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(54) **Connection system of wheelsets in self-steering railway bogie**

(57) The system comprises elastic elements parallel to the longitudinal axis of the railway bogie, connected with arms (3) of wheelsets (4) on the left and the right side of the railway bogie. The each elastic element is made of a single sheet of elastic material with two parallel longitudinal side cuts separating the side strips constituting whiskers (1b) from the longer central strip (1a),

where the ends of the whiskers (1b) are permanently connected with a rigid cleat (2), the central strip (1a) has a fragment bent in the shape of a channel section, located between the whiskers (1b) and the cleat (2), and the flat end of the central strip (1b), passing under the cleat (2), is attached to the arm (3) of the adjacent wheelset (4).

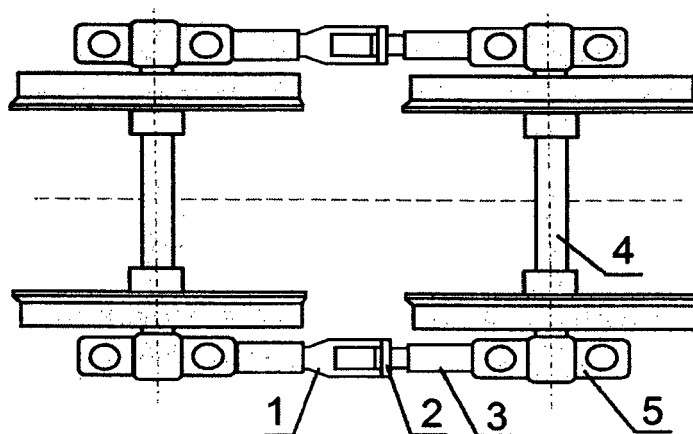


FIG. 1

Description

[0001] The subject of the invention is a connection system of wheelsets in a self-steering railway bogie, designated for self-adjusting wheelsets of railway bogie, which makes it possible to reduce the wheel wear during running on a curved track and to achieve stable running of the vehicle at high speeds.

[0002] A solution of an elastic system for connection of wheelsets in a self-steering railway bogie is known from the patent description US 6439130. That solution applies arms attached to bearing housings of wheelset axles, each of the arms parallel to the longitudinal axis of the railway bogie and directed towards the centre of the railway bogie. The arms at a given side of the railway bogie, on the left and on the right, are connected with one another using an assembly containing many elements such as preloaded coil springs, flat springs, limiters, ball-and-socket joints, bolts, pins, screws, nuts and their protections, constituting a complex elastic apparatus. A disadvantage of that solution is the high cost of manufacturing of the elastic apparatus, complex adjustment, and operational reliability threatened by the high number of complex elements of the apparatus.

[0003] The purpose of the invention is to eliminate these disadvantages with a connection system of wheelsets of a new construction in self-steering railway bogies, making it possible to reduce the wheel wear and to achieve a stable running of the vehicle at high speeds by providing a sufficiently high stiffness to counteract the parallel anti-symmetric relative displacements of wheelsets in the horizontal plane, called the substitute shear stiffness of the system, while providing a low stiffness counteracting the symmetric angular displacements of wheelsets in the horizontal plane, called the substitute bending stiffness of the system.

[0004] A connection system of wheelsets in a self-steering railway bogie, consisting of elastic elements parallel to the longitudinal axis of the railway bogie, connected with arms of wheelsets on the left and the right side of the railway bogie, according to the invention is characterized in that each elastic element is made of a single sheet of elastic material with two parallel longitudinal side cuts separating the side strips constituting whiskers from the longer central strip, where the ends of the whiskers are permanently connected with a rigid cleat, the central strip has a fragment bent in the shape of a channel section, located between the whiskers and the cleat, and the flat end of the central strip, passing under the cleat, is attached to the arm of the adjacent wheelset.

[0005] The system according to the invention has a simple structure with no moving parts, where the elastic element is made of a single sheet of material, and obtaining the required stiffness depends on the choice of dimensions of the elastic element.

[0006] An example of implementation of the subject matter of the invention is presented in the drawing, where fig. 1 presents the connection system of wheelsets in the

railway bogie in a top view, fig. 2 presents the elastic element attached to the arms of the wheelsets, and fig. 3 presents the elastic element before being shaped from a sheet of elastic material.

[0007] As presented in fig. 1, 2, the wheelsets 4 are connected on the left and the right side of the bogie with elastic elements located in parallel to the longitudinal axis of the railway bogie. Each elastic element is made of a single sheet of elastic material, whose prepared fragment is shown in unfurled view in fig. 3. This fragment has whiskers 1b on its sides, in the form of short strips separated with parallel longitudinal cuts from the longer central strip 1a. The ends of whiskers 1b are permanently connected with a rigid cleat 2. Bending of the central strip 1a along four lateral dashed lines, shown in fig. 3, leads to creating a strip fragment in the shape of a channel section, located between the whiskers 1b and the cleat 2. The first bend runs along the dashed line connecting the bases of the whiskers 1b. The last bend is made in the plane of whiskers 1b. The flat end of the central strip 1a, passing under cleat 2, is attached to the arm 3 of the adjacent wheelset 4, and the arms 3 are attached to saddle protrusions of the bearing housings 5 of each wheelset 4.

