March 19, 1935. E. WOODINGS 1,995,020

RAIL FASTENER

Filed Dec. 29, 1930 2 Sheets-Sheet 1

Fig. 1.

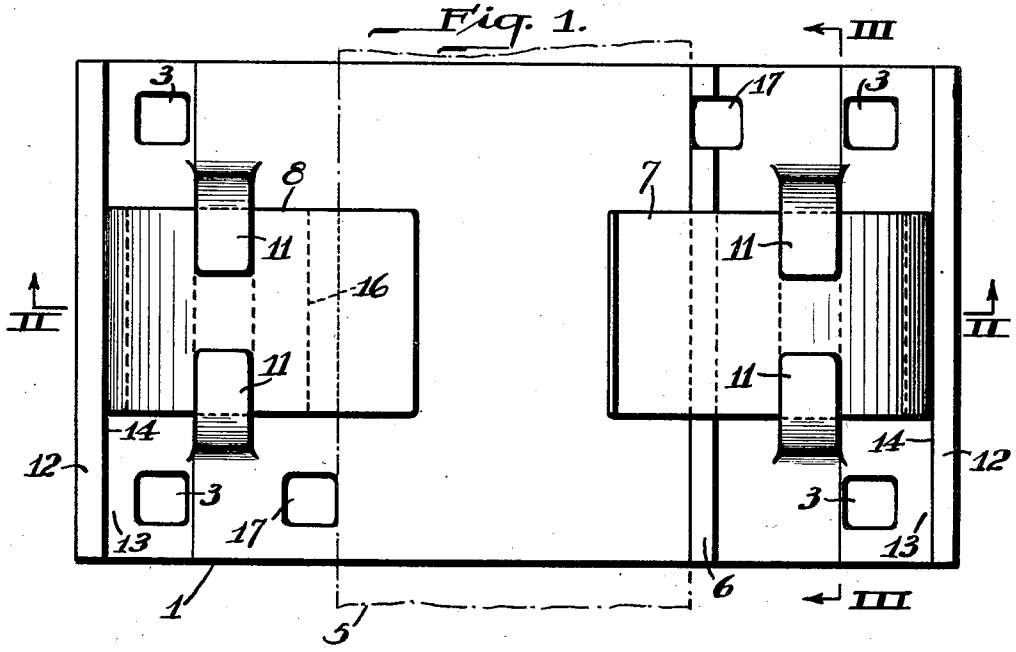


Fig. 2.

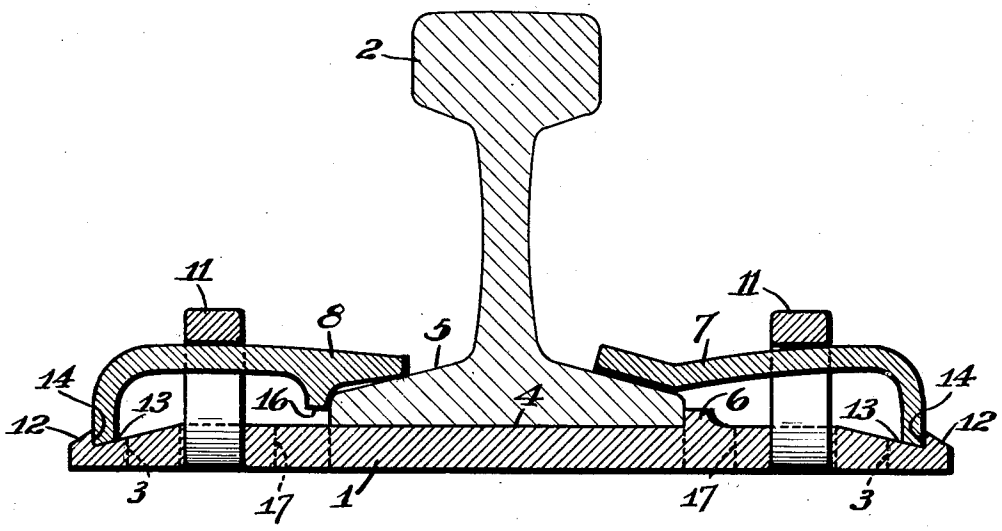
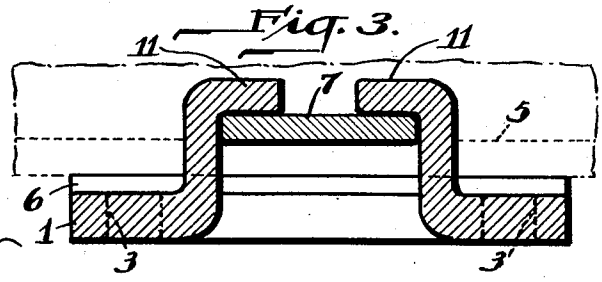


