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(54) **RAILWAY FROG ADAPTED TO SEVERAL WHEEL PROFILES**

EISENBAHNFROSCH, ANGEPASST AN VERSCHIEDENE RADPROFILE

COEUR DE CROISEMENT ADAPTÉ À PLUSIEURS PROFILS DE ROUES

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Description

[0001] The invention relates to the field of the railway frogs and more particularly to the field of the railway frogs adapted to the rolling of wheels having different profiles.

[0002] It is known that, while passing through a railway frog, a wheel successively rolls on two different parts of the frogs separated by an open throat, these two parts corresponding to a portion of the upper surface of the wing rail and the upper surface of the nose. Thus, in an area of the frog, the weight of the wheel is simultaneously borne by the respective surfaces of the wing rail and the nose of the frog. Due to the loads carried by the wheels, the transfer of a rolling wheel from the wing rail to the nose must be arranged to be operated smoothly by avoiding, or eventually limiting, any abutment of the wheel against the nose of the frog. Consequently, the geometry of the frog and more particularly the geometry of the upper surfaces of the frog is arranged so that upper surface of the wing rail is higher than the upper surface of the nose before descending to the level of the surface of the nose in the area of the open throat. Thus, in such frog, the rolling wheel is lifted by the upper surface of the wing rail in contact with the portion of the wheel tread the furthest of the flange of the wheel in order to place the portion of the wheel tread the closest to the flange of the wheel on the upper surface of the nose. A railway frog according to the preamble of independent claim 1 is known from CN 104 975 542 A.

[0003] However, due to the variety of types of wheel profiles and more particularly the variety of shapes of wheel treads in a plan in section passing by the rotating axis of the wheel, which may travel through a railway frog, the contact points of the wheels against the rolling surfaces are different depending on the respective shapes of the wheel treads, so that the transfer of some wheels with particular profiles may be realized at the end of the upper surface of the wing rail by a fall of the wheel against the upper surface of the nose. Even if a unique type of wheels travels through the railway frog, the profile geometry of these wheels may be modified in a plan in section passing by the rotating axis of the wheel, so that a concave curvature may progressively appear in the area bearing against the upper surface of the rail, what means mainly in the area of the wheel the closest to its flange.

[0004] Due to a concave curvature in the wheel tread profile, the transfer of the wheel is operated while the travel of the wheel is at the end of the upper surface of the wing rail by a fall of the wheel against the upper surface of the nose. Thus, the transfer of the wheel between the two parts of the railway frog is operated by an impact obtained by the fall of the wheel rolling against the upper surface of the tip of the nose. The most concave is the wheel tread profile, the most important is the impact due to the fall of the worn wheel on the upper surface of the nose.

[0005] The present invention has as its object to remedy to these drawbacks by proposing a railway frog having a geometry adapted to several profiles of rolling

wheels and more particularly adapted to wheel whose wheel tread profiles are different or modified by the wear of the wheels.

[0006] For this purpose, the present invention, has as its object a railway frog having two wing rails positioned on both sides of a nose, the wing rails being separated with respect to the nose by respective crossing flangeways, characterized in that, according to a plane in section essentially perpendicular to the axis of flangeways, the plane in section being positioned in the area of the nose, the upper rolling surface of at least one of the wing rails is higher than the upper surface of the tip of the nose and lower than the upper surface of the end of the nose topping, this upper rolling surface of the wing rail corresponding to an area wherein the rolling wheel is transferred from the wing rail to the nose of the frog.

[0007] The invention will be better understood using the description below, which relates to at least one preferred embodiment, given by way of nonlimiting example and explained with reference to the accompanying drawings, in which:

[Fig. 1] shows a schematic illustration of an example of the railway frog of the invention according to a top view,

[Fig. 2] shows schematic illustrations of the respective levels of the different surfaces of the nose and one of the wing rails in an example of the railway frog of the invention according to a side way of the frog with respect to a top view,

[Fig. 3] shows a schematic illustration of the respective position of two different wheel profiles with respect to the different upper surface portions of an example of the railway frog of the invention at different steps of the traveling of the wheels in the railway frog and according to a plane in section essentially perpendicular to the main traveling axis of the wheels.

[0008] It is reminded that the wheel only impacts the nose 3 of the railway frog 1 when the wheels passing through the railway frogs 1 arrive at one of the upstream ends of the wing rails 2, roll from this end to the nose 3 side of the frog 1 to reach one of the downstream ends of the nose 3 and leave the frog 1.

[0009] According to a classical arrangement, the flangeways 4 crossing inside the railway frog 1 are mainly linear in a horizontal plan in section. However, alternative usual arrangements exist wherein at least one of the flangeways 4 is curved. Despite crossed together, the flangeways 4 define the main axis of the railway frog 1. According to a particular interpretation of the arrangement of the railway frog 1, such main axis might be considered as a symmetrical axis of the railway frog 1 as further detailed.

[0010] The present invention concerns a railway frog 1

having two wing rails 2 positioned on both sides of a nose 3, the wing rails 2 being separated with respect to the nose 3 by respective crossing flangeways 4, characterized in that, according to a plane in section essentially perpendicular to the axis of flangeways 4, the plane in section being positioned in the area of the nose 3, the upper rolling surface of at least one of the wing rails 2 is higher than the upper surface of the tip 31 of the nose 3 and lower than the upper surface of the end 32 of the nose 3 topping, this upper rolling surface of the wing rail 2 corresponding to an area wherein the rolling wheel is transferred from the wing rail 2 to the nose 3 of the frog 1.

