Aug. 27, 1935. E. W. CARUTHERS 2,012,807

RAILWAY FROG

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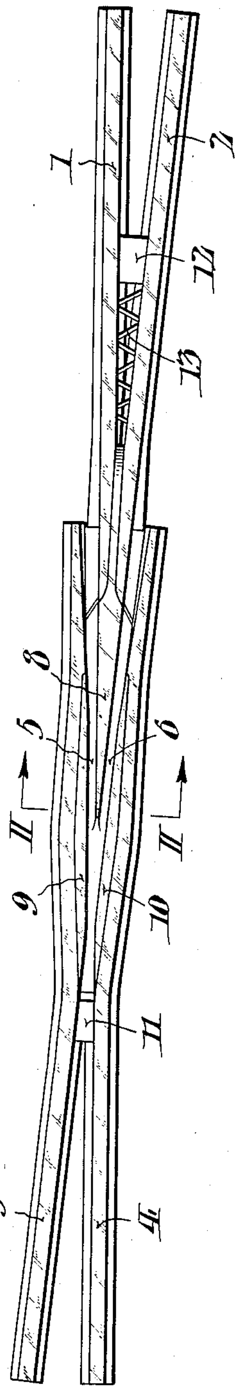

FIG. I.

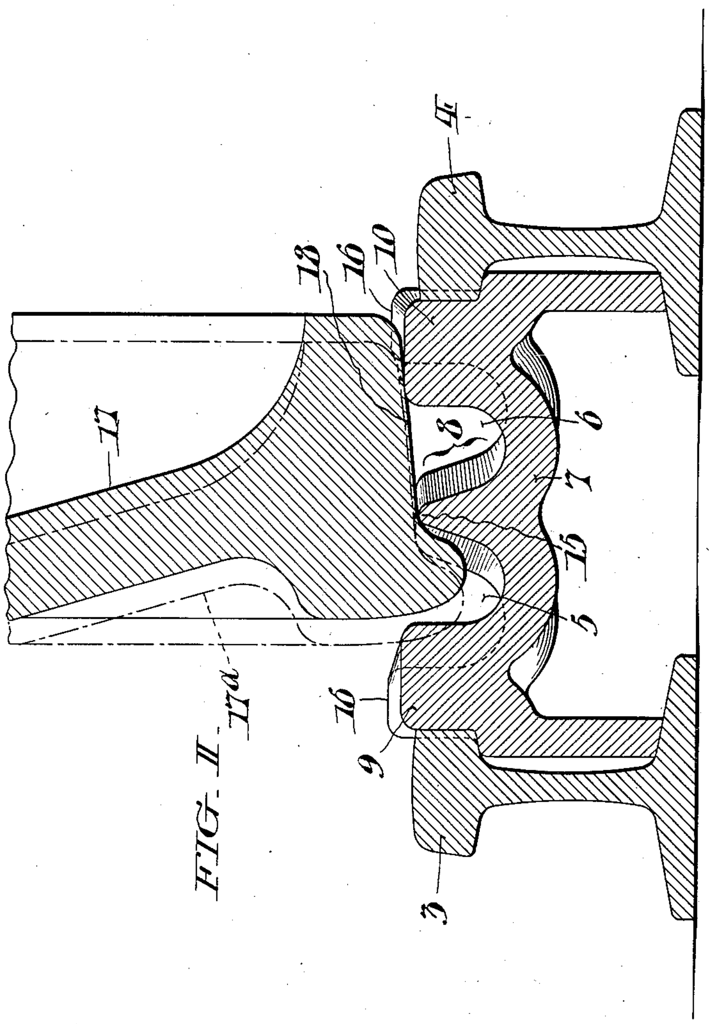

FIG. II.

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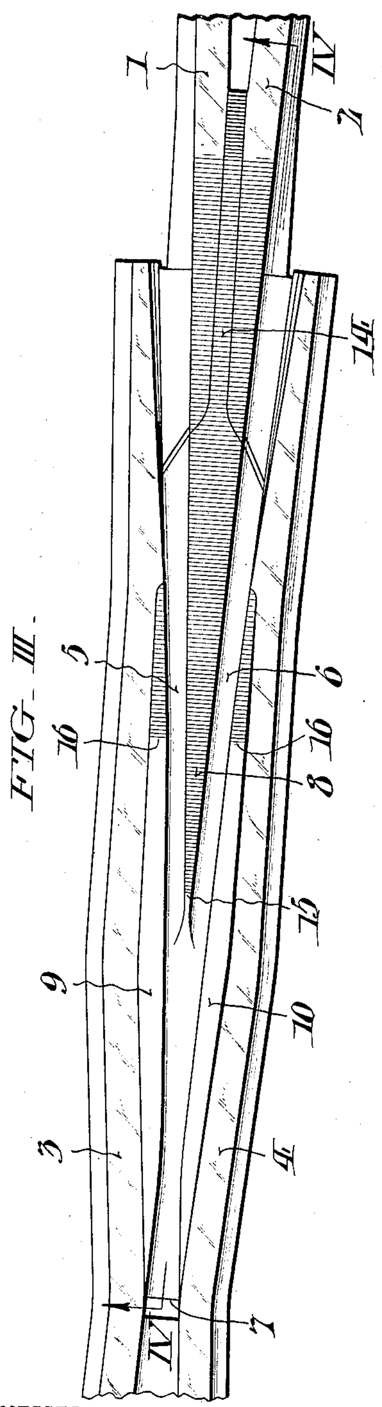

FIG. III.

