United States Patent [19]

Perrot

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[54] **GREAT-LENGTH FROGS FOR VERY HIGH SPEED TRAFFIC RAILWAY TRACKS**

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[30] **Foreign Application Priority Data**

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Mar. 5, 1974 France 74.7435

[52] **U.S. Cl.** **246/468;** 246/382
[51] **Int. Cl.²** **E01B 7/14**
[58] **Field of Search** ..... 246/274, 275, 382, 383, 246/384, 385, 386, 387, 388, 389, 391, 392, 435 R, 435 A, 436, 437, 438, 468, 472; 104/130

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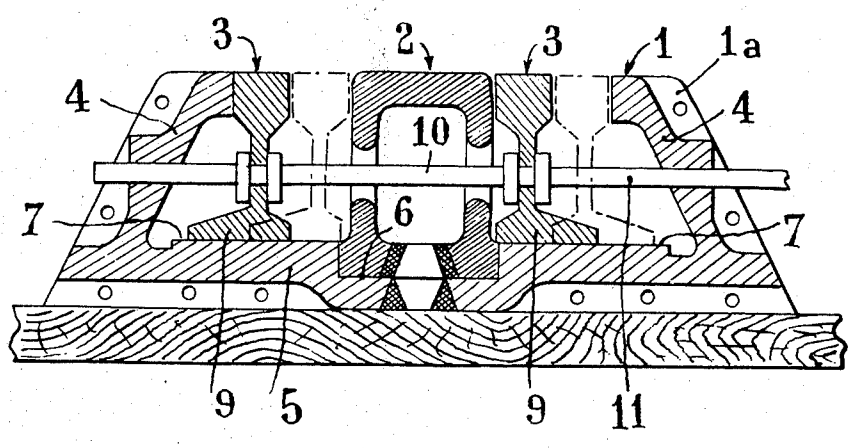
Assistant Examiner—Randolph A. Reese
Attorney, Agent, or Firm—Gottlieb, Rackman, Reisman & Kirsch

[57] **ABSTRACT**

This crossing frog of very great length (for example 28 meter giving a frog angle of tg. 0.0145) for very high speed traffic railway tracks is characterized in that the various fixed and movable members constituting same are housed inside a rigid cradle consisting of several sections assembled in end to end relationship and having a U-shaped cross-sectional contour with the cavity directed upwards and convergent lateral walls, the bottom of said cradle, constituting the frog base, being flat.

5 Claims, 13 Drawing Figures



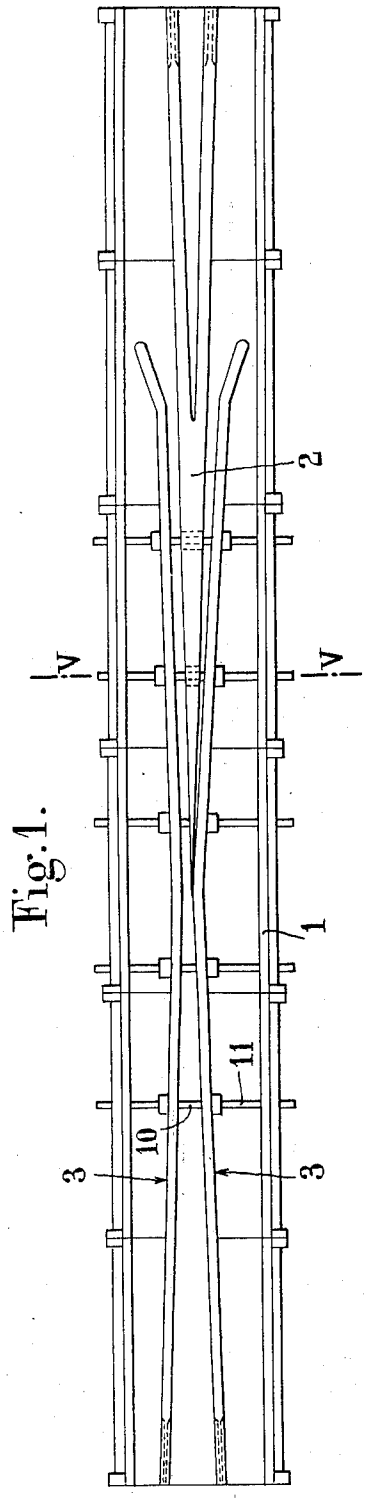


Fig.1.