[0011] Such construction of the upper surfaces of the different parts of the railway frog 1 of the invention is arranged in order to operate a transfer of the wheel from the wing rail 2 to the nose 3 by minimizing the abrupt change of the position of the wheel in height by the upper surface of the wing rail 3 and therefore minimize the force induced on the nose 3. Thus, the transfer of the wheel is operated while the wheel is rolling at constant height along a portion of the upper surface of the wing rail 2. While the wheel tread portion the furthest of the flange of the wheel is traveling on the wing rail 2, the ramp 23 formed by the progressive increase in height of the front surface of the nose 3 between the tip 31 of the nose 3 and the end 32 of the nose 3 topping is arranged to progressively come in contact against the wheel tread portion the closest to the flange of the wheel in order to bear the wheel. As the upper rolling surface of the wing rails 2 is higher than the upper surface of the tip 31 of the nose 3 and lower than the upper surface of the end 32 of the nose 3 topping, the nose 3 is progressively positioned against the wheel tread portion wherein, depending on the wheel profile, a concave curvature might be present, no matter if a concavity exists or how wide is the concavity. The increase of the height of the nose 3 between its tip 31 and the end 32 of the nose 3 topping to position the upper surface of the nose 3 higher than the upper surface of the wing rail 2 bearing the wheel by the wheel tread portion the furthest of its flange, progressively provides a support to bear the wheel travelling through the railway frog 1.

[0012] According to an example relating to a variant of the invention, the railway frog 1 is characterized in that the upper rolling surface of at least one of the wing rails 2 comprises at least two surface portions 21, 22 having different respective heights with respect to the bottom surface of the railway frog 1. According to its upstream end on the upstream edge 6 of the railway frog 1, the rolling surface of the wing rail 2 is arranged to match with the rolling surface of an upstream connected rail. For example, according to a plane in section essentially perpendicular to the axis of flangeways 4 of the railway frog 1, such match is reached when the respective upper rolling surfaces of the wing rails 2 and the connected rail have identical shapes. The at least two surface portions 21, 22 of the wing rail 2 having different respective heights are arranged to realize, on its upstream side, an optimized connection with upstream rails and, on its down-

stream side, a rolling surface to bear and position the wheel in order to realize a smooth transfer of this wheel on the nose 3. The respective height of each surface portion 21, 22 of the wing rail 2 is adapted to its respective

5 purpose on each end of the railway frog 1. According to a preferred arrangement, the wing rail 2 comprises an intermediate arrangement between these two portions 21, 22 in order to modify the position of the contact of the wing rail 2 against the wheel tread. Indeed, on its upstream end on the upstream edge 6 of the railway frog 1, the first surface portion 21 of the rolling surface of the wing rail 2 is similar to the rolling surface of a rail profile so that this first surface portion 21 of the wing rail 2 is in contact with the wheel tread portion the closest to its 10 flange to bear the rolling wheel. On the contrary, on the downstream end of the second surface portion 22 of the wing rail 2, the second surface portion 22 of the rolling surface of the wing rail 2 bears the rolling wheel by being in contact with the wheel tread portion the furthest of the 15 flange of the wheel in order to avoid the interference by the eventual concavity of the wheel profile, so that the position of the wheel in height is independent of the profile of the wheel.

[0013] According to an example relating to a particular 20 variant of the invention, the railway frog 1 is characterized in that the maximum height difference between the upper rolling surface of the wing rail 2 and the upper surface of the nose 3 is in a range of 0 and 10 millimeters. According to a prefer arrangement of the height difference is in a 25 range of 0 and 8 millimeters, ideally in a range of 1 and 6 millimeters.

[0014] According to an example relating to another 30 variant of the invention, the railway frog 1 is characterized in that the two surface portions 21, 22 of the upper rolling surface of the wing rail 2 are arranged along the edge 5 of the wing rail 2 with the flangeways 4 so that the first surface portion 21 positioned upstream is higher and the second surface portion 22 positioned downstream is lower, at least the positioned downstream surface portion 35 22 corresponding to an area of the wing rail 2 wherein the rolling wheel is transferred from the wing rail 2 to the nose 3 of the frog 1. Thus, the wing rail 2 comprises portions 21, 22 of its upper surface adapted to particular interactions 40 with the respective wheel tread portions in travel along the wing rail 2. According to an example corresponding to a preferred arrangement, the upper surface of the upstream portion 21 of the wing rail 2 is positioned at the same level as the upper surface of the end 32 of the nose 3 topping. Additionally, the upper surface of the downstream portion 22 of the wing rail 2 is positioned at a lower 45 level than the upper surface of the end 32 of the nose 3 topping. According to an example corresponding to another preferred arrangement, the edge 5 of the wing rail 2 with the flangeways 4 shows an angle 51 in a horizontal plan in section due to the two flangeways 4 crossing inside the frog 1, so that the upstream portion of the edge 5 with respect to the angle 51 is positioned along the first 50 flangeway 4 defining the main traveling direction of the