Fig. 3.



WITNESSES

A. B. Wallace.

J. V. Bailey Brown

INVENTOR

Emanuel Woodings

by Brown & Critchlow

his attys

March 19, 1935. E. WOODINGS 1,995,020

RAIL FASTENER

Filed Dec. 29, 1930 2 Sheets-Sheet 2

Fig. 4.

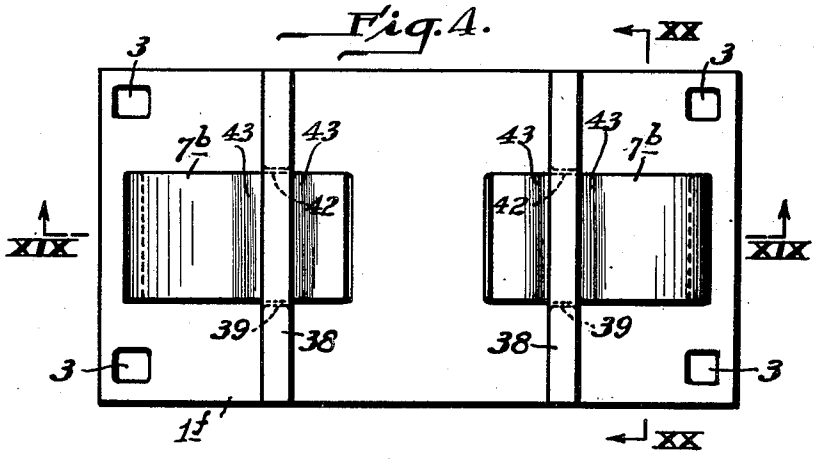


Fig. 5.

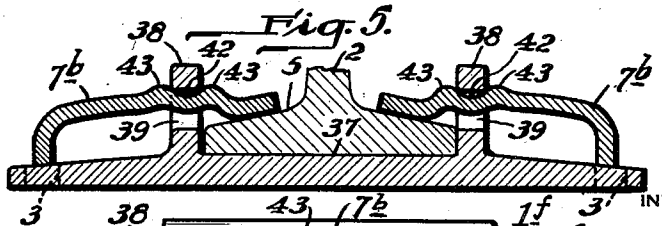
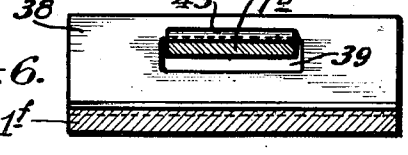


Fig. 6.



WITNESSES

A B Wallace

J. Bailey Brown

INVENTOR

Emanuel Woodings

by Brown & Critchlow

his Attys

Patented Mar. 19, 1935 1,995,020

UNITED STATES PATENT OFFICE

1,995,020

RAIL FASTENER

Emanuel Woodings, Oakmont, Pa., assignor to Woodings-Verona Tool Works, Verona, Pa., a corporation of Pennsylvania

Application December 29, 1930, Serial No. 505,241

5 Claims. (Cl. 238—304)

This invention relates, generally, to rail retaining devices and particularly to resilient fastenings for attaching rails to tie plates.

As a locomotive and train of cars move along a railroad track of standard construction the rails are deflected successively by each wheel that passes. The deflection of the track occurs by reason of the heavy load, the flexibility of the rails and their supporting ties, and the elasticity of the ground on which the track is laid. Every point in the length of a rail assumes alternately a position below and above its normal horizontal position in the track as the wheels of a train pass over it. This is known as the wave motion of the rails. The amplitude of this wave motion is obviously dependent upon the force exerted by the wheels of the rolling stock and upon the degree of rigidity of the rails and their supporting structure.

