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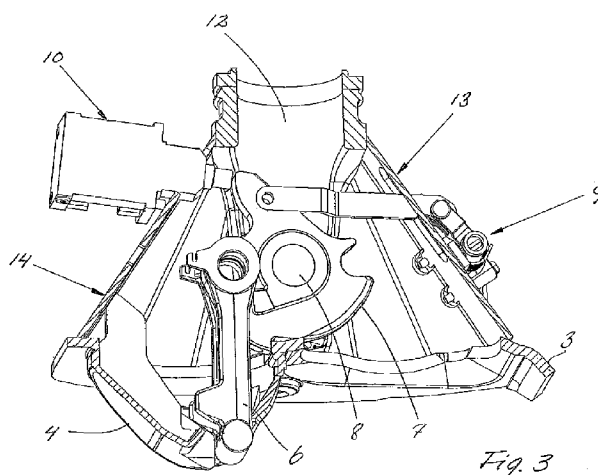
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(54) Title: COUPLER HEAD WITH COUPLER HOUSE MADE OF SHEET METAL



(57) Abstract: Coupler head (1) in automatic couplers for rail vehicles, which comprises a coupler house (13, 14) formed to contain components (6, 7, 8) included in a mechanical coupling and, in a front end, to support a front plate (3). The coupler house consists of two separate elongate shell-shaped house parts (13, 14), which in mutually opposite and open long sides are individually joined to the outside of a beam (12) that runs centrally in the coupler head and in a rear end is adapted to be coupled to a drawbar and in a front end adapted for bearing a main shaft (8) included in the mechanical coupling, the parts of the coupler house being joined to the outside of the beam by means of welding seams (16) that mainly run in the longitudinal direction of the beam, whereby tractive forces are transferred from the coupling to the drawbar via the centrally running beam without loading said house parts and welding seams, while thrust forces are transferred from the front plate to the beam and the drawbar via said house parts and welding seams without loading the coupling, the main shaft thereof and the bearing of the main shaft in the beam.



TITLE

Coupler head with coupler house made of sheet metal

TECHNICAL FIELD OF THE INVENTION

- 5 The present invention relates to a coupler head in automatic couplers for rail vehicles comprising a coupler house serving to contain and protect components included in a mechanical coupling, such as central plate, main shaft, and coupling link, by which rail vehicles are coupled to each other. More precisely, the invention relates to a coupler head the coupler house of which is made of sheet metal.

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BACKGROUND AND PRIOR ART

- Automatic couplers for rail vehicles typically comprise a drawbar that in one end is articulately attached in the chassis of a rail vehicle, and in its other end carries a coupler head having a coupling adapted to couple automatically to a
- 15 correspondingly formed coupler. Usually, the coupler head has a cast coupler house in which the main shaft of the coupling is journalled. A coupling link extends forward from a central plate rotatably mounted on the main shaft and automatically engages the central plate of the meeting coupler when the couplers are brought together. For the guidance of the couplers, a guide cone serves that protrudes from
- 20 the front plate of the coupler head and is received in a correspondingly shaped opening in the front plate of the meeting coupler, when the couplers approach each other.

- In normal operation, the coupler head and the coupler house are subjected to repeated tensile and compressive loads that in course of time could cause fatigue of
- 25 materials and joints unless these were dimensioned with safety margin. Therefore, the cast coupler house is typically a comparatively heavy component in an automatic coupler, dimensioned to resist thrust forces upon coupling at relative speeds of up to 15 km/h, as well as thrust and tractive forces that arise by repeated jerking in the coupler during travelling.

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SUMMARY OF THE INVENTION

The invention aims at reducing the weight of an automatic coupler intended for the coupling of rail vehicles. Another object is to provide a coupler head that can be manufactured by a production process that is simplified in comparison with casting and with a decreased need of finishing and reduced rejection.

- 5 According to the invention, both these objects are achieved by a coupler head the coupler house of which is made of sheet metal.

More precisely, according to the invention, there is provided a coupler head with a coupler house consisting of two separate elongate shell-shaped house parts, which in mutually opposite and open long sides are individually joined to the outside of a
10 beam that runs centrally in the coupler head and in a rear end is adapted to be coupled to a drawbar and in a front end adapted for the mounting of and bearing a main shaft included in the mechanical coupling, the parts of the coupler house being joined to the outside of the beam by means of welding seams that mainly run in the longitudinal direction of the beam.