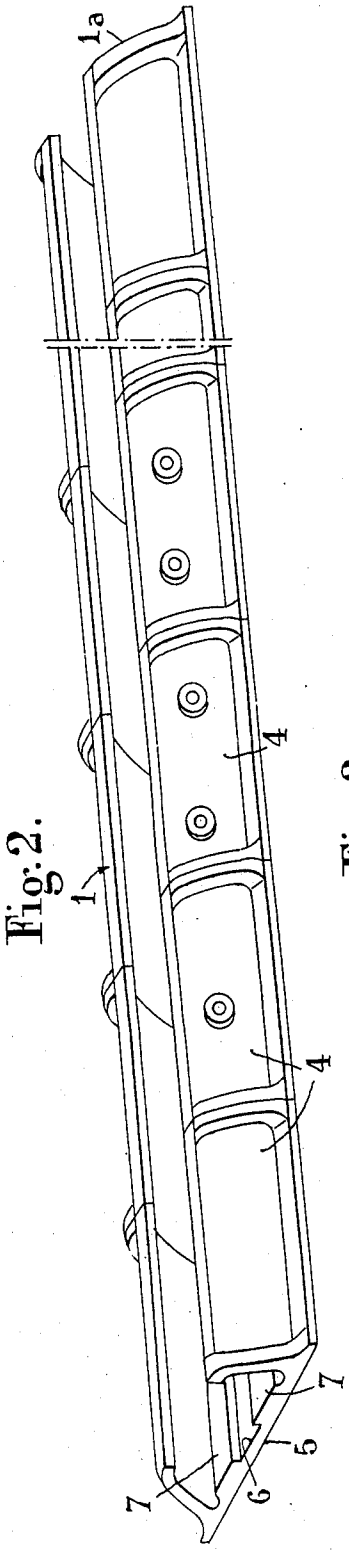


Fig.2.

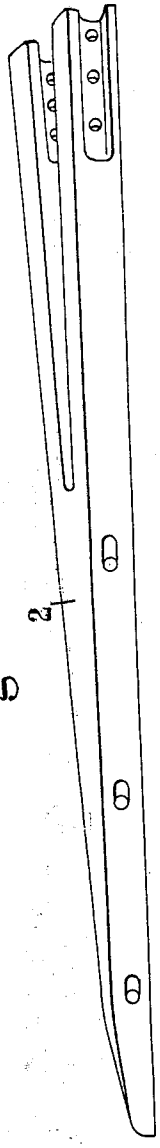


Fig.3.

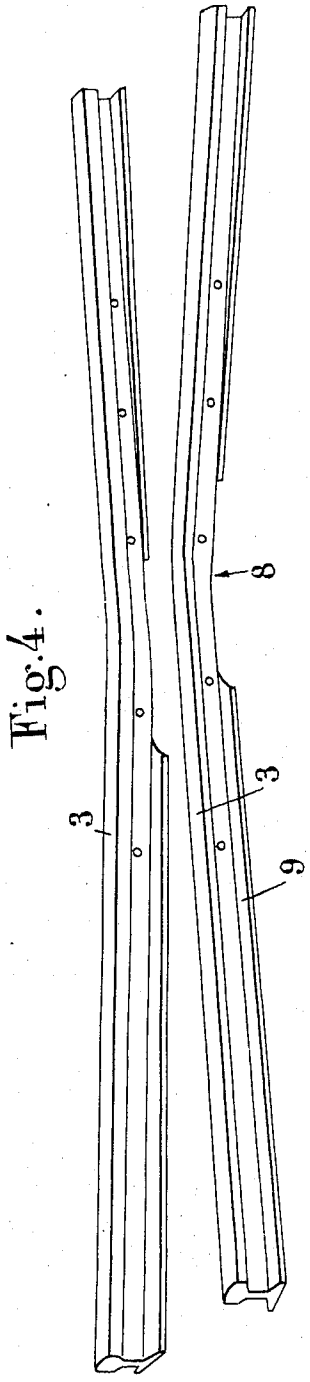


Fig.4.

