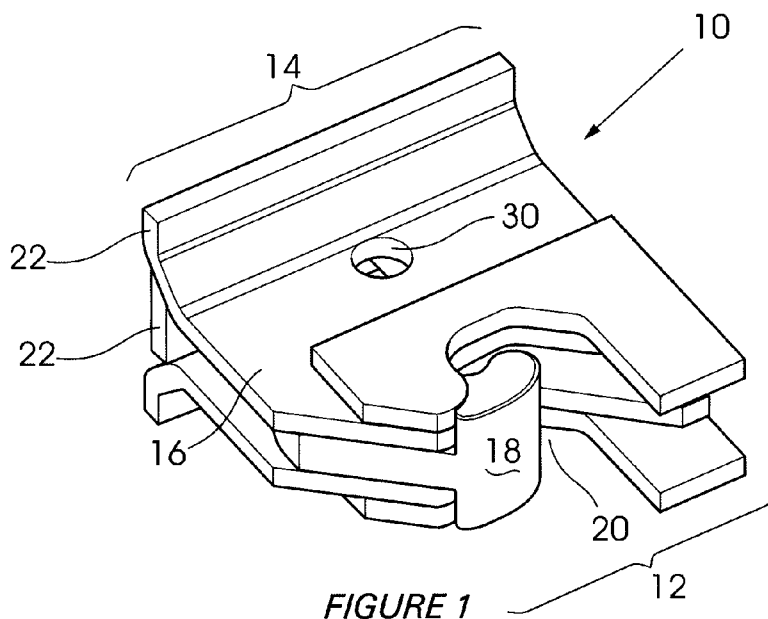




- (51) **International Patent Classification:**
B61G 5/04 (2006.01) *B61G 7/00* (2006.01)
- (21) **International Application Number:**
PCT/ZA2011/000058
- (22) **International Filing Date:**
19 August 2011 (19.08.2011)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
2010/06016 24 August 2010 (24.08.2010) ZA
2010/06467 9 September 2010 (09.09.2010) ZA
- (71) **Applicant (for all designated States except US):** **VICTOR HAVENGA TRUST** [ZA/AD]; 24 Gaisford Street, Potch Industrial, Potchefstroom 2531, North West Province (ZA).
- (72) **Inventors; and**
- (75) **Inventors/Applicants (for US only):** **COOMBES, Arthur** [ZA/ZA]; 165 Vinko Street, Sinoville, Pretoria, Gauteng (ZA). **HAVENGA, Victor, Lionel** [ZA/ZA]; Farm "Wag-'n-Bietjie", Potchefstroom 2531, North West Province (ZA). **BREEDT, Norman, Roy**; 12 Aarbei
- Laan, Miederpark, Potchefstroom 2531, North West Province (ZA).
- (74) **Agent:** **SIBANDA & ZANTWIJK**; PO Box 1615, Houghton 2041, Johannesburg (ZA).
- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,

[Continued on next page]

(54) **Title:** COUPLING ADAPTOR



(57) **Abstract:** This invention relates to a coupling adaptor. More specifically, the invention relates to a coupling adaptor for coupling railway vehicles having different types of coupling systems. The coupling adaptor includes a first coupling formation being correspondingly engageable with a first type of coupler, a second coupling formation being correspondingly engageable with a second type of coupler, and a buffer for impacting similar buffer formations on the railway vehicles during coupling. This enables, through the coupling adaptor, a first railway vehicle fitted with the first type of coupler to couple to a second railway vehicle fitted with the second type of coupler.



SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, — *of inventorship (Rule 4.17(iv))*
GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

- *with international search report (Art. 21(3))*

COUPLING ADAPTOR

BACKGROUND OF THE INVENTION

THIS invention relates to a coupling adaptor. More specifically, the invention relates to a coupling adaptor for coupling railway vehicles having different types of coupling systems.

Many different types of coupling systems for coupling railway vehicles are known. For underground railway applications, two types of coupling systems are particularly popular. The first is a knuckle coupler having a knuckle member movable between open and closed positions within a knuckle head to respectively release or and lock corresponding knuckle coupler thereto.

The second type of coupler is in the form of a buffer head defining a mouth and a pin transversely displaceable within the mouth. The pin is co-operative with an aperture defined in a male connector element received in the mouth so as to lock the connector element within the buffer coupler. In this way, buffer type couplers may be coupled to one another by locking to opposite ends of a common connector element.