- 15 In a coupler head formed in this way, all tractive forces from the coupling are transferred to the drawbar via the centrally running beam, while said house parts and welding seams only are loaded by occurring thrust forces.

More precisely, tractive forces (see arrow D in attached Figure 6) are transferred from the coupling to the drawbar via the centrally running beam without loading
20 said house parts and welding seams, while thrust forces (see arrow T in Figure 6) are transferred from the front plate to the beam and the drawbar via the parts of the coupler house and welding seams without loading the coupling, the main shaft thereof and the bearing of the main shaft in the beam.

- 25 In other words, the forces that act in compressive and tensile load partly find different ways through the coupler head. From this, it is also clear that the risk of fatigue of welding seams in a coupler house made of sheet steel can be reduced.

It is preferred that the respective house part, by a plurality of longitudinally running bendings, forms a shell, which consists of several sides and the bendings of which extend from the beam in diverging directions forward toward the front
30 plate.

- By this design, each house part forms a self-supporting box, by which thrust forces are propagated at an acute angle inward toward the beam. More precisely, the house part may be compared to a truncated cone or polygonal pyramid that is cut-off at an acute angle α to its symmetry axis S, and is welded to the centrally
35 running beam in the cut edges (as illustrated in attached Figure 6).

Alternatively, the house parts may be made as obliquely truncated cones with a circular or oval cross-section, or with a cross-section that contains both straight and arched segments in combination, produced by bending and/or by compression-moulding,

- 5 In a preferred embodiment, the respective house part embraces an essentially plane and vertically standing side formed between an upper side angled in two or more different planes and an under side angled in two or more different planes.

Alternatively, the upper and/or under side may be made arched and united by a plane vertical side.

- 10 It is suitable that the coupler house, in particular on the vertical sides of the coupler house, and preferably outside the coupler house, is adapted for the mounting of control members for the mechanical coupling. It is further suitable that the beam, on its upper and/or under side, is adapted for the mounting of connection members for the supply of the vehicle, such as connection members for
15 air, oil, electricity. For this purpose, attachments may be arranged on the coupler house and access openings be recessed through the wall of the coupler house.

- It should be emphasized that, by two house parts, reference is made to a left and a right house part, which does not exclude that one of them, or both, *per se*, may be composed of or comprise several parts, which upon mounting form a left and a right
20 house part, respectively, of the coupler house.

- Preferably, the beam is formed of a pipe that through recesses in its wall connects the spaces in the two coupler house parts when these are welded to the beam. The front end of the beam, which by the two opposite and laterally positioned recesses may be compared to a fork with an upper and a lower branch, is suitably reinforced
25 for bearing the main shaft of the coupling in the mutually vertically aligned branches.

BRIEF DESCRIPTION OF THE DRAWINGS

- An embodiment example of the invention is explained in more detail below,
30 reference being made to accompanying schematic drawing figures. In the same:

Fig. 1 shows a coupler head according to the invention in perspective from the front;

Fig. 2 shows a coupler head according to the invention in perspective from behind;

Fig. 3 shows a horizontal cross-section through the coupler head;

Fig. 4 shows a vertical cross-section through the coupler head;

Fig. 5 shows the parts of the coupler house in the unmounted state, and;

Fig. 6 shows the parts of the coupler house in the mounted state.

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DETAILED DESCRIPTION OF THE EMBODIMENT EXAMPLE

In the drawing figures, there is shown a coupler head 1, which, in the shown embodiment, in a rear end, is provided with flanges 2 by which the coupler head can be connected to a drawbar, not shown, by means of a flange coupling commonly occurring in this context. In the front end of the coupler head, a front plate 3 is supported from which a guide cone 4 projects in a conventional way. The front plate 3 is supported by a coupler house 5 that protects components included in a mechanical coupling, such as a coupling link 6 and a central plate 7, which are rotatably arranged on a vertically oriented main shaft 8. Outside the coupler house, locking and unlocking members 9 and 10, respectively, are arranged, by which the central plate can be manoeuvred into its locked and unlocked positions. Further, on the coupler head 1, members 11 are arranged for the connection and supply of occurring hydraulic, pneumatic and electric functions as well as for the communication between coupled rail vehicles. These members 9–11 are incidental to the invention and may be of a conventional kind known *per se* and do not need to be treated in more detail in this description of the invention.