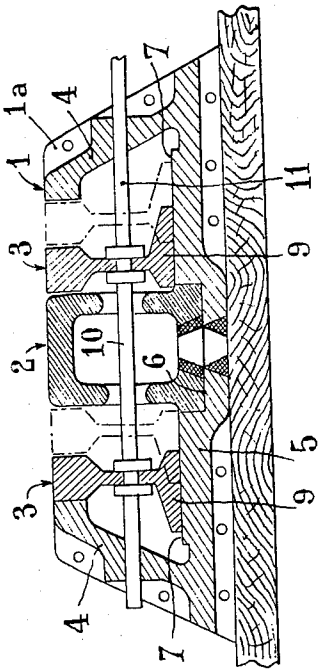
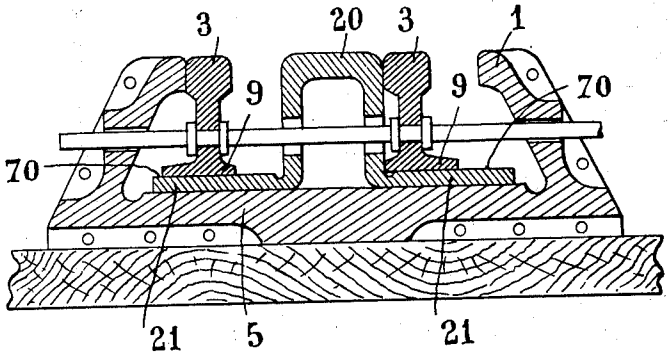


Fig.5.

Fig.6.



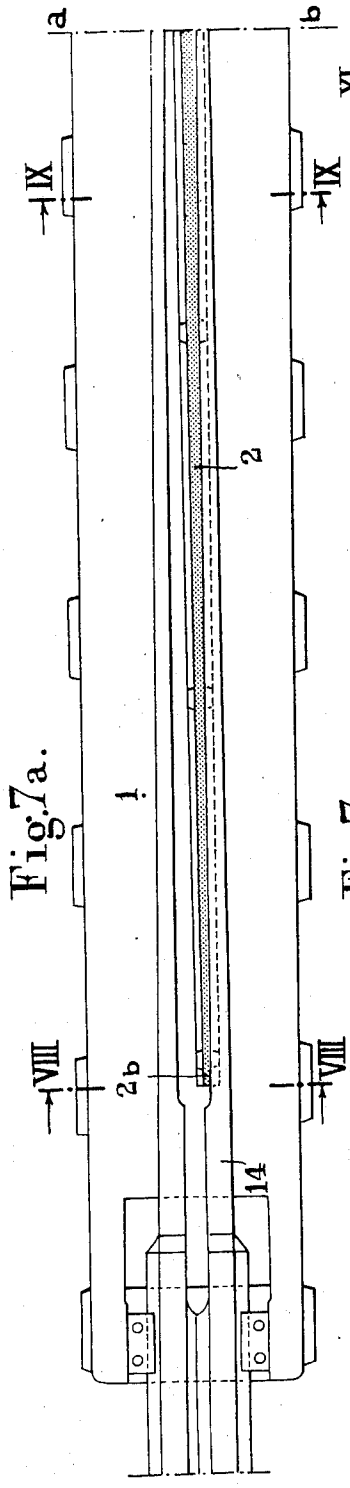


Fig.7a.

