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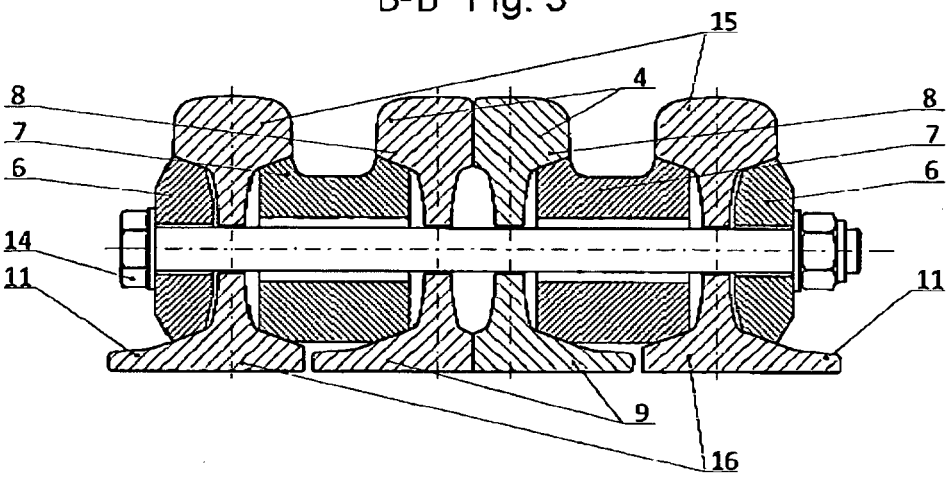
(54) **FROG WITH SHORTENED MONO-BLOCK CAST**

(57) A frog with a shortened mono-block casting (1) permanently connected on one side of the frog prior to the start of a mono-block casting (1) with two pieces of connecting rails (2) and on the other side it is permanently connected in the widest part of the tip (3) of the mono-block casting (1) with point rails (4), **where in** the point rails (4) are releasably connected to each other by high-strength screws (5), shims (6) and inserts (7).

B-B Fig. 3



EP 3 722 502 A1

Description

Technical Field

[0001] The technical solution concerns the construction of a frog with shortened mono-block cast, used at railway switches.

Contemporary State of the Art

[0002] Known and used as to this date as one of the most important and most stressed components of railway switches at all required turn angles are all-cast frogs, frogs with shortened mono-block, Insert frogs, cast wedge frogs, frogs with forged hardened tip and surface hardened wing rails and mounted frogs of rails, which have different functional and utility properties.

[0003] An example of all-cast frogs are frogs according to CZ patent file No. 282131, the disadvantage of which is their complicated production, demanding moulding and difficult cleaning after casting, high steel consumption for their production, high weight, increased costs for a considerable extent of their machining to the desired geometric shape, increased possibility of machining defects. This is also related to the high energy intensity of their manufacture, which is given by the dimensions and weight of the frog casting, the considerable extent of machining and the increased demands on the repair of defects.

[0004] The disadvantage of frogs with shortened mono-block according to the CZ utility model No. 5698 is the construction lay-out of the end part, which does not meet the requirements for providing the necessary stiffness necessary to transmit dynamic forces occurring during the rolling stock movement, which would prevent excessive stress in shaped cross section spots. An exemplary embodiment of Insert frogs are the frogs according to CN patent file No. 102021867, the disadvantage of which is a complicated construction, an unfavourable transition of the wheel from the rail steel part to the cast part of the frog in the area of the frog neck.

[0005] The disadvantage of a frog with forged hardened tip and surface hardened wing rails is lower stiffness and shorter service life. The construction design does not offer the necessary compactness of the tip and wing rail connection, which can result in loose joints, loss of stiffness and reduced service life.

[0006] Mounted frogs from rails according to the CZ utility model No. 6952 have lower rigidity and are subject to rapid wear. The construction design of this frog design does not offer the necessary compactness of connection of the individual parts assembled together, which results in loosening of the joints, loss of stiffness and reduced service life.