The coupler head 1 consists of four main components: a beam 12 that runs centrally in the coupler head and to which, in opposite sides, a respective house part 13 and 14 forming a coupler house should be joined, as well as said front plate 3 that should be connected to the parts 13 and 14 of the coupler house. The parts 13, 14 of the coupler house are each other's mirror images and may be symmetrically uniform and interchangeable with each other. The parts 13, 14 of the coupler house are made of sheet metal and have, according to the embodiment example, by longitudinal bendings 15, been bent integrally into the shape of a truncated pyramid that in an obliquely cut and open long side is welded to the beam 12 (see Figure 6). Accordingly, the welding seams 16 extend principally in the longitudinal direction of the beam, and the bendings 15 run divergingly from the beam 12 toward the front plate 3.

The house part 13, 14 of the embodiment example has a vertically standing outside 17, which in its upper edge transforms into an upper side (visible in Figure 2) angled in three different planes and transforms in its lower edge into an under side (visible in Figure 3) angled in three different planes. Accordingly, each house part 5 13 or 14 has six rectilinear bendings (and seven essentially plane sides) by which thrust forces are transferred at an acute angle from the front plate 3 to the beam 12. In their front ends, the parts 13, 14 of the coupler house are welded to the front plate 3. Thereby, the front plate 3 serves the purpose of interconnecting the house parts and contributes to impart the coupler house increased strength to resist 10 lateral loads in order to, in this way, further counteract fatigue and prevent separation in the welding seams 16, caused by, for instance, a flow of thrust forces from the front plate 3 to the beam 12 and the drawbar via the house parts 13 and 14.

According to the invention, the main shaft 8 of the mechanical coupling is 15 journaled in the centrally running beam 12. For this purpose, two laterally positioned recesses 18, 19 opposite each other are formed in the wall of the beam so as to allow accommodation of the central plate, the coupling link and other appurtenant members that are necessary for the manoeuvring of the mechanical coupling. By these recesses 18, 19, which connect the spaces in the two laterally 20 positioned coupler house parts, the front end of the beam obtains the shape of a fork with an upper branch 12' and a lower branch 12". In the branches 12' and 12", seats 20 are arranged for bearing the main shaft 8, and for the purpose, the branches may be reinforced and have increased material thickness in the area in which the bearing of the main shaft is arranged.

25 In other words, in a coupler head according to the invention, tractive forces and thrust forces are propagated in different paths through the coupler head, such as illustrated in Figure 6, wherein arrow D indicates flow of force in the traction direction while arrow T indicates flow of force in the thrust direction. In this way, on one hand the welding seams and the coupler house are spared from tractive forces, 30 while the coupling, the main shaft and the bearing thereof in the centrally running beam are spared from thrust forces.

As mentioned above under Summary of the Invention, the parts 13, 14 of the coupler house may have another design than the polygonal embodiment shown in the drawings. In order to comply with the object of the invention, the parts of the 35 coupler house are formed of sheet metal, preferably sheet steel, which by bending and/or compression-moulding is imparted a self-supporting elongate shape, preferably an obliquely truncated conical or pyramidal shape, and which, at an

open side of the house part, is joined to the centrally running beam by means of a welding seam running principally in the longitudinal direction of the beam.

Here, it should be mentioned that in alternatives to bending/compression-moulding, the parts of the coupler house may be produced by the joining of individual side elements, wherein the diverging bendings 15 instead will consist of diverging welding seams. Even if this alternative embodiment may be less meritorious from the point of view of manufacturing and strength, it could be a feasible alternative to the integrally formed coupler house part 13 or 14 included in the embodiment example.

It will be further appreciated that the centrally running beam 12, which in the embodiment example is formed of a cylindrical pipe having a circular cross-section, alternatively may have another cross-sectional shape, such as a four-sided cross-section.