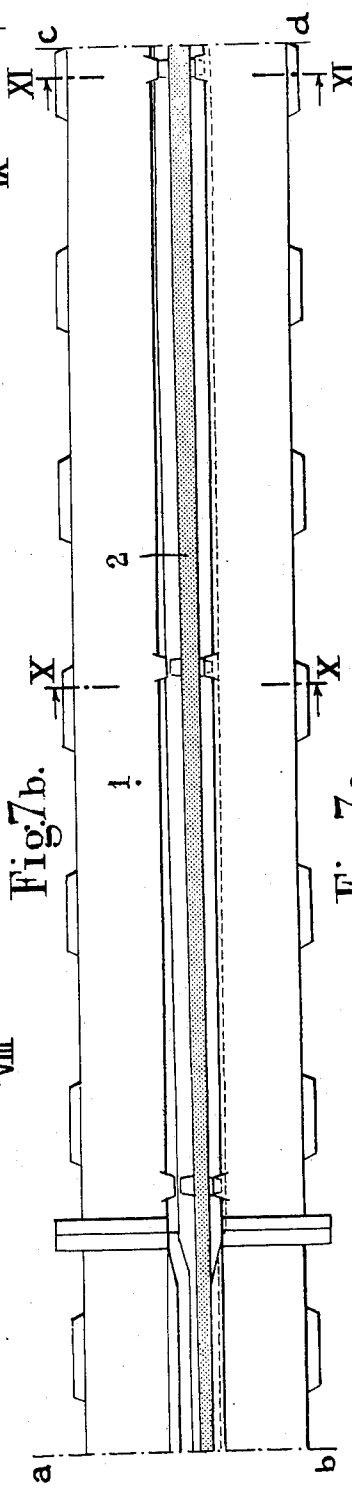


Fig.7b.

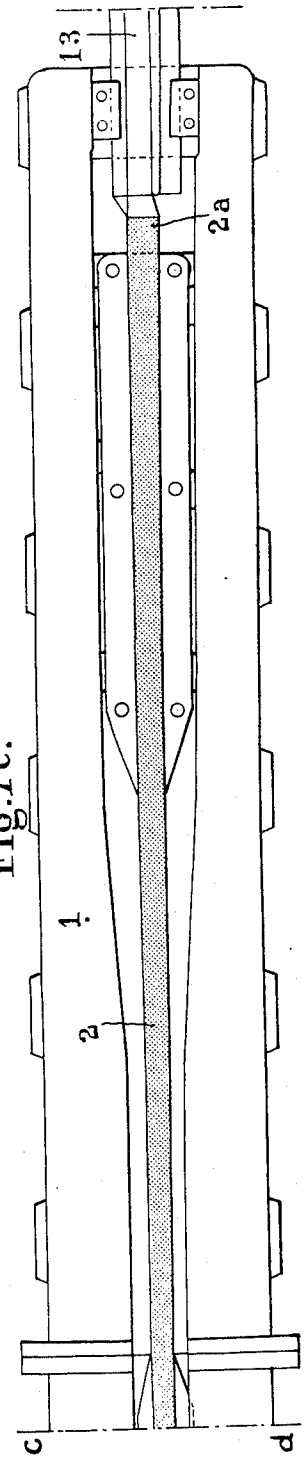


Fig.7c.

Fig.8.

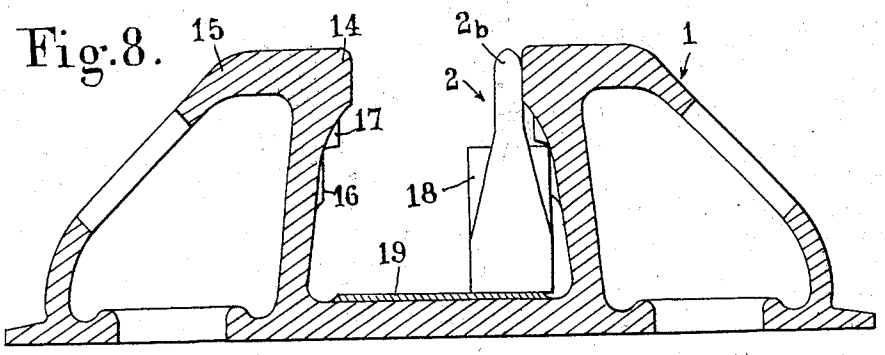


Fig.9.