There is a tendency for relative motion between the rails and the ties both in the vertical direction and longitudinally of the rails. It has been found to be impracticable to secure the rails to the ties in such manner that there can be no relative motion between them.

In the ordinary track construction, in which the rails are spiked to wooden cross ties, which are embedded in ballast, the relative vertical motion between the rails and the ties gradually pulls the spikes from the ties. After the spikes are loosened, the amount of relative motion between the rails and the ties increases, with the result that a wearing or grinding action takes place between the rails and the ties, and also between the edges of the rail bases and the throat portions of the spikes. This wear accelerates its destructive effects on the ties and spikes as the amount of relative motion between the rails and the ties becomes greater as the ties and spikes wear away. Because of this action, the rails gradually become loosened from the ties, and the spikes or even the ties have to be replaced or renewed.

To avoid direct wearing of the ties by the rails, tie plates of various types have been quite generally used. However, even when tie plates are used the relative motion between the ties and the rails causes the plates to move relative to the ties in such manner that the ties are worn or cut by the tie plates. Further, the tendency of the rails to withdraw the spikes from the ties is not removed by utilizing tie plates, and inasmuch as the spikes are depended upon to engage the rails the spikes are subjected to the same general condition of wear existing when no tie plates are used.

After a piece of track so constructed has been in use for some time a train in passing over it will cause the rails to be alternately lifted from the tie plates and forced down upon them as successive wheels pass along the rail. This pounding action of the rails upon the loose tie plates results in objectionable noise and tends to further wear the bases of the rails, the tie plates, ties, and spikes.

It is, therefore, an object of my invention to provide means for securing the rails of a railway track to the ties in such manner that the securing means will not become loosened as a result of the wave motion of the track, and which will not be worn or otherwise injured by relative movement of the rails and ties.

Another object of the invention is to provide a rail retaining device that also serves to anchor the rail against longitudinal movement thereof relative to the ties.

A further object is to provide a resilient rail retaining device that may be readily and economically manufactured, that is adapted to be easily and quickly applied to secure a rail in position, and that may be readily released without injuring the rail or the tie.

In accordance with the present invention, I provide a tie plate that is adapted to be securely fastened to a tie by spikes or screws in the usual manner, and resilient spring clips for securing the rail to the tie plate in such manner that limited relative motion may take place between the rail and the tie plate by reason of the resilient connection therebetween, without resulting in permanent looseness or destructive wear between the various parts, and without pulling the tie plate away from the tie, or wearing the spikes attaching it to the rail.

The foregoing, and other objects of the invention that will become apparent as a fuller understanding of it is had upon reading this specification, may be achieved by means of the structures herein described in connection with the accompanying drawings in which specific embodiments of the invention are shown in the different views, Fig. 1 being a top plan view of a tie plate and rail fastening means embodying my invention; Fig. 2 a view in transverse section of a rail and the retaining device shown in Fig. 1, taken on the plane represented by line II—II; and Fig. 3 a view in longitudinal section, taken on the plane represented by line III—III in Fig. 1. Fig. 4 is a top plan view of still another modifi-

cation; Fig. 5 is a view in cross section taken on the plane represented by the line XIX—XIX in Fig. 4; and Fig. 6 is a view in longitudinal section taken on the line XX—XX of Fig. 4.

The preferred embodiment of my invention, which is shown in Figs. 1, 2 and 3, comprises a tie plate 1 adapted to rest on the upper surface of a standard tie (not shown) for supporting a rail 2 of any standard type. The tie plate 1 may be securely fastened to the tie by spikes (not shown) which pass through holes 3 punched near each corner of the plate. The spikes may be of the usual driven type, but I prefer to utilize the lag-screw type or so-called screw spikes. The tie plate 1 is provided with a plain upper surface 4 for receiving the base flange 5 of the rail 2, that is disposed thereon with one edge, preferably the one at the outer side of the track, in engagement with a shoulder 6 formed integrally on the upper surface of the tie plate 1.