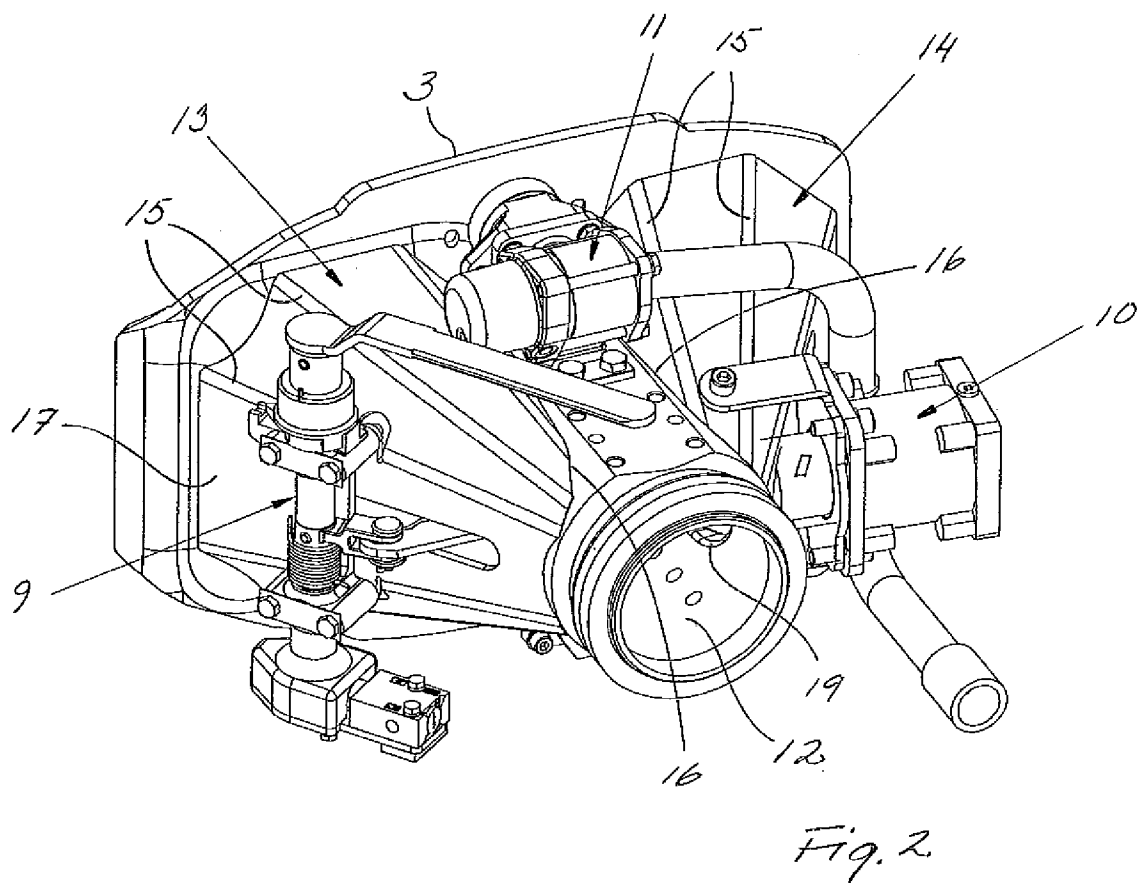
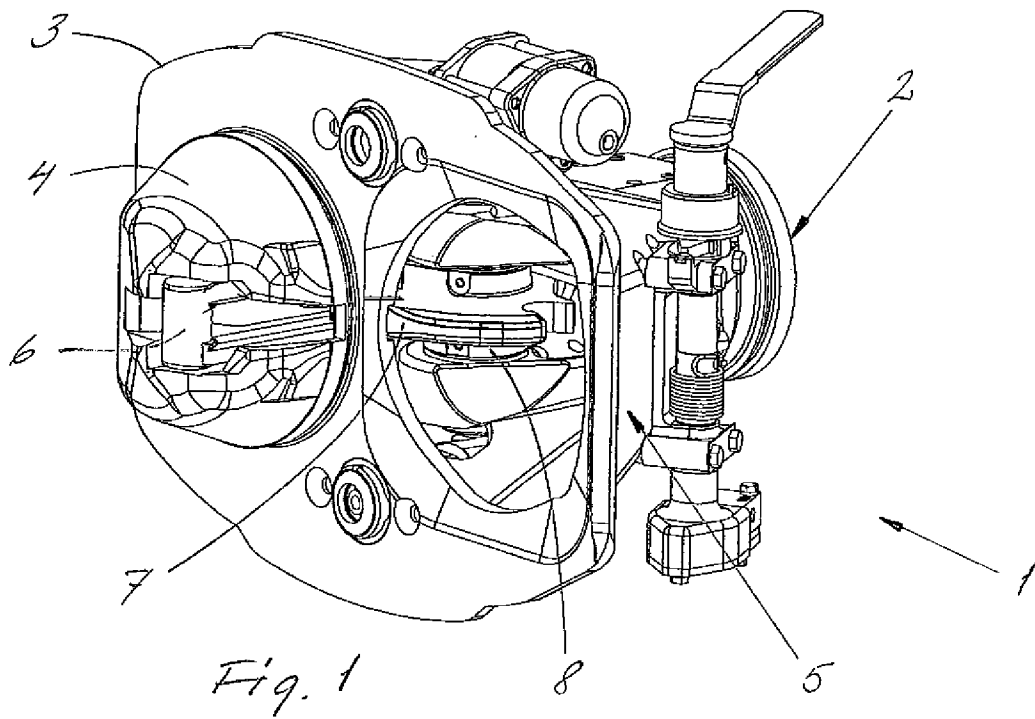
Based on the above description of the solution, it is within the reach of the person skilled in the art to modify the embodiment example while retaining the technical effect of the invention and without deviating from the general idea of the invention, and therefore the invention is not limited to the described detailed embodiment but should be considered to embrace all such modifications thereof that are comprised in the attached claims.