[0007] An example of a frog with a shortened mono-block casting are the frogs according to the CZ utility model No. 30786, when the tip rails are welded together along the length of the contact surfaces on the head, heel and forehead after the assemblage and subsequently welded to the machined frog casting. Three-point contact inserts are used for the overall frog assemblage, in the place on the web, under the head and at the foot of the wing rails and the connecting tip rails. The disadvantage of frogs with shortened casting of mono-block according to UV 30786 is the constructional arrangement of the connecting tip rails, when the long-term operational loading of the weld of the contact surfaces on the head of the connecting tip rails leads to defects with the possibility of cracks formation and development.

Technical Solution Base

[0008] The design of the shortened mono-block brings the benefits of complete mono-block frogs in terms of monolithing and mechanical, static and dynamic certainty of the structure, whose carrier at the point where the rail wheels pass through the groove is provided by a monolithic casting while maintaining the shortened mono-block advantage like savings of expensive casting material and simplification of its production, i.e. shortening the length of the casting and thus reducing energy consumption for its production, reducing foundry defects and straightening costs and other related production costs.

[0009] These advantages are largely obtained by a frog with a shortened mono-block casting, non-rewirably connected on one side of the frog prior to the start of the mono-block casting with two pieces of connecting rails, and on the other side, non-rewirably connected at the widest part of the mono-block casting tip with the tip rails, while the tip rails are - before the non-rewirable connection with the mono-block casting detachably connected to each other by means of high-strength bolts, shims and inserts, which preferably rest only in the lower part of the head of the tip rails and the upper part of the foot of the tip rails.

[0010] Advantageously, the tip rails are then permanently joined over the entire length of the contact surface by a front weld for the sake of consistency in the subsequent permanent / non-rewirable joint with the mono-block cast.

[0011] Furthermore, it appears advantageous that the double-sided wing rails forming the grooves run-out of the mono-block castings are detachably connected to the monoblock casting part by high-strength bolts and to the part of the tip rails by high-strength bolts through inserts and shims which are at the same time relying only on the lower part of the head and upper part of the foot of the tip rails.

[0012] It seems to be advantageous that the wing rail heads are flush-mounted from the side with the outer side walls of the mono-block casting by machining in parallel in the vertical direction.

Explanation of Drawings

[0013] The technical solution will be explained in detail

using the drawings, when Fig. 1 schematically shows the frog with the shortened cast mono-block in plan view, Fig. 2 shows a cross-section A-A of the connection of the tip rails with high-strength screws through the shims. Fig. 3 shows a cross-section B-B of the connection of the tip rails and the wing rails with high-strength bolts through shims and inserts, and Fig. 4 shows the connection of the wing rails to the mono-block casting and the alignment of the lateral sides of the wing rail heads with the outer side walls of the mono-block casting.

Technical Solution Design Samples

[0014] The technical solution according to Fig. 1 consists of a shortened casting of mono-block 1 permanently connected on one side of the frog before the start of the casting of monoblock 1 with two pieces of connecting rails 2 and on the other side it is permanently connected at the widest part of the tip 3 of the casting monoblock 1 with the tip rails 4. The tip rails 4 under Fig. 1 and Fig. 2 are - before the permanent connection with the casting of the mono-block 1 - releasably connected to each other by high-strength screws 5, shims 6 and inserts 7, which only support in the lower part of the head of tip rails 8 and the upper part of the foot of tip rails 9 and the tip rails 4 are then permanently connected by a front weld 10 along the whole length of the contact surface to the casting of mono-block 1 for reasons of consistency during the consequent permanent connection. The double-sided wing rails 11 forming run-outs of the grooves 12 of castings of mono-block 1, according to Fig. 1 are detachably connected to the casting part of the mono-block 1 by high-strength screws 13, according to Fig. 4 and with a part of the tip rails 4 with high-strength bolts 14 over the inserts 7 and shims 6, which together rest only on the lower part of the head 15 and the upper part of the foot 16 of the wing rails 11 and they simultaneously rest only at the lower part of the head 8 and upper part of the foot 16 of the wing rail 4 as shown in Fig. 3. The heads of the wing rails 15 are aligned from the side with the outer side walls 17 of the mono-block cast 1 by machining in parallel in the vertical direction, as shown in Fig. 4.