wheel rolling on the wing rail 2 of the frog 1 while the portion of the edge 5 downstream with respect to the angle 51 is positioned along the second flangeway 4 over which the rolling wheel is intended to pass thanks to the frog 1, this second flangeway 4 being positioned between the wing rail 2 and the nose 3. Each of the two surface portions 21, 22 are arranged along respective portions of the edge 5 of the wing rail 2 positioned on different sides of the angle 51, so that the upstream portion 21 of the wing rail 2 is mainly positioned upstream with respect to the angle 51 of the edge 5, while the downstream portion 22 of the wing rail 2 is mainly positioned downstream with respect to the angle 51 of the edge 5. Further, because of this angle 51 of the edge 5 of the wing rail 2 with respect to the first flangeway 4 defining the main traveling direction of the wheel rolling on the wing rail 2 of the frog 1, the downstream portion 22 of the wing rail 2 is laterally offset from this first flangeway 4. However, as the rolling wheel keeps its main traveling direction considered without swaying, the upper surface of the wing rail 2 bearing the wheel by contact with the wheel tread, is moved laterally from the wheel tread portion the closest to its flange to the wheel tread portion the furthest of its flange. Consequently, because of this angle 51 of the edge 5 of the wing rail 2, the upper surface of the wing rail 2 becomes in contact with the wheel tread portion which might be concerned by the wear of the wheel.

[0015] According to an additional example corresponding to a particular arrangement of these two portions 21, 22 of the wing rail 2, these portions 21, 22 have respective constant height with respect to the bottom surface of the railway frog 1.

[0016] According to an additional example corresponding to an alternative to the previous particular arrangement, downstream portion 22 of the wing rail 2 may have a concave or convex curved surface.

[0017] According to an example relating to another variant of the invention, the railway frog 1 is characterized in that the upper rolling surface comprises a ramp 23 to achieve a continuity of the rolling surface of the wing rail 2 between the different respective heights of the two surface portions 21, 22 having different heights. According to a preferred arrangement of the ramp 23, this ramp 23 is positioned along the edge 5 of the wing rail 2 with the flangeways 4 between the higher upstream portion 21 and the lower downstream portion 22. According to an example corresponding to a particular arrangement of the ramp 23, this ramp 23 is positioned downstream with respect to the angle 51 of the edge 5 of the wing rail 2. Depending on the profile requested, this ramp 23 may be realized according to different arrangement in a vertical plan in section comprising the main axis of the rolling surface of the upstream portion 21 of the wing rail 2, this main axis being essentially parallel to the edge 5 of the wing rail 2 with flangeways and more particularly with the first flangeway 4. According to a preferred arrangement, according to a plane in section essentially parallel to the edge 5 of the wing rail 2 with the first flangeway 4, the

ramp 23 has a linear arrangement and shows an angle with respect to a horizontal plan. However, alternative arrangements may be considered. For example, the ramp 23 may have a curvature showing a convexity or a concavity. Additionally, this curvature may be realized by a broken arch formed by a succession of linear portions. Further, the ramp 23 between the upstream and the downstream surface portions of the wing rail 2 might be formed by successive horizontal steps.

5 **[0018]** According to an example relating to another variant of the invention, the railway frog 1 is characterized in that the most downstream point of the ramp 23 is positioned upstream from the area of the wing rail 2 wherein the rolling wheel is transferred from the wing rail 2 to the nose 3 of the frog 1. According to such example of construction, the upstream end of the lower surface portion 22 along the edge 5 of the wing rail 2 is positioned upstream to the nose 3 of the frog 1 and more particularly upstream to the tip 31 of the nose 3. Thus, according to 10 such construction, the wheel traveling on the upper surface of the wing rail 2 leaves the ramp 23 and reaches the lower surface portions 22 of the wing rail 2 previously its transfer from the wing rail 2 to the nose 3 above the flangeway positioned between the wing rail 2 and the nose 3. Consequently, the lowering of the wheel along the ramp 23 is finished when the wheel travels on the lower surface portions 22 of the wing rail 2, so that the wheel travels at the adapted height on the wing rail 2 to be transferred to the upper surface of the nose 3.

15 **[0019]** According to an example relating to another variant of the invention, the railway frog 1 is characterized in that the ramp 23 being positioned in the extension of the surface portion 21 of the wing rail 2 having the highest height, has a larger width positioned upstream and a narrower width positioned downstream. According to a top view of the construction of the wing rail 2, by being positioned in the extension of the higher surface portion 21 of the wing rail 2 what means in the extension of the main traveling direction of the wheel rolling on the wing rail 2 of the frog 1, the ramp 23 positioned downstream with respect to the angle 51 of the edge 5, is arranged according to an extension of the higher surface portion 21 of the wing rail 2 positioned upstream with respect to the angle 51. Consequently, the ramp 23 is arranged to bear 20 the rolling wheel according to a contact against the wheel tread similarly to the contact of the higher surface portion 21 against the wheel. The ramp 23 and the higher surface portion 21 of the wing rail 2 are both arranged to interact with the wheel tread portion the closest to the flange of the wheel. According to a top view of the construction of the wing rail 2, because of the angle 51 of the edge 5 of the wing rail 2, the edge 5 of the wing rail 2 downstream this angle 51 shows the edge 5 inclined with respect to the main traveling direction of the rolling wheel. Consequently, as the ramp 23 is in the extension of the higher surface portion 21, the inclined edge 5 provides a reduction 25 in the width of the ramp 23. Such reduction in the width of the ramp 23 participates to the disappearance of

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the ramp 23 upstream from the area of the wing rail 2 wherein the rolling wheel is transferred from the wing rail 2 to the nose 3 of the frog 1.