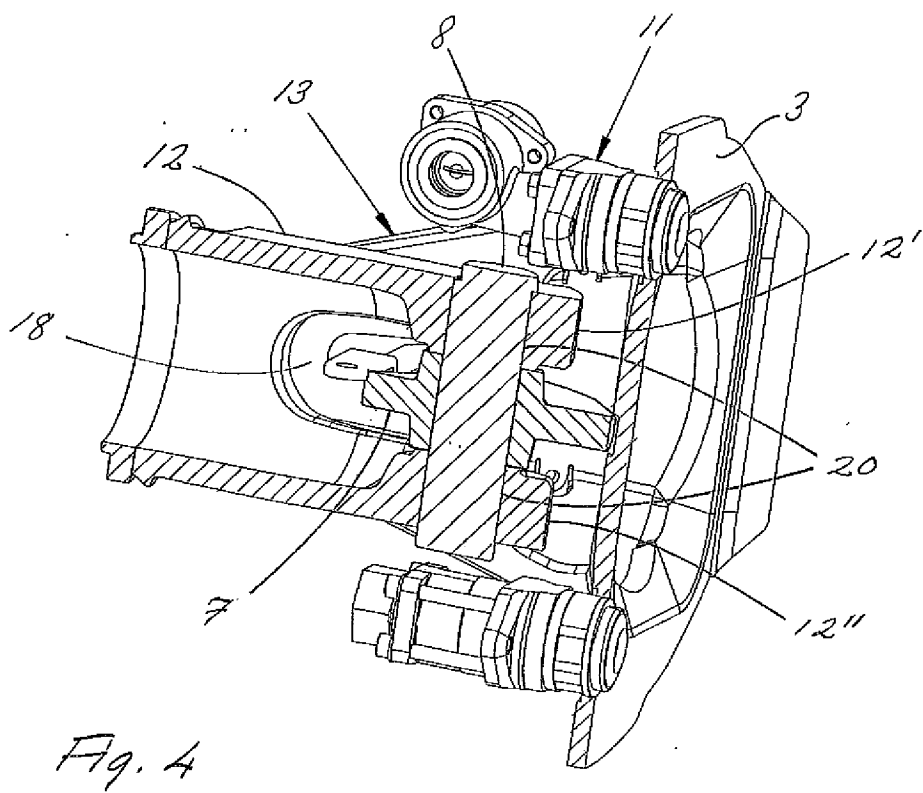
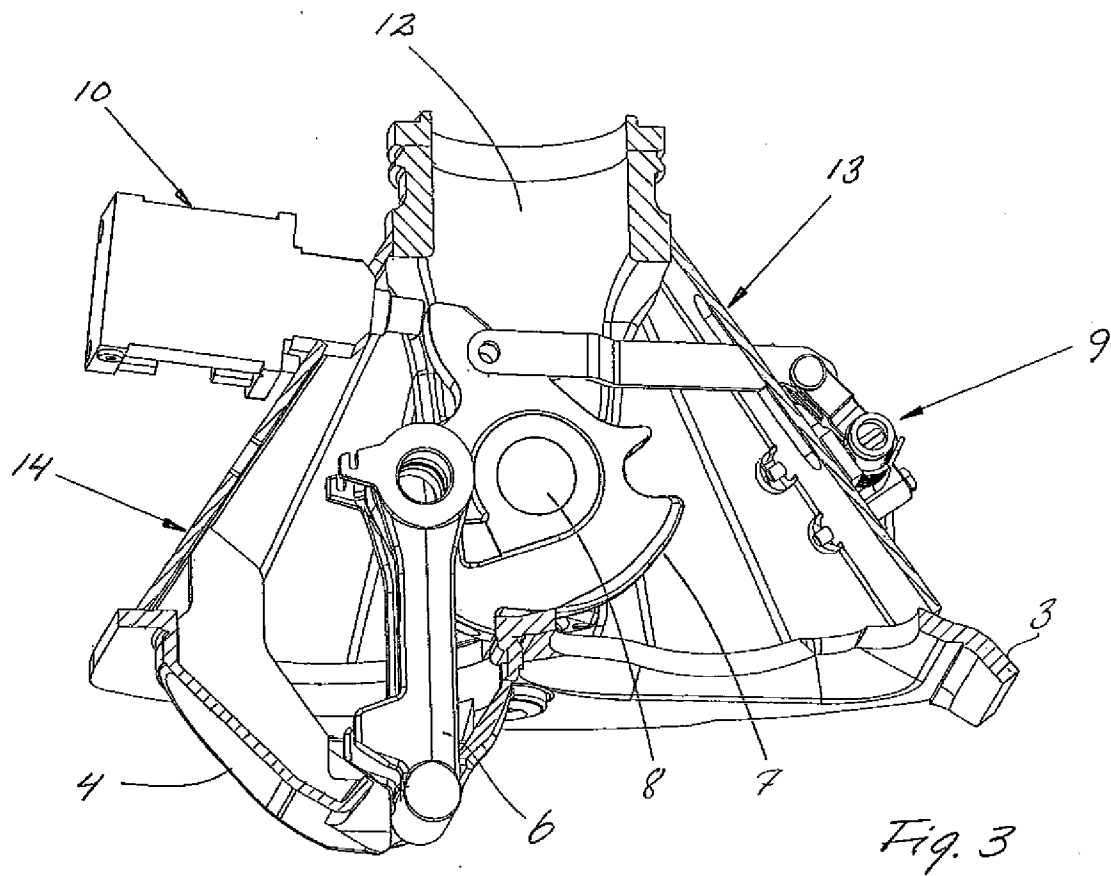
CLAIMS