For holding the rail on the tie plate instead of the usual spikes I utilize resilient spring clips 7 and 8 that bear upon the top of the rail base 5, exerting a resilient force thereon that permits the rail in its normal wave motion under the influence of passing trains to move relative to the tie plate without altering the amount of force tending to hold the rail on the tie plate.

As shown in Fig. 2 each of the spring clips 7 and 8 is shaped or arched in such manner that one end bears on the base 5 and the other end bears on the top of the tie plate 1 near its outer edge. The spring elements are essentially plates of steel having rectangular cross sections.

To deflect the spring elements and cause them to exert downward forces upon the rail base 5, the tie plate 1 is provided with fulcrum members 11 adapted to bear upon the intermediate part of the spring. As shown in Fig. 3 each fulcrum member 11 comprises a pair of up-struck lugs near the edge of the tie plate and spaced in such manner that the spring element 7 may be passed between them. The upper ends of the lugs are bent toward each other to constitute what may be termed an incomplete arch or bridge member for exerting downward pressure on the middle of the spring element, when it is in normal relation thereto. In order to place the springs 7 and 8 in position they are passed beneath the fulcrums 11 with their inner ends resting upon the rail base 5 and their outer ends engaging sloping faces 12 at the edges of the tie plate 1. The springs may then be moved to final position by forcing or driving them towards the rail and beneath the fulcrum 11 in such manner that the inner ends move upwardly along the sloping top surface of the rail base 5 and the outer ends also move upwardly along the sloping faces 12 of the tie plate 1 while the central portions are held down by the fulcrum 11.

When the springs reach their final positions the outer ends drop into shallow notches 13 near the edges of the tie plate and bear against vertical shoulders 14 that constitute the outer sides of the notches. The springs are thus effectively restrained from moving away from the rail. Inasmuch as the shoulders 14 are disposed parallel with the rail they also hold the springs in proper alignment with the rail and prevent them from turning in the event the rail tends to creep longitudinally relative to the tie plates.

In this manner the spring elements 7 and 8 act also as rail anchors and effectively resist longitudinal movement of the rail relative to its supporting ties. The longitudinal holding effect results from the frictional resistance to movement between the rail and the springs, and inasmuch as two springs are used on each rail at each tie, the combined holding force of such springs is greater than the holding force of the lesser number of rail anchors that are usually applied to each rail.

The spring tension and the frictional holding force may be increased by arranging the springs to be driven farther onto the upwardly sloping rail base flange. In some instances it may not be necessary to utilize a notch 13 or shoulder 14 as the frictional resistance between the outer ends of the springs and the top of the tie plate may be utilized to hold the springs in position. In such event the spring tension may be adjusted by driving the springs in the required distance and should loosening result from wear in service the tension may be restored by driving the springs farther up on the sloping face of the rail base.

As shown the inner ends of the springs that bear upon the rail base 5 are bent upwardly to present relatively flat wearing surfaces of substantial area for frictionally engaging the rail.

When the spring 7 is driven into position in the manner just described it will be stressed by reason of the fact that the inner end moves upwardly along the sloping face of the rail base 5 and the arched spring moves under the fulcrum member 11. This bending of the spring 7 forces the inner end downwardly against the rail base with considerable pressure.

Inasmuch as the shoulder 6 is provided only at one side of the rail 2 the tie plate 1 may be utilized for supporting rails of different widths. To prevent the rail 2 from moving transversely on the tie plate 1 the spring 8, which is intended for use on the inner side of the rail, is provided with an integrally formed depending shoulder 16 that engages the edge of the rail base 5 and functions as an abutment to hold the rail against inward lateral displacement. In case it becomes desirable to replace the rail 2 with a rail of different width it is merely necessary to replace the spring clip 8 with another of a size adapted to hold the new rail.

To remove the rail 2 from the tie plate 1 it is only necessary to lift the outer ends of the spring clips 7 and 8 out of the notches 13 by means of a suitable pry bar or other tool and withdraw the springs from beneath the fulcrum members 11.

Emergency spike holes 17 are provided in the tie plate 1 at each side of the rail base in such manner that they may be utilized to receive spikes in the ordinary manner to temporarily hold the rail and plate in the event that the springs or the fulcrum members 11 are damaged or broken by accident.