[0020] According to an example relating to another variant of the invention, the railway frog 1 is characterized in that, according to a plane in section essentially perpendicular to the axis of flangeways 4, the ramp 23 is positioned between the edge 5 of the wing rail 2 with the flangeway 4 and at least a part of the surface portion 22 of the wing rail 2 having the lowest height. More particularly, the ramp 23 is positioned between the edge 5 of the wing rail 2 with the second flangeway 4 over which the rolling wheel is intended to pass and a part of the surface portion 22 of the wing rail 2 having the lowest height. Thus, upstream to the most downstream point of the ramp 23, the lower surface portion 22 of the upper surface of the wing rail 2 is arranged along the lateral edge of the ramp 23 on the opposite side the flangeways 4. Such construction of this variant of the invention provides an arrangement wherein, while the wheel travels on the ramp 23 by its wheel tread portion the closest to its flange, the wheel tread portion the furthest of its flange is able to interact with the lower surface portion 22 of the wing rail 2 upstream to the most downstream point of the ramp 23, so that the wheel becomes bear by this lower surface portion 22 of the wing rail 2. Depending on the wear of the profile or the type of the wheel, the concavity of the curvature may be more or less deep, so that the rotating axis of the wheel rolling on the ramp 23 is more or less high with respect to bottom surface of the frog 1 or with respect to the lower surface portion 22 of the wing rail 2. Consequently, because of the lower surface portion 22 of the upper surface of the wing rail 2 is arranged along the lateral edge of the ramp 23, the wheel tread portion the furthest of its flange interacts with the lower surface portion 22 of the wing rail 2 around a point positioned upstream with respect to the most downstream point of the ramp 23. Thus, depending on the type of the profile of the wheel due to its eventual wear, the transfer of the wheel from the ramp 23 to the lower surface portion 22 of the wing rail 2 may be operated at different positions along the ramp 23, so that the bearing contact of the upper surface of the wing rail 2 with the wheel tread is moved laterally from the wheel tread portion the closest to its flange borne by the ramp 23 to the wheel tread portion the furthest of its flange borne by the lower surface portion 22 of the wing rail 2.

[0021] According to an example relating to another variant of the invention, the railway frog 1 is characterized in that the wing rail 2 comprises an additional ramp 24 arranged upstream and in the extension of the surface portion 22 of the wing rail 2 having the lowest height and positioned along the lateral edge of the ramp 23 and/or along the highest surface portion 21 of the wing rail 2 on the opposite side the flangeways 4. This additional ramp 24 is arranged so that its highest end correspond to its downstream end in the extension of the lowest surface portion 22 of the wing rail 2. The height of the additional

ramp 24 increases from its upstream end to its downstream end.

[0022] Thus, according to such construction, while the wheel travels on the upper surface 21 or on the ramp 23 of the wing rail 2 by its wheel tread portion the closest to its flange, the wheel tread portion the furthest of its flange might be able to interact with the additional ramp 24 in the extension and upstream the lower surface portion 22 of the wing rail 2, so that the wheel might become bear by the upper surface of this additional ramp 24. Depending on the wear of the profile or the type of the wheel, the concavity of the curvature may be more or less deep, so that the rotating axis of the wheel rolling on the upper surface 21 or on the ramp 23 is more or less high with respect to bottom surface of the frog. Consequently, because of the additional ramp 24 increasing in the extension and upstream the lower surface portion 22 of the upper surface of the wing rail 2 is arranged along the lateral edge of the upper surface 21 or of the ramp 23, the wheel tread portion the furthest of its flange might interact with the upper surface of the additional ramp 24 around a point positioned upstream with respect to the most upstream point of the lower surface portion 22 of the wing rail 2 and even around a point positioned upstream with respect to the most upstream point of the ramp 23. Thus, depending on the type of the profile of the wheel due to its eventual wear, the transfer of the wheel from the upper surface portion 21 to the lower surface portion 22 of the wing rail 2 might be operated at different positions along the upper surface portion 21 or along the ramp 23, so that the bearing contact of the upper surface of the wing rail 2 with the wheel tread is moved laterally from the wheel tread portion the closest to its flange borne by the upper surface portion 21 of the wing rail 2 or by the ramp 23 to the wheel tread portion the furthest of its flange borne by the upper surface of this additional ramp 24.

[0023] According to a preferred arrangement, according to a plane in section essentially parallel to the edge 5 of the wing rail 2 with the first flangeway 4, this ramp 24 has a linear arrangement and shows an angle with respect to a horizontal plan. However, alternative arrangements may be considered. For example, the ramp 24 may have a curvature showing a convexity or a concavity. Additionally, this curvature may be realized by a broken arch formed by a succession of linear portions. Further, the ramp 24 between the upstream and the downstream surface portions of the wing rail 2 might be formed by successive horizontal steps.

[0024] According to an example relating to another variant of the invention, the railway frog 1 is characterized in that the railway frog 1 has a symmetrical arrangement according to an axis passing by the intersection of the crossing flangeways 4 in the frog 1. However, since the two traveling directions of the wheels in the frog 1 are mainly defined by the crossing flangeways 4 and the edges of the wing rails 2 and since these crossing flangeways 4 and edges of the wing rails 2 may be linear or curved or a combination thereof, the "symmetrical ar-

angement" feature must be understood according to a large interpretation wherein the symmetry of the frog mainly or only concerns the distribution of the different functional parts of the frog 1 of the invention on both side of the main axis passing by the intersection of the crossing flangeways 4 in the frog 1.

[0025] According to an example relating to another variant of the invention, the railway frog 1 is characterized in that the upper rolling surface portions 21, 22, eventually including a ramp 23, of at least one wing rail 2 of the frog 1 are made by respective different materials and/or supported by respective different blocks assembled to make at least a part of the wing rail 2. According to such example, the railway frog 1 of the invention may be realized by the connection of several structural elements, eventually made by respective materials with different hardness, and assembled and maintained together in order to form one or several parts of the railway frog 1 such as its nose 3 or its wing rails 2.