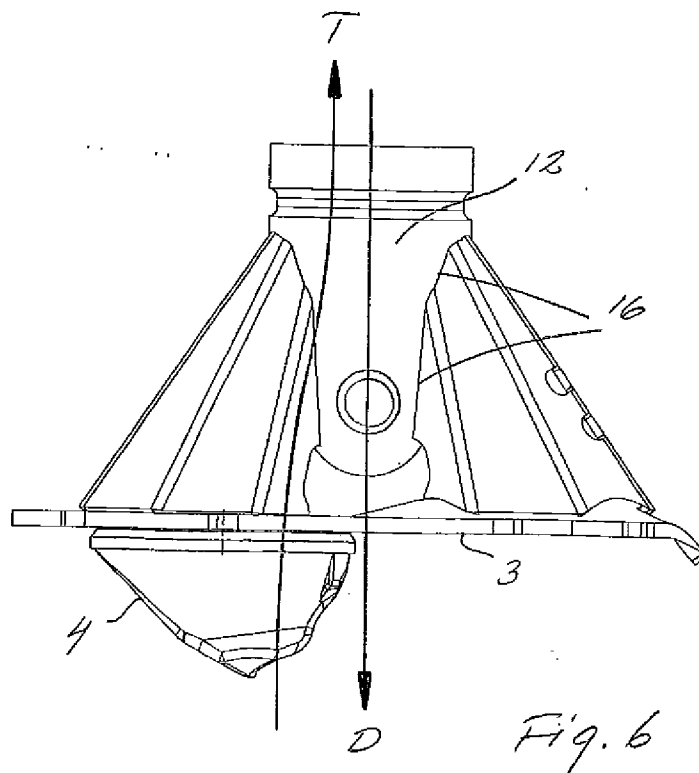
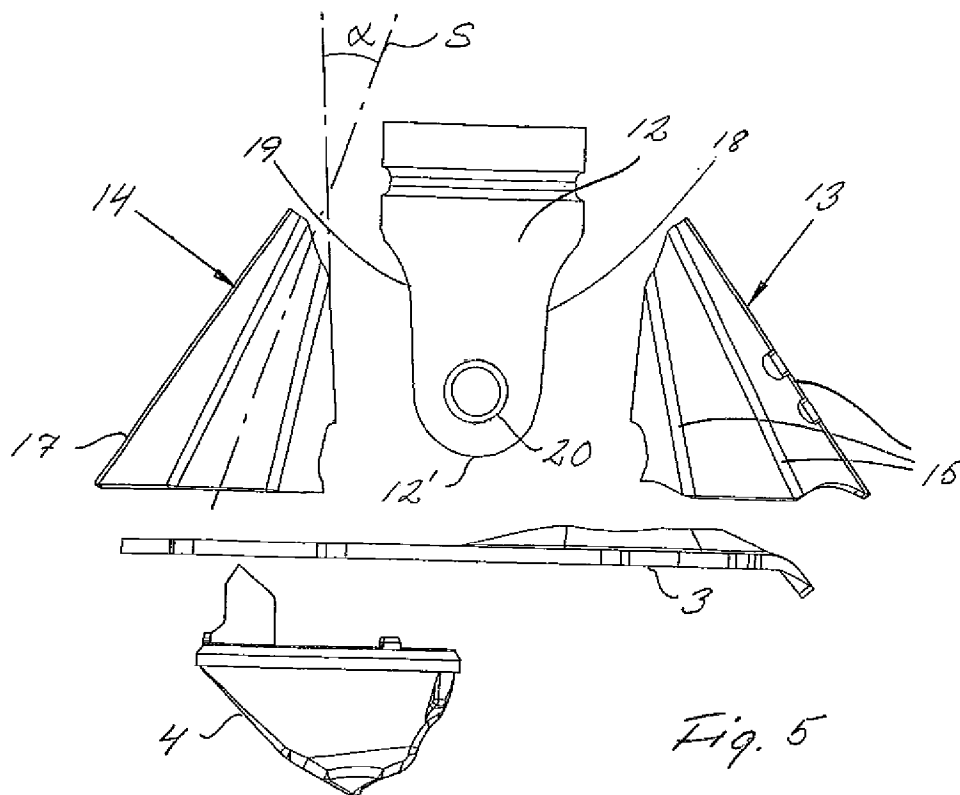
1. Coupler head (1) in automatic couplers for rail vehicles, which comprises a coupler house (13, 14) formed to contain components (6, 7, 8) included in a mechanical coupling and, in a front end, to support a front plate (3), characterized in that the coupler house consists of two separate elongate shell-shaped house parts (13, 14), which in mutually opposite and open long sides are individually joined to the outside of a beam (12) that runs centrally in the coupler head and in a rear end is adapted to be coupled to a drawbar and in a front end adapted for bearing a main shaft (8) included in the mechanical coupling, the parts of the coupler house being joined to the outside of the beam by means of welding seams (16) that mainly run in the longitudinal direction of the beam, whereby tractive forces (D) are transferred from the coupling to the drawbar via the centrally running beam without loading said house parts and welding seams, while thrust forces (T) are transferred from the front plate to the beam and the drawbar via said house parts and welding seams without loading the coupling, the main shaft thereof and the bearing of the main shaft in the beam.
2. Coupler head according to claim 1, wherein the respective house part (13, 14) by a plurality of longitudinally running bendings (15) forms a polygonal shell the bendings of which extend divergingly from the beam (12), whereby thrust forces are propagated at an acute angle inward toward the beam.
3. Coupler head according to claim 2, wherein the respective house part (13, 14) embraces a vertically standing side (17) formed between an upper side angled in two or more different planes and an under side angled in two or more different planes.
4. Coupler head according to any one of claims 1–3, wherein the coupler house, in particular on the vertical sides (17) of the coupler house, and preferably outside the coupler house, is adapted for the mounting of control members (9, 10) for the mechanical coupling, while the beam, on its upper and/or under side, is adapted for the mounting of connection members (11) for the supply of the vehicle, such as connection members for air, oil, electricity.