In manufacturing tie plates it is customary to roll long strips of metal of width equal to the width of the finished tie plate and with the various notches and shoulders formed longitudinally thereof. After being rolled the strips are cut, as by shearing to suitable lengths to form tie plates. The spike holes 3 and 17 may then be punched in the plates and the upstruck fulcrum members 11 formed by punching and pressing them out of the metal of the tie plate.

Likewise the spring elements 7 and 8 may be formed by rolling long strips of spring steel of suitable cross section and with the shoulder 16 (in the case of the spring 8) formed longitudinally of the strip. The strips may then be

sheared to form springs of the desired width after which the springs may be heat treated to develop the necessary resilient properties of the material.

In the modification of the invention shown in Figs. 4 and 5, the notches and shoulders at the edges of the tie plate are dispensed with. Special springs 7b are utilized. They are provided with depressions 42 in their upper surfaces disposed in such manner that they engage the fulcrum members 38. The depressions 42 provide shoulders 43 that engage each side of the webs 38 to prevent the springs 7b from becoming displaced.

From the foregoing description and explanation of the functions of my rail fastening device, it is apparent that I have provided a rugged and practical structure for resiliently retaining railroad rails on their supporting ties that takes the place of the rail holding spikes heretofore used, and that also performs the functions of the rail anchors ordinarily used for preventing creeping of the rails on the ties.

Although the invention has been set forth by referring to specific embodiments thereof, it is to be understood that the various details illustrated and the expressions used in explaining the functioning of the devices are to be interpreted as descriptive merely, and not in the sense of limiting the scope of the invention as it is defined in the appended claims.

I claim:

1. A rail retaining device comprising a tie plate, integral ribs extending longitudinally of the rail base and defining the rail seat, said ribs constituting shoulders for holding the rail against lateral movement and having slots in the direction transverse to the rail, arched spring elements disposed through said slots with one end in engagement with the rail base and the other end in engagement with the top surface of the tie plate, each of said spring elements being bent to present shoulders for engaging the sides of the ribs to hold the springs in rail-retaining position.

2. A rail retaining device comprising a tie plate, an integral rib extending longitudinally of the rail base and defining one side of the rail seat, said rib constituting a shoulder for holding the rail against lateral movement and having a slot in the direction transverse to the rail, an arched spring element adapted to be driven through said slot with one end in engagement with the rail base and the other end in engagement with the top surface of the tie plate, said spring element being bent to present a shoulder for engaging the inside of the rib to hold the spring in rail retaining position.

3. A rail retaining device comprising a tie plate adapted to be secured to a tie, a spring element for retaining a rail on the tie plate, said spring element being bent to constitute an arch with one end in contact with the top of the rail flange and the other end bent downward to engage the tie plate, a fulcrum element integral with the tie plate disposed to engage an intermediate portion of the spring arch, and a bend in the spring arch adapted to form a hump for locking the spring in position when the spring is driven under the fulcrum element to normal position.

4. A rail retaining device comprising a tie plate having a seat therein for retaining a rail base, an integral fulcrum member on the tie plate at one side of the rail seat, an arched spring element adapted to be driven underneath a portion of the said fulcrum member with one end in engagement with the rail base at a substantial distance inward from the fulcrum member and with the other end in engagement with the top surface of the tie plate on the other side of the fulcrum member, and a projection on the upper side of said spring element adapted to engage the inside of the fulcrum member when the spring is driven thereunder to normal position, whereby to hold the spring in rail retaining position on the rail and plate.

5. A rail supporting and retaining means comprising a tie plate, an integral upstanding rib formed on said tie plate constituting a shoulder for positioning a rail seated on said tie plate and means on each side of the rail seat overlying the rail flanges and adapted to resiliently retain the rail on said rail seat, the retaining means on the side of the rail seat opposite said rib consisting of a spring element having one end downturned and adapted to be flexed transversely of the rail and secured under tension to said tie plate and its other end adapted to engage the rail flange edge and thereby maintain the opposite rail flange edge against said rib together with means engaging the center portion of said element to prevent upward movement of said last mentioned portion.

EMANUEL WOODINGS.