[0026] Of course, the invention is not limited to the at least one embodiment described and represented in the accompanying drawings. Modifications remain possible, particularly from the viewpoint of the composition of the various elements or by substitution of technical equivalents without thereby exceeding the field of protection of the invention.

Claims

1. A railway frog (1) having two wing rails (2) positioned on both sides of a nose (3), the wing rails (2) being separated with respect to the nose (3) by respective crossing flangeways (4), **characterized in that**, according to a plane in section essentially perpendicular to the axis of flangeways (4), the plane in section being positioned in the area of the nose (3), the upper rolling surface of at least one of the wing rails (2) is higher than the upper surface of the tip (31) of the nose (3) and lower than the upper surface of the end (32) of the nose (3) topping, this upper rolling surface of the wing rail (2) corresponding to an area wherein the rolling wheel is transferred from the wing rail (2) to the nose (3) of the frog (1).
2. A railway frog (1) according to claim 1, **characterized in that** the upper rolling surface of at least one of the wing rails (2) comprises at least two surface portions (21, 22) having different respective heights with respect to the bottom surface of the railway frog (1).
3. A railway frog (1) according to claim 2, **characterized in that** the two surface portions (21, 22) of the upper rolling surface of the wing rail (2) are arranged along the edge (5) of the wing rail (2) with the flangeways (4) so that the first surface portion (21) positioned upstream is higher and the second surface

portion (22) positioned downstream is lower, at least the positioned downstream surface portion (22) corresponding to an area of the wing rail (2) wherein the rolling wheel is transferred from the wing rail (2) to the nose (3) of the frog (1).

4. A railway frog (1) according to claims 2 or 3, **characterized in that** the upper rolling surface comprises a ramp (23) to achieve a continuity of the rolling surface of the wing rail (2) between the different respective heights of the two surface portions (21, 22) having different heights.
5. A railway frog (1) according to at least claim 4, **characterized in that** the most downstream point of the ramp (23) is positioned upstream from the area of the wing rail (2) wherein the rolling wheel is transferred from the wing rail (2) to the nose (3) of the frog (1).
6. A railway frog (1) according to claims 4 or 5, **characterized in that**, according to a plane in section essentially parallel to the edge (5) of the wing rail (2) with the flangeway (4), the ramp (23) has a linear arrangement.
7. A railway frog (1) according to claims 4 to 6, **characterized in that** the ramp (23) being positioned in the extension of the surface portion (21) of the wing rail (2) having the highest height, has a larger width positioned upstream and a narrower width positioned downstream.
8. A railway frog (1) according to claims 4 to 7, **characterized in that**, according to a plane in section essentially perpendicular to the axis of flangeways (4), the ramp (23) is positioned between the edge (5) of the wing rail (2) with the flangeway (4) and at least a part of the surface portion (22) of the wing rail (2) having the lowest height.
9. A railway frog (1) according to any previous claims, **characterized in that** the height difference between the upper rolling surface of the wing rail (2) and the upper surface of the nose (3) is in a range between 0 and 10 millimeters.
10. A railway frog (1) according to any previous claims, **characterized in that**, according to a plane in section essentially perpendicular to the axis of flangeways (4), the upstream edge (6) formed by the rolling surface of the wing rails (2) is shaped to match with the rolling surface of an upstream connected rail.
11. A railway frog (1) according to any previous claims, **characterized in that** the railway frog (1) has a symmetrical arrangement according to an axis passing by the intersection of the crossing flangeways

(4) in the frog (1).

12. A railway frog (1) according to any previous claims, **characterized in that** the upper rolling surface portions (21, 22), eventually including a ramp (23), of at least one wing rail (2) of the frog (1) are made by respective different materials and/or supported by respective different blocks assembled to make at least a part of the wing rail (2).