Industrial Applicability

[0015] The technical solution can be used for all they types of switches, especially switches designed for modernization of railways with high demands on stiffness and resistance to dynamic stress and wear. The technical solution is advantageously applicable also to switches for urban tram transport.

List of reference marks

[0016]

1 monoblock casting
2 connecting rails
3 the widest part of the tip
4 tip rails
5 high-strength screws
6 shims
7 inserts
8 head of tip rails
9 foot of tip rails
10 front weld
11 wing rails
12 run-outs of grooves
13 high-strength screws
14 high strength screws
15 head of wing rails
16 foot of wing rails
17 outer side walls (of the mono-block cast)

Claims

1. A frog with a shortened mono-block casting (1) permanently connected on one side of the frog prior to the start of a mono-block casting (1) with two pieces of connecting rails (2) and on the other side it is permanently connected in the widest part of the tip (3) of the mono-block casting (1) with point rails (4) **characterized in that** the point rails (4) are releasably connected to each other by high-strength screws (5), shims (6) and inserts (7).

2. A frog with a shortened mono-block casting according to claim 1, **characterized in that** the shims (6) and inserts (7) are supported/ rest only in the lower part of the head of the tip rails (8) and the upper part of the foot of the tip rails (9).

3. A frog with a shortened mono-block casting according to claims 1 and 2, **characterized in that** the tip rails (4) are then releasably connected over the entire length of the contact surface by the front weld (10).

4. A frog with a shortened mono-block casting according to claim 1, **characterized in that** the inserts (7) and shims (6) are supported/rest only on the lower part of the head (15) and the upper part of the foot (16) of the wing rails (11) and the lower part of the head (8) and the upper part of the foot (9) of the tip rails (4).