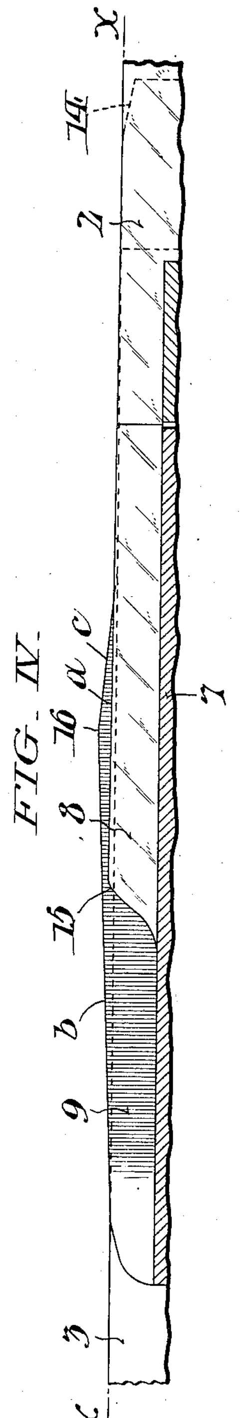

FIG. IV.

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2,012,807

RAILWAY FROG

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Application February 1, 1934, Serial No. 709,344

5 Claims. (Cl. 246—455)

This invention relates to railway frogs and its principal object is to relieve frog points and the adjacent wings of the intense hammer blows to which they are ordinarily subjected and to cause the wheels of passing vehicles to run smoothly through the frogs at turnouts or like track structures.

The use of coned wheels on railway vehicles has become general and has resulted in the subjection of frog points to severe hammer blows where the frogs are manufactured with their tread surfaces in a level plane. To relieve this condition it has been proposed to raise the tread surfaces of the wings at the throat, but so far as I am aware such schemes have not been altogether successful in some respects.

Frogs, especially those of the railbound type wherein a manganese central body is employed, shortly after they are placed in service lose their original surface characteristics by reason of cold flow of the surface metal incident to heavy loadings. As distinguished from ordinary wear, the flow of the tread surface metal of frogs, immediately after they are placed in service, is very pronounced up to a certain point and is neglible thereafter. Following the original displacement of its surface metal, a frog acquires a substantially permanent set, the running surfaces thereafter changing only very gradually as they are subjected to wear. Hence frogs which are designed with precision as to the original form of the running surfaces may not perform efficiently after cold flow of the metal has occurred.

Moreover, to relieve frog points of intense loadings, it is desirable to avoid abrupt or sudden shift of the load from the wing rails to the point and to so design the tread surfaces at each side of the point that the pressure of the load will be distributed proportionally between the frog point and the adjacent wing rails.

Accordingly, the frog of the present invention is designed to overcome the above recited difficulties, as well as to satisfy many other considerations, such as simplicity and economy of manufacture, and conformity with standard railroad practice.

Other objects and advantages characterizing my invention will become more fully apparent from the detailed description of one embodiment or example thereof which follows hereinafter having reference to the accompanying drawings. Of the drawings:

Fig. I represents a plan view of a frog of my invention.

Fig. II represents an enlarged cross section of the same, taken as indicated by the lines II—II of Fig. I, and showing a portion of a coned wheel in passage over the frog point.

Fig. III represents an enlarged plan view of the medial portion of the frog showing clearly the frog point, wings and flangeways; and,

Fig. IV represents a longitudinal cross section of the same, taken as indicated by the lines IV—IV of Fig. III.

In the drawings there is shown a frog of my invention, and the particular type selected for illustration is a railbound manganese steel frog. It comprises generally heel rails 1, 2, wing rails 3, 4, and flangeways 5, 6 between the rails. The rails proper merge with a central manganese body 7 which includes the frog point 8 and wing portions 9, 10. Inasmuch as many other types of frogs are embraced within my invention, the reference herein to "heel rails" and "wing rails" is general, no distinction being made between the manganese steel portion at the center of the frog and the carbon steel rail portions at the ends thereof.

In its general form the frog shown in the drawings is similar to frogs now in use. At the toe end there is a filler block 11, and at the heel end there is an additional filler block 12 and a foot guard 13.

The special surfacing of the throat and point regions of the frog, in accordance with the practice of my invention, is best shown in Fig. IV. Commencing at the heel of the frog, preferably near the end of the heel riser 14, the tread surface of the point 8 is inclined upward towards the point end (the actual point of frog) 15, such inclinations being represented at a, and being effected gradually with respect to the top plane of the frog indicated at x—x. At the point end 15 where cold flow of metal may be expected to be very pronounced, the tread surface a reaches its maximum elevation, the vertical height above the top plane of the frog being determined by the expected ultimate displacement of surface metal which can be estimated with fair accuracy by actual tests.