Patentansprüche

1. Eisenbahnfrosch (1) mit zwei Flügelschienen (2), die auf beiden Seiten einer Nase (3) positioniert sind, wobei die Flügelschienen (2) in Bezug zur Nase (3) durch jeweilige sich kreuzende Spurrillen (4) getrennt sind, **dadurch gekennzeichnet, dass** entsprechend einer Ebene, die im Querschnitt im Wesentlichen senkrecht zur Achse der Spurrillen (4) ist, wobei die Ebene im Querschnitt im Bereich der Nase (3) positioniert ist, die obere Rollfläche mindestens einer der Flügelschienen (2) höher ist als die obere Fläche der Spitze (31) der Nase (3) und niedriger als die obere Fläche des Endes (32) der Oberseite der Nase (3), wobei die obere Rollfläche der Flügelschiene (2) zu einem Bereich gehört, in dem das rollende Rad von der Flügelschiene (2) zur Nase (3) des Froschs (1) übertragen wird.
2. Eisenbahnfrosch (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die obere Rollfläche mindestens einer der Flügelschienen (2) mindestens zwei Flächenabschnitte (21, 22) mit jeweils verschiedenen Höhen in Bezug zur Bodenfläche des Eisenbahnfroschs (1) umfasst.
3. Eisenbahnfrosch (1) nach Anspruch 2, **dadurch gekennzeichnet, dass** die zwei Flächenabschnitte (21, 22) der oberen Rollfläche der Flügelschiene (2) entlang der Kante (5) der Flügelschiene (2) mit den Spurrillen (4) derart angeordnet sind, dass der vorgelagert positionierte erste Flächenabschnitt (21) höher ist und der nachgelagert positionierte zweite Flächenabschnitt (22) niedriger ist, wobei zumindest der nachgelagert positionierte Flächenabschnitt (22) zu einem Bereich der Flügelschiene (2) gehört, in dem das rollende Rad von der Flügelschiene (2) zur Nase (3) des Froschs (1) übertragen wird.
4. Eisenbahnfrosch (1) nach Anspruch 2 oder 3, **dadurch gekennzeichnet, dass** die obere Rollfläche eine Rampe (23) umfasst, um eine durchgehende Rollfläche der Flügelschiene (2) zwischen den jeweils unterschiedlichen Höhen der zwei Flächenabschnitte (21, 22) mit unterschiedlichen Höhen zu erreichen.
5. Eisenbahnfrosch (1) zumindest nach Anspruch 4, **dadurch gekennzeichnet, dass** der am weitesten nachgelagerte Punkt der Rampe (23) dem Bereich der Flügelschiene (2) vorgelagert positioniert ist, in dem das rollende Rad von der Flügelschiene (2) zur Nase (3) des Froschs (1) übertragen wird.
6. Eisenbahnfrosch (1) nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** entsprechend einer Ebene, die im Querschnitt im Wesentlichen parallel zur Kante (5) der Flügelschiene (2) mit den Spurrillen (4) ist, die Rampe (23) eine lineare Anordnung aufweist.
7. Eisenbahnfrosch (1) nach Anspruch 4 bis 6, **dadurch gekennzeichnet, dass** die Rampe (23), die in der Erweiterung des Flächenabschnitts (21) der Flügelschiene (2) mit der größten Höhe positioniert ist, vorgelagert eine größere Breite und nachgelagert eine schmalere Breite aufweist.
8. Eisenbahnfrosch (1) nach Anspruch 4 bis 7, **dadurch gekennzeichnet, dass** entsprechend einer Ebene, die im Querschnitt im Wesentlichen senkrecht zur Achse der Spurrillen (4) ist, die Rampe (23) zwischen der Kante (5) der Flügelschiene (2) mit den Spurrillen (4) und zumindest einem Teil des Flächenabschnitts (22) der Flügelschiene (2) mit der niedrigsten Höhe positioniert ist.
9. Eisenbahnfrosch (1) nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** der Höhenunterschied zwischen der oberen Rollfläche der Flügelschiene (2) und der oberen Fläche der Nase (3) im Bereich zwischen 0 und 10 Millimeter liegt.
10. Eisenbahnfrosch (1) nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** entsprechend einer Ebene, die im Querschnitt im Wesentlichen senkrecht zur Achse der Spurrillen (4) ist, die durch die Rollfläche der Flügelschienen (2) ausgebildete vorgelagerte Kante (6) geformt ist, um zur Rollfläche einer vorgelagert angeschlossenen Schiene zu passen.
11. Eisenbahnfrosch (1) nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** der Eisenbahnfrosch (1) eine symmetrische Anordnung entsprechend einer die Schnittstelle der sich kreuzenden Spurrillen (4) im Frosch (1) passierenden Achse aufweist.
12. Eisenbahnfrosch (1) nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die oberen Rollflächenabschnitte (21, 22), die schließlich eine Rampe (23) enthalten, mindestens einer Flügelschiene (2) des Froschs (1) jeweils aus unter-

schiedlichen Materialien bestehen und/oder durch jeweils unterschiedliche Blöcke abgestützt werden, die dazu montiert sind, zumindest einen Teil der Flügelschiene (2) auszubilden.

Revendications

1. Cœur de croisement (1) comportant deux pattes de lièvre (2) positionnées des deux côtés d'un nez (3), les pattes de lièvre (2) étant séparées par rapport au nez (3) par des ornières transverses (4) respectives, **caractérisé en ce que**, selon un plan en coupe essentiellement perpendiculaire à l'axe des ornières (4), le plan en coupe étant positionné dans la zone du nez (3), la surface de roulement supérieure d'au moins une des pattes de lièvre (2) est supérieure à la surface supérieure de la pointe (31) du nez (3) et inférieure à la surface supérieure de l'extrémité (32) de la partie supérieure de nez (3), cette surface de roulement supérieure de la patte de lièvre (2) correspondant à une zone dans laquelle la roue de roulement est transférée de la patte de lièvre (2) au nez (3) du cœur (1).
2. Cœur de croisement (1) selon la revendication 1, **caractérisé en ce que** la surface de roulement supérieure d'au moins l'une des pattes de lièvre (2) comprend au moins deux parties de surface (21, 22) ayant des hauteurs respectives différentes par rapport à la surface inférieure du cœur de croisement (1).
3. Cœur de croisement (1) selon la revendication 2, **caractérisé en ce que** les deux parties de surface (21, 22) de la surface de roulement supérieure de la patte de lièvre (2) sont disposées le long du bord (5) de la patte de lièvre (2) avec les ornières (4) de sorte que la première partie de surface (21) positionnée en amont soit plus haute et la seconde partie de surface (22) positionnée en aval soit plus basse, au moins la partie de surface (22) positionnée en aval correspondant à une zone de la patte de lièvre (2) dans laquelle la roue de roulement est transférée de la patte de lièvre (2) au nez (3) du cœur (1).
4. Cœur de croisement (1) selon la revendication 2 ou 3, **caractérisé en ce que** la surface de roulement supérieure comprend une rampe (23) pour obtenir une continuité de la surface de roulement de la patte de lièvre (2) entre les différentes hauteurs respectives des deux parties de surface (21, 22) ayant des hauteurs différentes.
5. Cœur de croisement (1) selon au moins la revendication 4, **caractérisé en ce que** le point le plus en aval de la rampe (23) est positionné en amont de la zone de la patte de lièvre (2) dans laquelle la roue de

roulement est transférée de la patte de lièvre (2) au nez (3) du cœur (1).