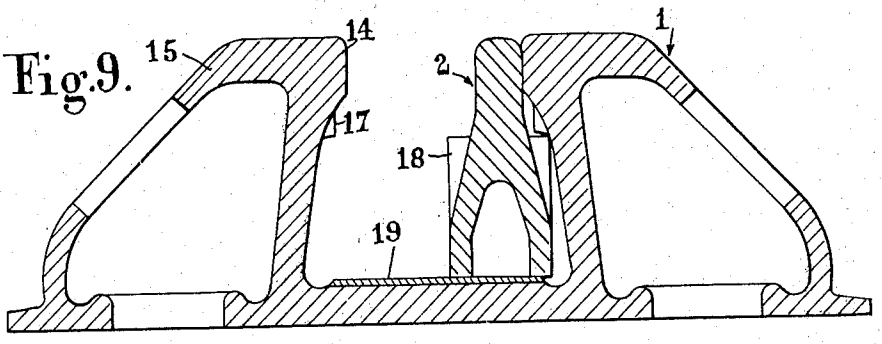


Fig.10.

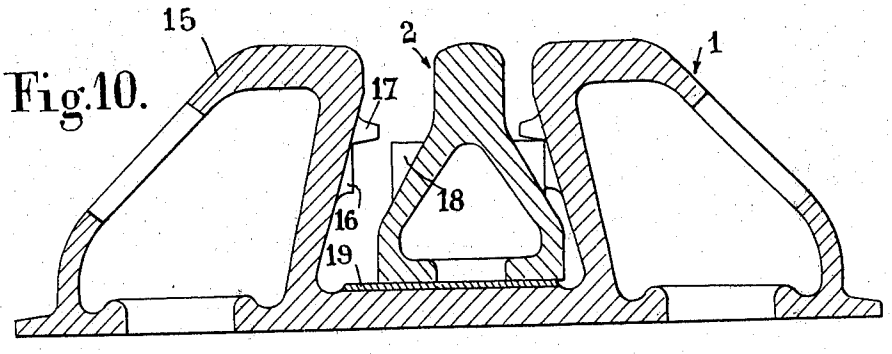
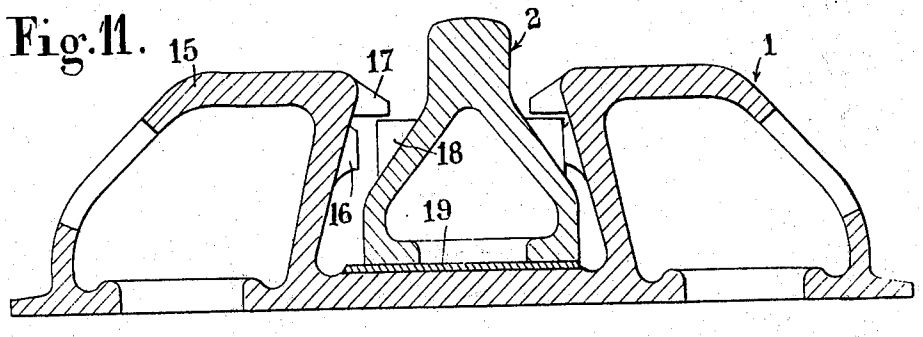


Fig.11.



GREAT-LENGTH FROGS FOR VERY HIGH SPEED TRAFFIC RAILWAY TRACKS

BACKGROUND OF THE INVENTION

The present invention relates in general to crossing frogs and has specific reference to a frog of very great length for railway tracks designed for trains travelling at very high speeds, of the order of 300 km. p.h. on straight or direct track sections and 250 km. p.h. on deflected or curved track sections. Obviously, these high operating or service speeds require the construction of very long crossing devices having a very small frog angle (e.g. tg. 0.0145 in a 28-meter long crossing), this last-mentioned requirement involving the existence of a considerable residual gap in the running rail.

It is the primary object of this invention to avoid the difficulty of making such very long devices (casting, hardening, machining, transport, etc.) which cannot be made as unitary, one-piece structures.

This invention is also directed to eliminate the so-called "gap area" where severe shocks develop, notably a considerable hammering of the tread surface of the wheels, further increased by the very high speed of the trains, as a consequence of the insufficient running surface.