Unfortunately, the different types of coupling systems are not compatible with one another. As such, the ability to transition from one type of coupler to another is virtually impossible without having a serious effective on productivity. This is particularly prevalent in the mine industry.

Accordingly, it is an object of the present invention to provide a coupling adaptor for enabling the coupling of railway vehicles fitted with different types of coupling systems.

SUMMARY OF THE INVENTION

According to the invention there is provided a coupler adaptor including:

a first coupling formation being correspondingly engageable with a first type of coupler;

a second coupling formation being correspondingly engageable with a second type of coupler; and

a buffer for impacting similar buffer formations on the railway vehicles during coupling;

such that a first railway vehicle fitted with the first type of coupler is capable of being coupled, through the coupling adaptor, to a second railway vehicle fitted with the second type of coupler.

Typically, the first and second coupling formations are located on an adaptor body. Preferably, the first and second coupling formations are located on opposing ends of the adaptor body.

The buffer may be an integral part of the second coupling formation. The buffer preferably defines a mouth for receiving a male connector element, wherein the male connector element is either permanently connected to the second coupling formation or releasably connectable thereto. In a preferred embodiment, the male connector element is releasably connectable to the second coupling formation by a pin extending transversely across the mouth and passing through a first aperture defined in the adaptor body and a second aperture defined in the male connector element.

Preferably, the mouth comprises guide formations for guiding the male connector element such that the first aperture defined in the adaptor body and the second aperture defined in the male connector element are alignable to receive the pin. More preferably, the guide formations are first tapered side faces for guiding the male connector element in a first substantially horizontal plane and second tapered upper

and lower faces for guiding the male connector element in a second substantially vertical plane.

The first tapered side faces may form the leading ends of a pair of guide members, the guide members further comprising trailing ends that are substantially parallel to one another and spaced apart from each other by a dimension slightly larger than the width of the male connector element. Typically, the coupling adaptor further includes a limiting formation for limiting the movement of the male connector element with respect to the mouth in which it is receivable, such that the limiting formation and the trailing ends of the guide members enable alignment of the first and second apertures defined in the adaptor body and the male connector element respectively. Preferably, the limiting formation is a limiting member positioned transversely with a line on which the male connector element is receivable in the mouth and between the first aperture defined in the adaptor body and the first coupling formation.

Generally, the coupling adaptor further includes one or more restraining formations for, in use, restraining the first type and/or second type of couplers in a vertical plane with respect to the coupling adaptor as a result of abutment of upper and/or lower surfaces of the first type and/or second type of couplers with the restraining formations.

Although the first type of coupler may be any coupler, it is typically a knuckle coupler. The first coupling formation may comprise a knuckle and a correspondingly shaped and sized knuckle cut-out defined in the adaptor body, wherein the knuckle and knuckle cut-out are co-operative to receive and engage with a knuckle and knuckle head of a knuckle coupler to which the coupling adaptor is connectable.

Although the second type of coupler may be any coupler, it is typically a buffer coupler of the type being capable of coupling via male connector elements.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:

- Figure 1** shows a first perspective view of a coupler adaptor according to the present invention;
- Figure 2** shows a second exploded perspective view of a coupler adaptor according to the present invention;
- Figure 3** shows a side view of the coupler adaptor mounted to a railway vehicle;
- Figure 4** shows an enlarged side view of the coupler adaptor mounted to the railway vehicle; and
- Figure 5** shows a top view of the coupler adaptor mounted between a pair of railway vehicles each being fitted with different types of couplers.

DETAILED DESCRIPTION OF THE DRAWINGS

A coupling adaptor according to a preferred embodiment of the invention is designated generally with the reference numeral 10 in figure 1 and figure 2. The coupling adaptor comprises a first coupling formation 12 and a second coupling formation 14 at opposing ends of a coupling body 16.

The first coupling formation 12 is correspondingly engageable with a knuckle coupler (not shown), and comprises a knuckle 18 and a knuckle-shaped cut-out 20 defined in the adaptor body 16. The knuckle 18 and knuckle-shaped cut-out 20 are co-operative to receive and engage with a knuckle (not shown) and knuckle head (not shown) of a knuckle coupler to which the coupling adaptor 10 is connectable. Although the first coupling formation 12 has been described and illustrated with reference to a knuckle type coupler, it will be appreciated that the first coupling formation 12 is capable of taking the required form of any other coupling system.