6. Cœur de croisement (1) selon la revendication 4 ou 5, **caractérisé en ce que**, selon un plan de section essentiellement parallèle au bord (5) de la patte de lièvre (2) avec l'ornière (4), la rampe (23) a une disposition linéaire.
- 10 7. Cœur de croisement (1) selon les revendications 4 à 6, **caractérisé en ce que** la rampe (23) positionnée dans l'extension de la partie de surface (21) de la patte de lièvre (2) ayant la hauteur la plus élevée, a une largeur plus grande positionnée en amont et une largeur plus étroite positionnée en aval.
- 15 8. Cœur de croisement (1) selon les revendications 4 à 7, **caractérisé en ce que**, selon un plan en coupe essentiellement perpendiculaire à l'axe des ornières (4), la rampe (23) est positionnée entre le bord (5) de la patte de lièvre (2) avec l'ornière (4) et au moins une partie de la partie de surface (22) de la patte de lièvre (2) ayant la hauteur la plus petite.
- 20 9. Cœur de croisement (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la différence de hauteur entre la surface de roulement supérieure de la patte de lièvre (2) et la surface supérieure du nez (3) est dans une plage comprise entre 0 et 10 millimètres.
- 25 10. Cœur de croisement (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que**, selon un plan de coupe essentiellement perpendiculaire à l'axe d'ornières (4), le bord amont (6) formé par la surface de roulement des pattes de lièvre (2) est conformé pour s'adapter à la surface de roulement d'un rail raccordé en amont.
- 30 11. Cœur de croisement (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le cœur de croisement (1) présente un agencement symétrique selon un axe passant par l'intersection des ornières transverses (4) dans le cœur (1).
- 35 12. Cœur de croisement (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les parties de surface de roulement supérieures (21, 22), comprenant éventuellement une rampe (23), d'au moins une patte de lièvre (2) du cœur (1) sont fabriquées dans des matériaux respectifs différents et/ou soutenues par des blocs respectifs différents assemblés pour constituer au moins une partie de la patte de lièvre (2).
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- 50
- 55

[Fig. 1]

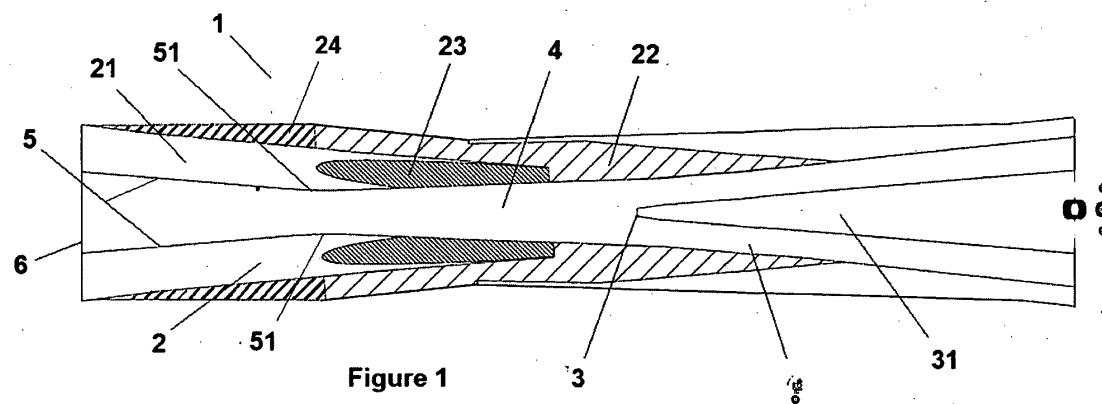


Figure 1

[Fig. 2]

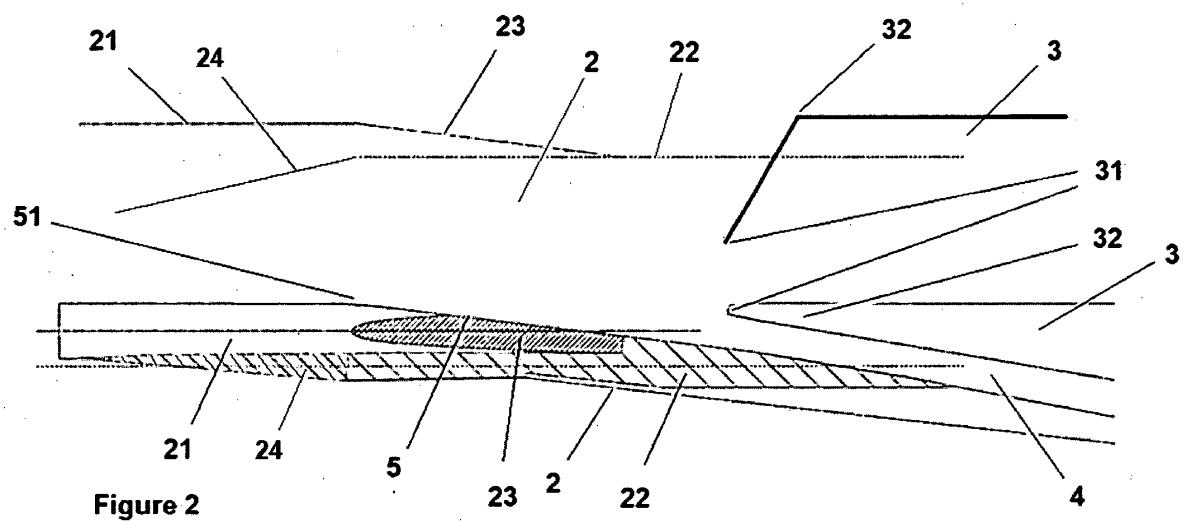


Figure 2

[Fig. 3]

