in the other figures.

The tie-plate shown in Fig. 3 differs from that of Fig. 2 in that the spike-holes are formed at their upper ends to fit the convex under surfaces of screw-spike.

The tie-plates are best arranged as shown in Fig. 4, with the hooked shoulders of the pairs of plates alternately arranged on the inside and outside of the rail. This arrangement may be somewhat modified but some sort of alternate arrangement is essential for secure fastening of the rail, for if all the hooks were arranged on the inside or all on the outside of any particular piece of track, there would not be sufficient security. Five pairs of tie-plates are shown in Fig. 4, a, b, c, d, e. Of the plates a, c, and e, the hooked shoulders 6 are arranged on the inside of the rails; of the plates b and d, on the outside.

Referring to certain details—the space between the two shoulders, as shown in Figs. 2 and 3, is made slightly greater than the width of the average rail-base, to allow for accidental variations in the parts. While a flat bottom rail only is, shown, yet it will be understood that my tie-plate can be used with rails having convex bases or bases of other special shapes, the tie-plates being formed to correspond. With such special shapes the grooves 14 are of more importance. Some yielding along the lines of these grooves is permitted to the plate in case it does not fit the rail-base accurately, thereby insuring firm support of the rail at the center, as well as along the edges, and preventing strains on the rail.

The diminishing of the disturbance of the ties and the spikes preserves the gage, alignment and surface of the track. Another special advantage of my plate is that the rail is so held between the parallel rib and shoulder, that danger of the ties slewing and the track collapsing is much reduced. The avoiding of these disturbances and dangers makes for economy and safety in travel. The advantages here claimed for my tie-plate have been tested and proved in practical use for nearly a year.

Having described my invention, I claim, 1. A tie-plate for railroad tracks comprising a base provided with a shoulder on its upper surface, said shoulder being provided with a hook adapted to extend over the edge of the rail flange and engage the same to prevent material tipping of the rail and being arranged to leave a space between the hook and the rail flange to permit slight upward movement of the rail.

2. A tie-plate for railroad tracks comprising a base provided with a shoulder on its upper surface, said shoulder being provided with a hook adapted to extend over the edge of the rail flange and engage the same to prevent material tipping of the rail and being spaced a sufficient distance above the rail flange to permit slight upward movement of the rail, and a shoulder opposite said first mentioned shoulder for engaging the opposite edge of the rail base.

3. A tie-plate for railroad rails comprising a base and parallel shoulders on the upper surface thereof to receive the rail base between them, one of said shoulders being straight and the other provided with a hook extending over the rail flange and spaced therefrom.

4. A tie-plate comprising a base and shoulders on the upper surface thereof, one of said shoulders being straight and the other provided with an inwardly turned hook, said hook being arranged to extend over the rail flange and spaced therefrom, and said base-plate being provided with spike holes so arranged that the spikes are maintained out of contact with the rail flange.

5. A tie-plate for railroad rails comprising a base and parallel shoulders on the upper surface thereof, one of said shoulders being provided with a hook extending over the rail flange and spaced therefrom, the other shoulder being straight and perforated by spike holes, and being of such a width that the spike holes are entirely surrounded by the metal of the shoulder and of such a height that the spike heads when extending over the rail flange shall be spaced a greater distance therefrom than the hook on the first shoulder.

6. A tie-plate for railroad rails comprising a base and parallel shoulders on the up-
per surface thereof, one of said shoulders being straight and wide, the other having a hook overhanging the rail flange and spaced therefrom, said tie-plate being formed with spike holes outside of the hooked shoulder on one side and through the straight shoulder on the other, said straight shoulder being higher than the thickness of the adjacent edge of the rail flange to maintain spike heads spaced from the rail flange when overhanging said flange.

7. In combination with railroad rails and ties a series of tie-plates each comprising a base and parallel shoulders on the base, one shoulder being straight and higher than the adjacent edge of the rail flange the other shoulder having a hook extending over the rail flange and spaced therefrom, said tie plates being arranged in pairs on the ties, the pairs being arranged alternately with the hooks of one pair on the inside of the rails and of the next pair on the outside.

8. A railroad track structure comprising the ties, the rails supported thereon and the tie-plates for the rails, said tie-plates being formed with a flat base and integral parallel shoulders spaced to receive the rail between them, one shoulder being straight and the other having a hook extending over the rail flange and spaced therefrom, and the tie-plates arranged in pairs on each tie, with the hooks of the pairs alternately arranged to engage with the inner and the outer flange of the rail.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANKLIN E. ABBOTT.

Witnesses:
J. R. MILLWARD,
ALFRED WILKINSON.