The coupling adaptor 10 further comprises a buffer 22 for impacting similar buffer formations on railway vehicles during coupling operations. The buffer 22 is an integral part of the second coupling formations 14 and defines a mouth 24 for receiving a male

connector element 26. In a first embodiment, the male connector element 26 is permanently connected to the second coupling formation 14. According to a second embodiment, the male connector element 26 is releasably connectable to the second coupling formation 14 by a pin 28 extending transversely across the mouth 24 and passing through a first aperture 30 defined in the adaptor body 16 and a second aperture 32 defined in each of the ends of the male connector element 26.

The mouth 24 further comprises guide formations 34,36, in the form of tapered upper, lower and opposing side faces, for guiding the male connector element 26 into the mouth 24 such that the first and second apertures 30,32 of the adaptor body 16 and male connector element 26 respectively are alignable to receive the pin 28. It will be appreciated that the tapered side 36 guide the male connector element 26 into the mouth 24 in a substantially horizontal plane while the tapered upper and lower faces 34 guide the male connector element 26 into the mouth 24 in a substantially vertical plane. It will be appreciated further that the tapered side 36 guides form the leading ends of a pair of guide members (not shown), which guide members further comprise trailing ends (not shown) that are substantially parallel to one another and spaced apart from each other by a dimension slightly larger than the width of the male connector element 26. The aforementioned dimension is envisaged to be such to allow the male connector element 26 to, with relative ease, fit between the trailing ends when coupled in the coupling adaptor 10. Typically, the aforementioned dimension about 5 millimetres or more greater than the width of the male connector element 26.

The coupling adaptor 10 also includes a limiting formation (not shown) for limiting the movement of the male connector element 26 with respect to the mouth 24. As a result, the limiting formation and the trailing ends of the guide members jointly enable alignment of the first aperture 30 defined in the adaptor body 16 and the second aperture 32 defined in any one of the ends of the male connector element 26 for receiving the pin 28. It is envisaged that the limiting formation is a limiting member (not shown) positioned transversely with a line on which the male connector element 26 is receivable in the mouth 24 and between the first aperture 30 defined in the adaptor body and the first coupling formation 12.

To prevent the first type of coupler from slipping out of coupling engagement with the

coupling adaptor 10, particularly in the vertical plane and most specifically in a downward direction as a result of gravity, the coupling adaptor 10 comprises restraining formations 40 that restrain the vertical movement of a first type of coupler coupled to the coupling adaptor 10. Vertical movement of the first type of coupler is limited as a result of abutment of upper and/or lower surfaces of the first type of coupler with the restraining formations 40.

Although the second coupling formation 14 has been described and illustrated as a buffer type coupler having the ability to couple via a male connector element, it will be appreciated that the second coupling formation 14 is capable of taking the required form of any other coupling system having a buffer incorporated therein.

The coupling adaptor 10 is particularly useful during a transition phase of an operation wherein couplers of a first type are being replaced with couplers of a second type. During this transition phase, the requirement to couple railway vehicles having different types of coupling systems is very likely.

In use, and with reference now to figure 3 and figure 5, the second coupling formation 14 of coupling adaptor 10 is brought into engagement with a male connector element 26 already being connected to a first railway vehicle 100 by a mounting pin 38. With the male connector element 26 received in the mouth 24 of the coupling adaptor 10, the pin 28 is dropped through aligned first and second apertures 30,32 defined in the coupling adaptor 10 and the male connector element 26.

Referring now to figure 5, a second railway vehicle 110 fitted with a knuckle coupler 112 is now capable of being coupled to the first railway vehicle 100 via the coupling adaptor 10. It will be appreciated that although the knuckle 18 of the coupling adaptor 10 is fixed, the knuckle coupler 112 is capable of coupling thereto as a result of the ability of a knuckle 114 of the knuckle coupler 112 to move between an open and closed position. In this way, two railway vehicle 100,110 having different types of couplers may be coupled to one another. It will be appreciated further that the knuckle coupler 112 is prevented from slipping out of engagement with the coupling adaptor 10 by the restraining formations 40.