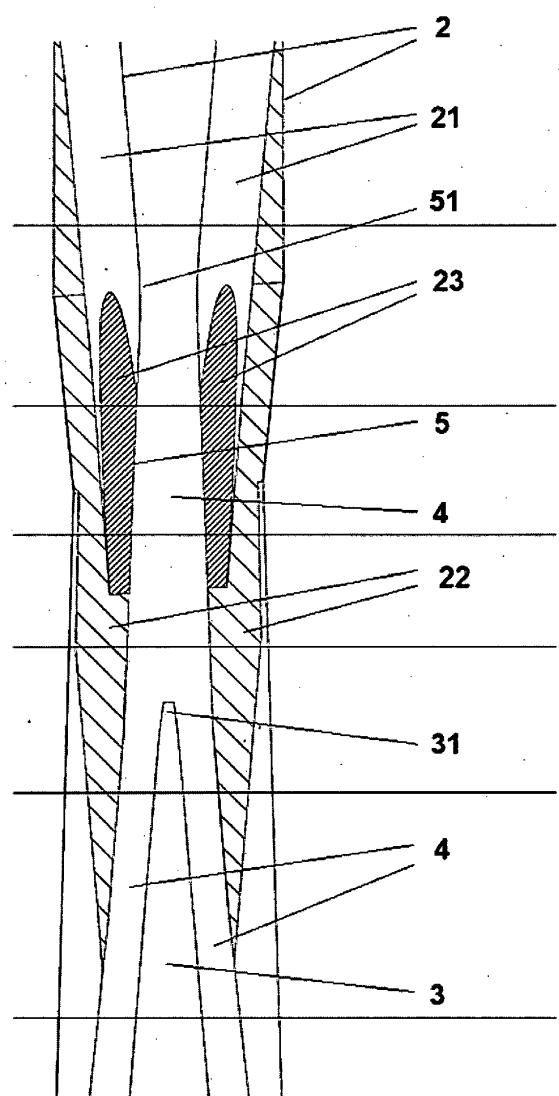
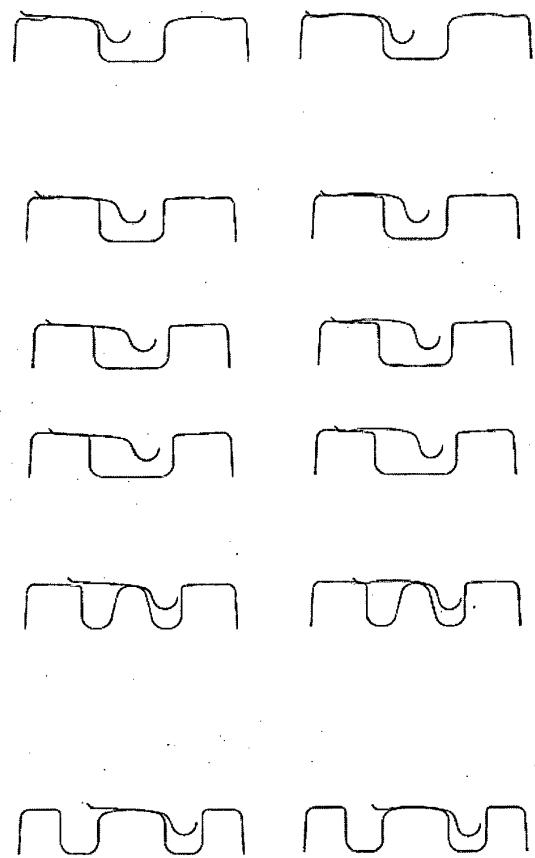
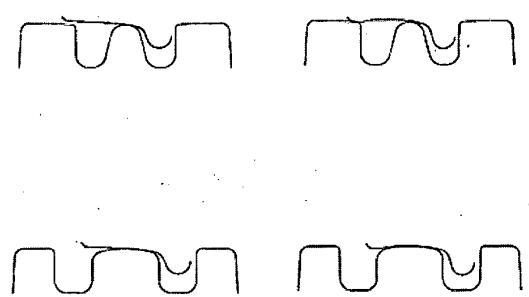
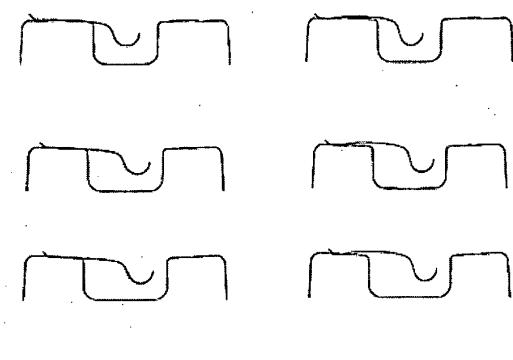


Figure 3

Wheel with
a straight profile



Wheel with
a curved profile



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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