Commencing at the toe of the frog and preferably near the end of the manganese body 7, the tread surfaces of the wings 9, 10 are inclined gradually upward toward the point 8, such inclination being represented at b. The tread surfaces b continue upward above and beyond the point end 15 to a region just beyond the peak 16 of the raised surface where there is a sufficient gage spread so that the load is supported entirely upon the point of the frog. It will be especially observed that the angle between the tread surfaces *b* and the top plane $x—x$ of the frog is such that a standard coned wheel of average length of service, such as represented at 17 in Fig. II, moving over the frog from the toe towards the heel, after reaching the point end 15, will bear jointly upon the point 8 and the wing 10, until the wheel reaches the region beyond the peak 16. From this region 16 to the end of the manganese wings 9, 10, the tread surfaces are inclined downward to the top plane of the frog as indicated at *c*.

The relation of the coned wheel surface 18 to the tread surfaces of the point 8 and wings 9, 10 of the frog is illustrated in Fig. II; and it will be readily seen from this figure that at the critical region of the frog, where the point has a relatively small gage spread, the wheel load is distributed and a smooth passage is afforded for the wheel, relieving the point of the hammer blows to which it would otherwise be subjected.

In Fig. II the wheel 17, in its full line position, is shown passing over the point end 15 of the frog. The wheel 17 is also represented in dot-and-dash lines at 17*a* showing the position assumed by it while passing over the peak 16 of the raised tread surface of the wing 10. It will be noted that in passing from the full line position to the dot-and-dash line position the wheel 17 is in effect shifted laterally with respect to the longitudinal axis of the frog point 8 and that the tread surfaces *a* and *b* are so designed as to compensate for such lateral shifting of the wheel so that the load throughout this region is distributed between the point 8 and the wing 10. Beyond the peak 16 of the frog the load is caused to be gradually transferred onto the point 8 until it is carried solely thereby.

In a railbound type of frog such as shown in the drawings, I preferably employ inclined tread surfaces for the point and wings which extend throughout a region of the frog substantially coincident with the length of the central body or insert 7. After such frogs have been placed in service, the tread surface of the point will lose its original inclination due to surface flow of metal and will acquire a substantially permanent set when its top surface has been reduced to approximately the level of the top plane of the frog. The amount of metal flow increases progressively with the decrease of the gage spread of the point. Hence the tread surface *a*, originally inclined at an acute angle with the top plane $x—x$ of the frog, will eventually be reduced to approximately the level of that plane.

The tread surfaces *b* of the wings will also be reduced in height incident to surface flow of the metal, but will always extend above the point end 15, and the difference in elevation at the overlapping areas of the wing and point tread surfaces will be maintained substantially constant, preserving the smooth running characteristics of the frog. The original angles selected for the inclined surfaces of the wings and point will necessarily depend upon the amount of surface flow experienced with like frogs tested in service.

The inclined tread surfaces *a* and *b* are preferably made long and flat to enable the frog to be economically manufactured. Such surfaces can be readily formed by the use of planer grinders, and the amount of hand grinding required is thereby reduced to a minimum.

While I have described my invention with reference to one example thereof incorporated in a particular type of frog, it will be apparent that the invention is applicable to many different types of frogs, and that the particular formation of the tread surfaces may be varied considerably without departure from the principle of my invention.

Having thus described my invention, I claim:

1. A railway frog comprising a point and wings, the tread surfaces of said wings being inclined gradually upward above the normal top plane of the frog in a direction from the toe towards the point and continuing upward above and beyond the point end and forming such an angle with the tread surface of the point that an average coned wheel will engage both said wing and point surfaces substantially throughout the region of their overlap with a gradual transfer of the load from one surface to the other.

2. A railway frog according to claim 1 characterized by the further fact that the tread surface of the wing reaches a peak in its upward inclination at a substantial distance beyond the point end and is then inclined abruptly downward to the normal top plane of the frog.

3. A railway frog according to claim 1 characterized by the further fact that the tread surface of the wing reaches a peak in its upward inclination immediately in advance of the position where the wheel load is supported entirely by the point and is then inclined abruptly downward to the normal top plane of the frog.

4. A railway frog according to claim 1 characterized by the further fact that the tread surface of the point, when the frog is initially placed in service, is throughout the region of overlap between the wing and point surfaces inclined gradually upward above the normal plane of the frog in a direction from the heel toward the point end.

5. A railbound frog comprising rails merging with a central metal body, said body having a point, wing portions at each side thereof and flangeways therebetween, the tread surfaces of said wings being inclined gradually upward above the normal top plane of the frog in a direction from the toe towards the point and extending above and beyond the point end, and the tread surface of the point being inclined gradually upward above the normal plane of the frog from the heel toward the point end, and the regions of said inclined tread surfaces being coextensive with the wing and point portions of said central body.

EUGENE W. CARUTHERS.