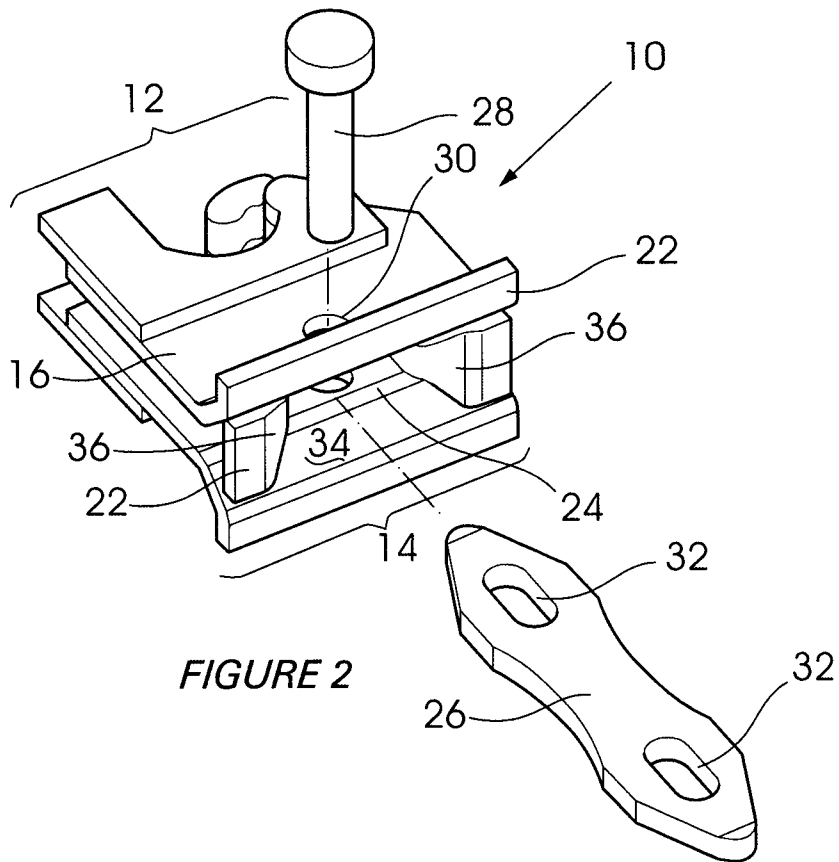
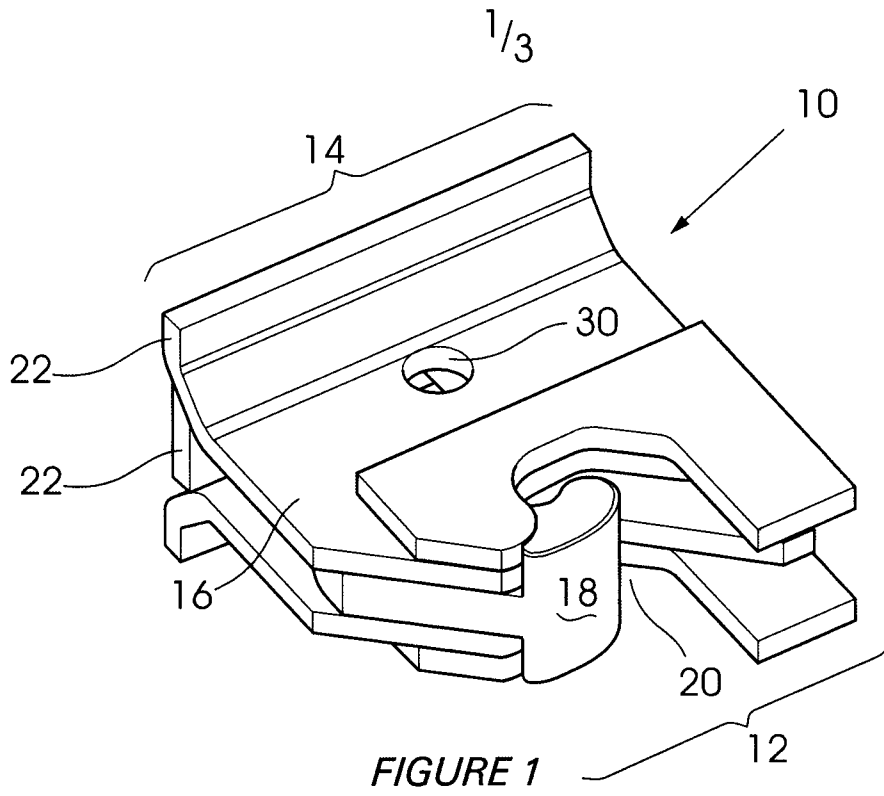
Although the invention has been described above with reference to preferred embodiments, it will be appreciated that many modifications or variations of the invention are possible without departing from the spirit or scope of the invention.