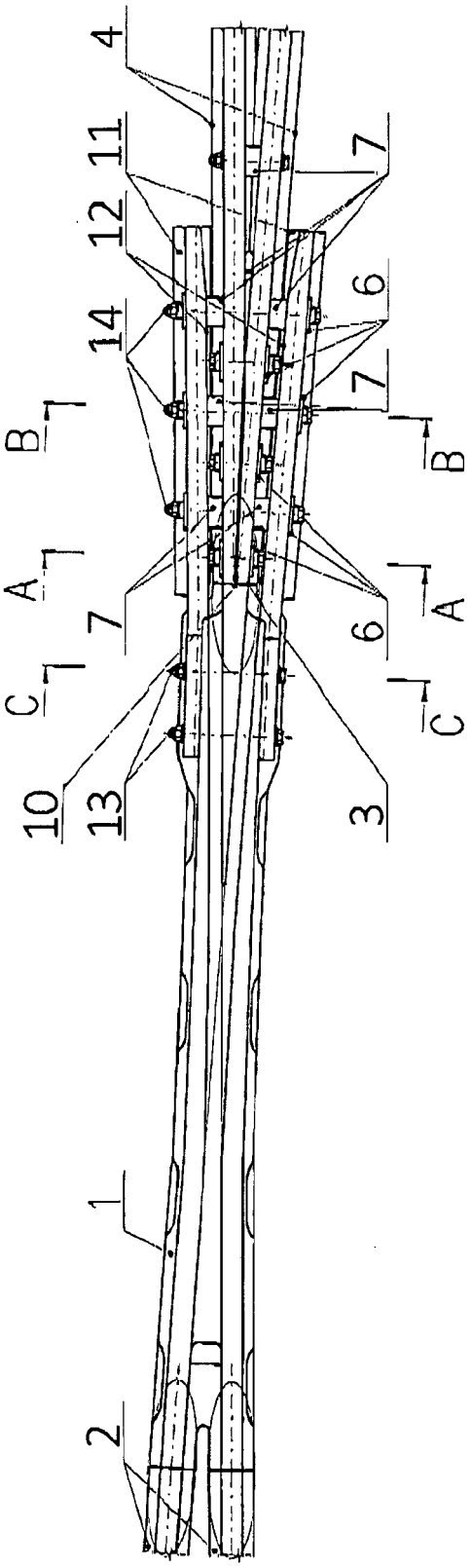
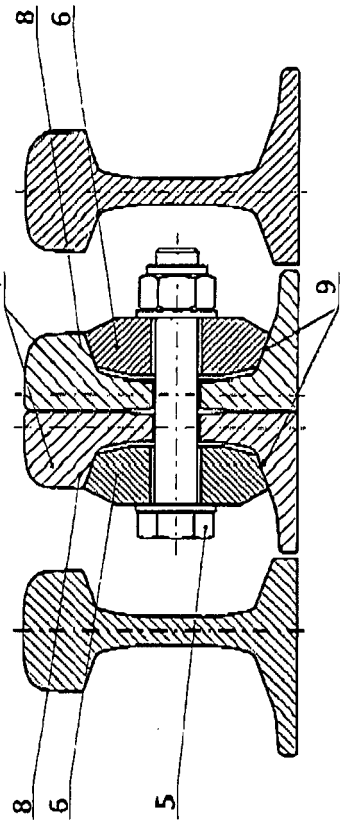
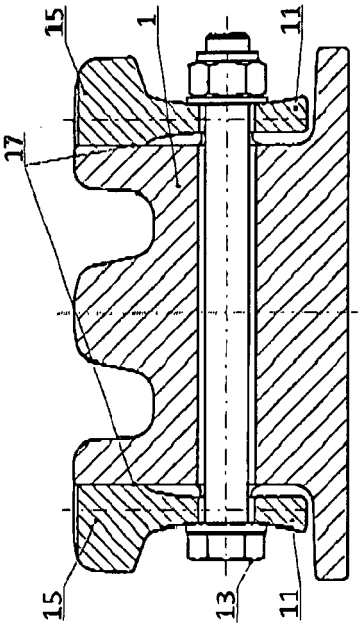


Fig. 1

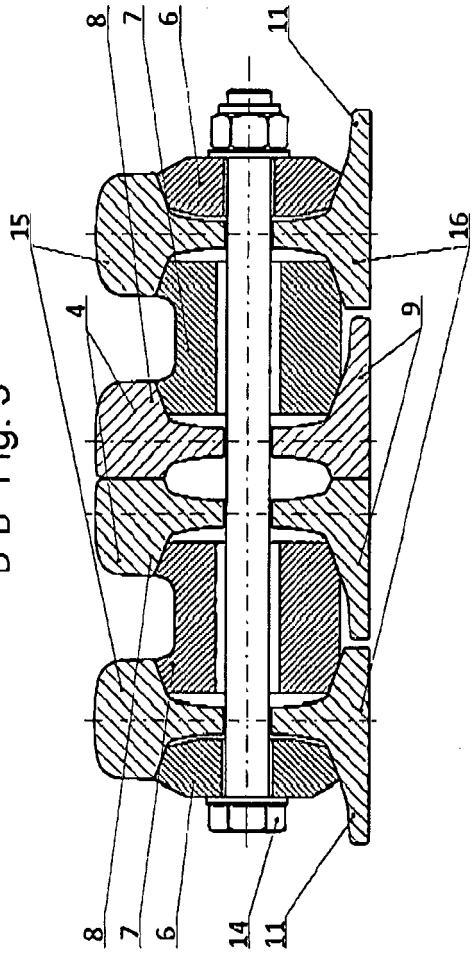
A-A Fig. 2



C-C Fig. 4



B-B Fig. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 20 00 0144

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 August 2020	Stern, Claudio

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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