[0008] When wheelsets 4 displace in parallel to one another and perpendicularly to the track axis, the arms 3 and the horizontal fragments of the elastic element are subject to bending in the horizontal plane and the vertical walls of the fragment in the shape of a channel section are being twisted. When the wheelsets are subject to symmetric angular displacements in the horizontal plane relative to the lateral axis of the bogie, the vertical walls of the fragment in the shape of a channel section are subject to twisting and bending in the vertical plane and the horizontal wall of that fragment is being bent in the horizontal plane. The arms 3 and the remaining horizontal fragments of the elastic element are also being bent. The required substitute bending stiffness of the connection system can be achieved by adequate choice of dimensions of the elements of the elastic element.

[0009] The connection system of wheelsets in a self-steering railway bogie according to the invention is particularly suitable for application in self-steering railway bogies in which the space between the axles of the wheelsets is not available for installation of another connection system of wheelsets, for example in the form of crossed rods or yokes connected with one another using a rubber element.

Claims

1. connection system of wheelsets in a self-steering railway bogie having elastic elements parallel to the longitudinal axis of the railway bogie, connected with arms of wheelsets on the left and the right side of the railway bogie, **characterized in that** each elastic element is made of a single sheet of elastic material

with two parallel longitudinal side cuts separating the side strips constituting whiskers (1b) from the longer central strip (1a), where the ends of the whiskers (1b) are permanently connected with a rigid cleat (2), the central strip (1a) has a fragment bent in the shape of a channel section, located between the whiskers (1b) and the cleat (2), and the flat end of the central strip (1b), passing under the cleat (2), is attached to the arm (3) of the adjacent wheelset (4).

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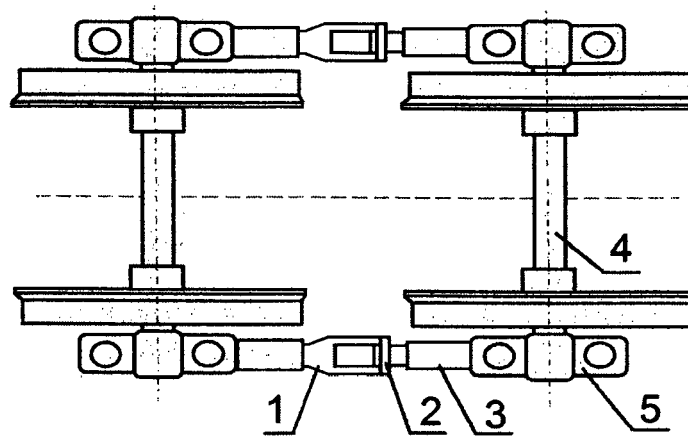


FIG. 1

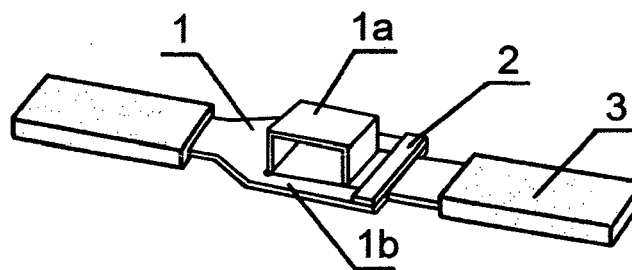


FIG. 2

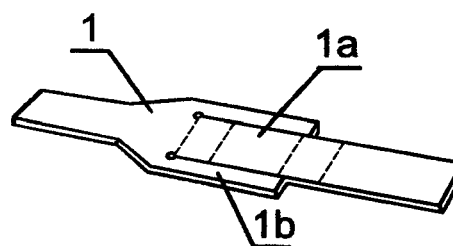


FIG. 3



EUROPEAN SEARCH REPORT

Application Number
EP 14 46 0069

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CH 225 097 A (SCHWEIZERISCHE LOKOMOTIV [CH]) 31 December 1942 (1942-12-31) * figures 5,6 *	1	INV. B61F5/38
A	EP 0 803 426 A1 (WAAGNER BIRO AG [AT] LEITNER AUSTRIA GMBH [AT]) 29 October 1997 (1997-10-29) * figure 1 *	1	
A	DE 42 40 098 A1 (KRUPP VERKEHRSTECHNIK GMBH [DE]) 1 June 1994 (1994-06-01) * figure 1 *	1	
A	EP 0 557 892 A2 (FIAT FERROVIARIA SPA [IT]) 1 September 1993 (1993-09-01) * figure 1 *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B61F
Place of search		Date of completion of the search	Examiner
Munich		12 May 2015	Lorandi, Lorenzo
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 46 0069

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The members are as contained in the European Patent Office EDP file on
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12-05-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CH 225097 A	31-12-1942	BE 448084 A	31-12-1942
		CH 225097 A	31-12-1942
		FR 892294 A	03-04-1944
		GB 555188 A	09-08-1943
		NL 61942 C	15-11-1948

EP 0803426 A1	29-10-1997	AT 190574 T	15-04-2000
		DE 59604686 D1	20-04-2000
		EP 0803426 A1	29-10-1997
		ES 2145950 T3	16-07-2000

DE 4240098 A1	01-06-1994	AT 170142 T	15-09-1998
		CA 2109560 A1	29-05-1994
		DE 4240098 A1	01-06-1994
		EP 0600172 A1	08-06-1994
		US 5429056 A	04-07-1995

EP 0557892 A2	01-09-1993	AT 138022 T	15-06-1996
		EP 0557892 A2	01-09-1993
		IT 1256529 B	07-12-1995

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 6439130 B [0002]