CLAIMS

1. A coupling adaptor for railway vehicles including:
 - a first coupling formation being correspondingly engageable with a first type of coupler;
 - a second coupling formation being correspondingly engageable with a second type of coupler; and
 - a buffer for impacting similar buffer formations on the railway vehicles during coupling;such that a first railway vehicle fitted with the first type of coupler is capable of being coupled, through the coupling adaptor, to a second railway vehicle fitted with the second type of coupler.
2. A coupling adaptor according to claim 1, wherein the first and second coupling formations are located on an adaptor body.
3. A coupling adaptor according to claim 2, wherein the first and second coupling formations are located on opposing ends of the adaptor body.
4. A coupling adaptor according to claim 2 or claim 3, wherein the buffer is an integral part of the second coupling formation, the buffer defining a mouth for receiving a male connector element.
5. A coupling adaptor according to claim 4, wherein the male connector element is permanently connected to the second coupling formation.
6. A coupling adaptor according to claim 5, wherein the male connector element is releasably connectable to the second coupling formation.

7. A coupling adaptor according to claim 6, wherein the male connector element is releasably connectable to the second coupling formation by a pin extending transversely across the mouth and passing through a first aperture defined in the adaptor body and a second aperture defined in the male connector element.
8. A coupling adaptor according to claim 7, wherein the mouth comprises guide formations for guiding the male connector element such that the first aperture defined in the adaptor body and the second aperture defined in the male connector element are alignable to receive the pin.
9. A coupling adaptor according to claim 8, wherein the guide formations are first tapered side faces for guiding the male connector element in a first substantially horizontal plane and second tapered upper and lower faces for guiding the male connector element in a second substantially vertical plane.
10. A coupling adaptor according to claim 9, wherein the first tapered side faces form the leading ends of a pair of guide members, the guide members further comprising trailing ends that are substantially parallel to one another and spaced apart from each other by a dimension slightly larger than the width of the male connector element.
11. A coupling adaptor according to claim 10, wherein the coupling adaptor further includes a limiting formation for limiting the movement of the male connector element with respect to the mouth in which it is receivable, such that the limiting formation and the trailing ends of the guide members enable alignment of the first and second apertures defined in the adaptor body and the male connector element respectively.
12. A coupling adaptor according to claim 11, wherein the limiting formation is a limiting member positioned transversely with a line on which the male connector element is receivable in the mouth and between the first aperture defined in the adaptor body and the first coupling formation.

13. A coupling adaptor according to any one of the preceding claims wherein the coupling adaptor further includes one or more restraining formations for, in use, restraining the first type and/or second type of couplers in a vertical plane with respect to the coupling adaptor as a result of abutment of upper and/or lower surfaces of the first type and/or second type of couplers with the restraining formations.
14. A coupling adaptor according to any one of claims 2 to 13, wherein the first type of coupler is a knuckle coupler, the first coupling formation comprising a knuckle and a correspondingly shaped and sized knuckle cut-out defined in the adaptor body, the knuckle and knuckle cut-out being co-operative to receive and engage with a knuckle and knuckle head of a knuckle coupler to which the coupling adaptor is connectable.
15. A coupling adaptor according to any one of the preceding claims wherein the second type of coupler is a buffer coupler of the type being capable of coupling via male connector elements.
16. A coupling adaptor substantially as herein described and illustrated.