SUMMARY OF THE INVENTION

To this end, the crossing frog according to this invention is characterized in that the various fixed and movable component elements of the frog are housed inside a rigid cradle or longitudinal sleeper consisting preferably of cast carbon steel. Advantageously, this rigid cradle is U-shaped in cross-section with its concavity facing upwards and the side wings slightly convergent and flat bottom constituting the frog base plate.

According to another feature characterizing this invention the cradle is constituted by an assembly of a plurality of sections disposed end to end, which may be six in number, for instance, in the case of a 28-meter long frog.

In a first form of embodiment the frog point is rigidly secured inside the cradle and a pair of wing rails are disposed on either side of the point in said cradle and adapted to move transversely therein for eliminating the gap in the running rail, in the direction of travel of the train. The frog base is furthermore properly machined to provide an axial cavity in which the point is rigidly fitted, between a pair of flat faces permitting the sliding movements of said wing rails. The pair of wing rails have their shoes properly machined in their central portions (across the nose of the point), in order to impart a certain elasticity thereto, and these wing rails are rigidly interconnected for translation by means of rods and distance-pieces extending through the point and the side wings of the cradle and connected to the switch control linkage.

According to a modified form of embodiment of this invention the point rigidly secured to the inside of said cradle has a substantially omega-shaped cross-section with its bottom divergent flanges extending laterally outwards and bearing horizontally on the cradle bottom, the upper faces of said flanges being suitably machined to constitute the slideway surface for the wing rail shoes.

In another form of embodiment of this invention the point disposed inside the cradle is rigidly secured to the track rails by its heel end, and the inherent elasticity of this point is sufficient to enable its nose end to engage by turns the two running rails of the frog. The inner walls of the side wings of said cradle carry at suitable locations two series of lugs having each, in one series, a vertical bearing face and, in the other series, a horizontal bearing face, said lugs being preferably cast integrally with the cradle and adapted to co-act with shoulders or like projections carried by the point sides and preferably cast integrally therewith, the mutual engagement between the point shoulders and the cradle lugs ensuring a highly efficient and reliable positioning and locking of said point in said cradle.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features characterizing the crossing frog of this invention will appear more clearly and in detail as the following description proceeds with reference to the accompanying drawings showing (FIGS. **1** to **5**) a first form of embodiment, (FIG. **6**) a modified construction, and (FIGS. **7** to **11**) a second form of embodiment. More particularly, in the drawings:

FIG. **1** is a diagrammatic plan view from above of the frog according to this invention;

FIGS. **2** to **4** are diagrammatic perspective views, on a larger scale, of the cradle, point and wing-rail assembly;

FIG. **5** is a cross-section taken on a larger scale along the line V—V of FIG. **1**;

FIG. **6** is a view similar to FIG. **5**, but showing a modified construction;

FIGS. **7***a*, **7***b* and **7***c* (to be assembled along the transverse lines *a–b–*, *c–d*) illustrate in plan view from above three successive sections of a second form of embodiment of this frog;

FIGS. **8** to **11** are cross-sectional views showing on a larger scale details of the structure shown in FIGS. **7***a* and **7***b*, the sections being taken along the lines VIII—VIII, IX—IX, X—X and XI—XI, respectively, of these Figures.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The various fixed and movable component elements of the crossing frog are housed inside a rigid cradle or longitudinal sleeper or cross-tie **1** having a U-shaped cross-section with its concavity directed upwards, the side walls or wings **1***a* of this cradle being slightly convergent, its flat bottom **5** constituting the frog base.

This cradle **1** consists of the mutual assembly of a plurality of sections **4** disposed end to end, the number of these sections being selected as a function of the length of the frog and also of the casting, transport and assembling conditions, the cradle composition depending on the other hand on local stresses.

In a first form of embodiment the point **2** is rigidly secured inside the cradle **1** and two wing rails **3** are disposed on either side of the point in this cradle, and adapted to move transversely therein.

The frog base **5** is properly machined to provide an axial cavity **6** in which the point **2** is rigidly fitted. This point **2** is disposed between a pair of flat faces **7** permitting the sliding movements of the wing rails **3** (FIG. **2**).

The pair of wing rails **3** have their shoes **9** properly machined in their central portion **8** across the nose of the crossing point (FIG. **4**) to impart a certain elasticity thereto, and they are rigidly assembled for translation by means of rods **11** and distance-pieces **10** extending

through the point 2 and side walls 1*a* of cradle 1, these rods and distance-pieces 11, 10 being connected to the switch control linkage (FIG. 5).

To facilitate the understanding of the general structure of the crossing frog, the latter is not shown in scale view in the drawings.

In the modified embodiment illustrated in FIG. 6 the point 20 rigidly secured within the cradle 1 has a substantially omega-shaped cross-section with divergent flanges 21 extending laterally outwards and bearing horizontally on the bottom 5 of this cradle 1, with their upper faces machined to constitute a slideway 70 engageable by the sliding shoes 9 of said wing rails 3.

In a second form of embodiment illustrated in FIGS. 7 to 11, the point 2 mounted inside the cradle 1 is rigidly secured at its heel end 2*a* to the network rails 13 (FIG. 7*c*) and has an elasticity sufficient to enable its point end 2*b* to be caused to engage by turns the two running rails 14 of this frog (FIG. 7*a*).

The cradle comprises a plurality of substantially U-section members having box-sectioned lateral compartments 15 suitably machined to ensure a perfect alignment of the various frog sections.

The inner walls of these lateral compartments 15 carry at suitable locations a plurality of lugs 16 having each a vertical bearing face and a plurality of lugs 17 having each a horizontal bearing face; preferably, these lugs are cast integrally with the cradle. The function of these lugs 16, 17 is to co-act with studs or like projections 18 carried by the side walls of the point and preferably cast integrally therewith, the engagement of these studs 18 with the vertical and horizontal lugs 16 and 17 respectively ensuring an accurate and reliable positioning and locking of the point in its cradle.

The cradle section carrying the nose portion 2*b* of the point has the top portion of its box-sectioned lateral compartments 15 shaped to constitute running rails (see FIGS. 8 and 9).

The point movements are controlled at several locations along this point to reduce stress and its sliding movements are facilitated by the provision of manganese steel lining plates 19 welded to the inner face of the cradle bottom, at suitable locations thereof.

Of course, many modifications may be brought to the specific forms of embodiment of this crossing frog described hereinabove with reference to the attached drawings. Thus, notably, the shape of the cradles may differ from the configurations illustrated, and other mechanisms may be used for controlling the movable components of the frog, without departing from the basic principles of the invention as set forth in the appended claims.

What I claim is:

1. Crossing frog of relatively great length for railway tracks with cross members for supporting the running rails, for high speed railway traffic, which comprises for each rail a U-sectioned flat-bottomed cradle bearing on said cross members and symmetrical lateral side wings converging toward each other, a point bearing on the bottom of said cradle, a pair of wing rails constituting the running rails housed on either side of said point and movable transversely in relation thereto within the limits allowed by the side wings of said cradle, and means for rigidly interconnecting said point and said wing rails for translation.

2. Crossing frog as set forth in claim 1, wherein said point is rigidly engaged in a median longitudinal groove formed in the bottom of said cradle.

3. Crossing frog as set forth in claim 1, wherein said point is omega-sectioned with the wings of the omega constituting the sliding surfaces of the wing-rail shoes.

4. Crossing frog as set forth in claim 1, wherein the means for rigidly interconnecting said point and said wing rails for translation consist of transverse distance-pieces extending through the point wing rails and the side wings of said cradle.

5. Crossing frog of relatively great length for railway tracks with cross members for supporting the running rails, for high speed railway traffic, which comprises for each rail an omega-sectioned flat-bottomed cradle bearing on transverse members and symmetrical side wings converging toward each other and shaped to constitute running rails, and a point movable transversely on the cradle bottom, a set of lugs having vertical and horizontal sliding-contact bearing faces, said lugs being formed on the registering faces of the side wings of said cradle, and projections formed on the sides walls of said point and adapted to co-act with said cradle lugs for properly positioning said point in said cradle.

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