5. Coupler head according to any one of the preceding claims, wherein the parts of the coupler house are compression-moulded.

5 6. Coupler head according to any one of the preceding claims, wherein the beam (12) is formed of a pipe, which through recesses (18, 19) in its wall connects the spaces in the two coupler house parts (13, 14), and which in its front end being fork-shaped by the recesses is adapted for bearing the main shaft (8) of the coupling.







INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2012/050604

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B21D, B61G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 20100322706 A1 (KOLSHORN KAY UWE ET AL), 23 December 2010 (2010-12-23); whole document --	1-6
A	US 20070187350 A1 (KONTETZKI ARTHUR), 16 August 2007 (2007-08-16); whole document --	1-6
A	EP 1894808 A2 (SCHWAB VERKEHRSTECHNIK AG), 5 March 2008 (2008-03-05); whole document --	1-6
A	GB 867609 A (DOWTY HYDRAULIC UNITS LTD), 10 May 1961 (1961-05-10); whole document --	1-6



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Date of the actual completion of the international search

10-08-2012

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Name and mailing address of the ISA/SE

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2012/050604

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 9418999 U1 (SCHARFENBERGKUPPLUNG GMBH), 2 February 1995 (1995-02-02); whole document -- -----	1-6

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International Patent Classification (IPC)

B61G 3/16 (2006.01)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SE2012/050604

US	20100322706 A1	23/12/2010	AR	077109 A1	03/08/2011
			AT	537049 T	15/12/2011
			AU	2010202124 A1	13/01/2011
			BR	PI1002282 A2	07/02/2012
			CA	2702342 A1	17/12/2010
			CN	101927772 A	29/12/2010
			DK	2263927 T3	19/03/2012
			ES	2375819 T3	06/03/2012
			JP	2011001056 A	06/01/2011
			KR	20100135654 A	27/12/2010
			MX	2010006639 A	08/11/2011
			RU	2010120521 A	27/11/2011
			TW	201100281 A	01/01/2011
US	20070187350 A1	16/08/2007	AT	413999 T	15/11/2008
			AT	400486 T	15/07/2008
			AU	2005281908 A1	16/03/2006
			CA	2540970 A1	16/03/2006
			CN	1842458 A	04/10/2006
			CN	100488820 C	20/05/2009
			DE	502005005972 D1	24/12/2008
			DE	502004007562 D1	21/08/2008
			DK	1805073 T3	23/03/2009
			DK	1632414 T3	17/11/2008
			ES	2313402 T3	01/03/2009
			ES	2308079 T3	01/12/2008
			KR	20070052231 A	21/05/2007
			KR	100951643 B1	07/04/2010
			MX	PA06002580 A	04/09/2006
			NO	20060031 A	08/03/2006
			US	7604136 B2	20/10/2009
			WO	2006027196 A1	16/03/2006
EP	1894808 A2	05/03/2008	AT	452808 T	15/01/2010
			CH	703319 B1	30/12/2011
			DE	502007002387 D1	04/02/2010
GB	867609 A	10/05/1961	NONE		
DE	9418999 U1	02/02/1995	AU	8163894 A	10/08/1995
			AU	678868 B2	12/06/1997
			DE	4402530 A1	03/08/1995
			EP	0665150 B1	09/09/1998
			ES	2122122 T3	16/12/1998
			US	5509548 A	23/04/1996