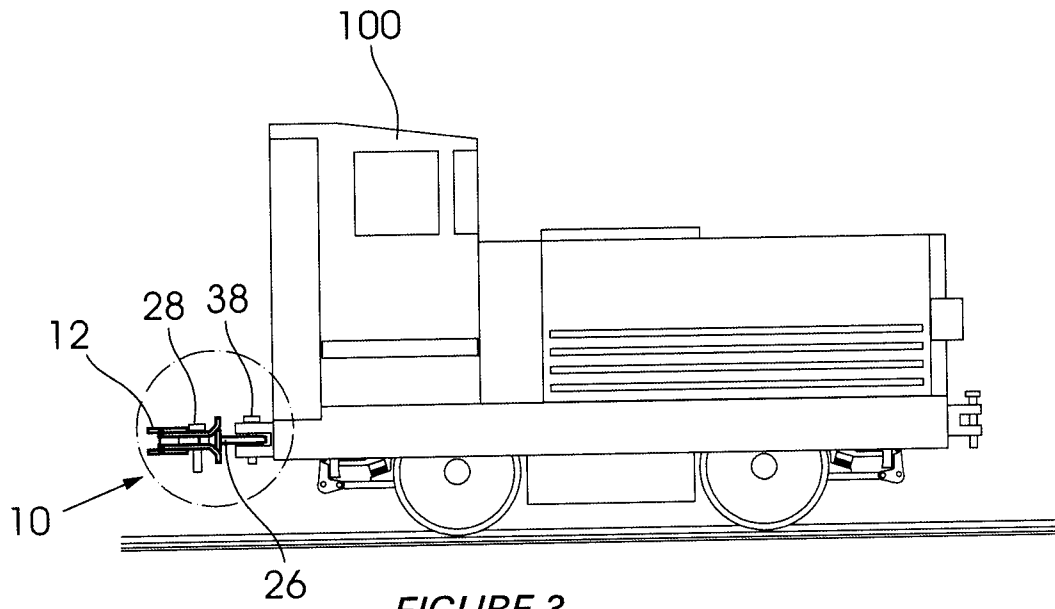


FIGURE 3

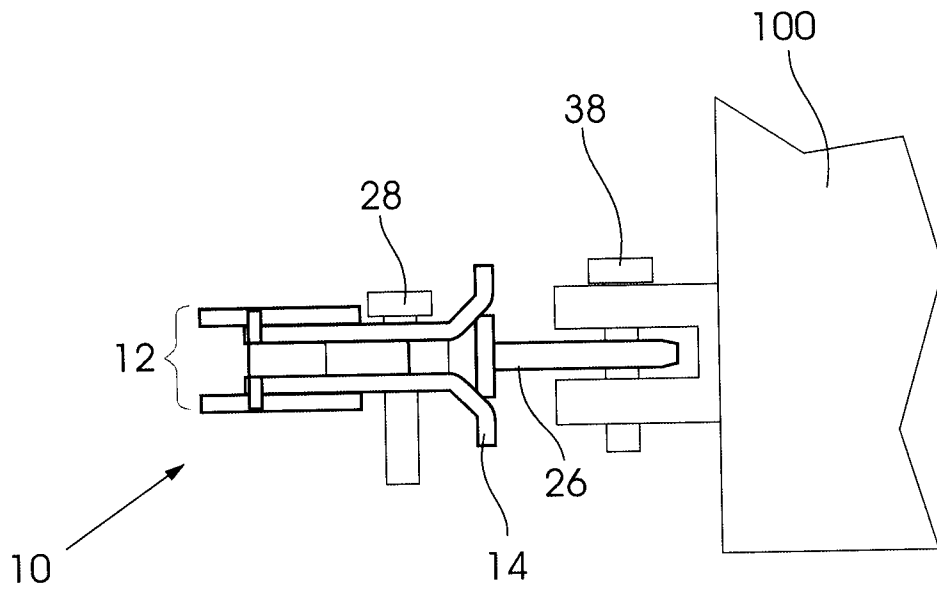


FIGURE 4

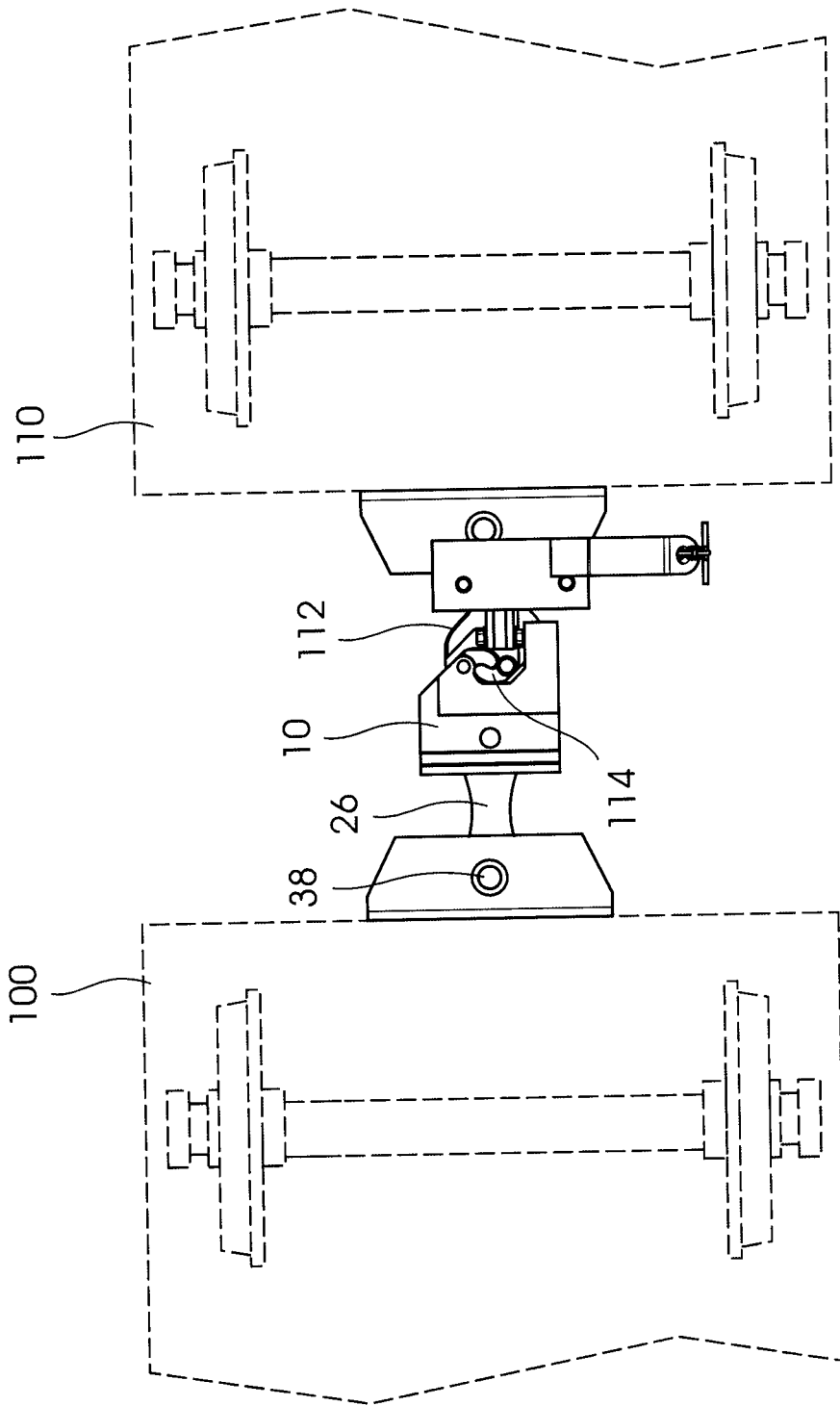


FIGURE 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ZA2011/000058

A. CLASSIFICATION OF SUBJECT MATTER												
Int. Cl.												
<i>B61G 5/04</i> (2006.01) <i>B61G 7/00</i> (2006.01)												
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)												
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched												
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPODOC, WPI. B61G5/04/EC/IC OR B61G7/ALL/EC/IC. Key words: knuckle, buffer, janney, buckeye, type_r, type_f, aar, adaptor, adaptor, transition, converter, interface, joiner, interchange, link, pin, rod, axle, hole, orifice.												
C. DOCUMENTS CONSIDERED TO BE RELEVANT												
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.										
X	GB 257074 A (PERDIJK) 26 August 1926 See figures 1-3, page 1 line 45-55, page 1 line 56-73 and page 1 line 79-82.	1-5										
X	US 3071256 A (METZGER) 01 January 1963 See figures 1-5 and column 1 line 24-29 and column 2 line 12-62.	1-4,14,15										
X	DD 246953 A1 (ZENTR. FI D. VERKEHRSWESENS INST. F. EISENBAHNWESEN SEKTION WE,DD) 24 June 1987 See figures 1-4	1-4,15										
A	GB 230409 A (TRIMMING) 15 December 1925	1-15										
<input type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex												
<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	"P" document published prior to the international filing date but later than the priority date claimed	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention											
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone											
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art											
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family											
"P" document published prior to the international filing date but later than the priority date claimed												
Date of the actual completion of the international search 26 October 2011		Date of mailing of the international search report 07/11/2011										
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. +61 2 6283 7999		Authorized officer MARK BLANCHARD AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No : +61 2 6283 2402										

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.: **16**
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
The claim does not comply with Rule 6.2(a) because it relies on references to the description and/or drawings.

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/ZA2011/000058

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Member
GB 257074	FR 601921
DD 246953	NONE
GB 230409	FR 598109 US 1568933
US 3071256	FR 1306663 GB 984447 NL 268665

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX