(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
8 April 2004 (08.04.2004)

PCT

(10) International Publication Number
WO 2004/029368 A1

(51) International Patent Classification[7]: E02F 3/36, 3/96, 9/00, E21C 27/30, B60D 7/00

(21) International Application Number: PCT/AU2003/000485

(22) International Filing Date: 23 April 2003 (23.04.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2002951687 25 September 2002 (25.09.2002) AU

(71) Applicant *(for all designated States except US)*: **DTB DIESEL PTY LTD** [AU/AU]; A.B.N. 22 097 159 834, 4-10 Karoonda Close, Rathmines, NSW 2283 (AU).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **CARROLL, William, Victor** [AU/AU]; 3 Faymax Street, Pelican NSW 2281 (AU). **VENTICINQUE, Greg** [AU/AU]; 3 Sophia Jane Drive, Seaham, NSW 2342 (AU).

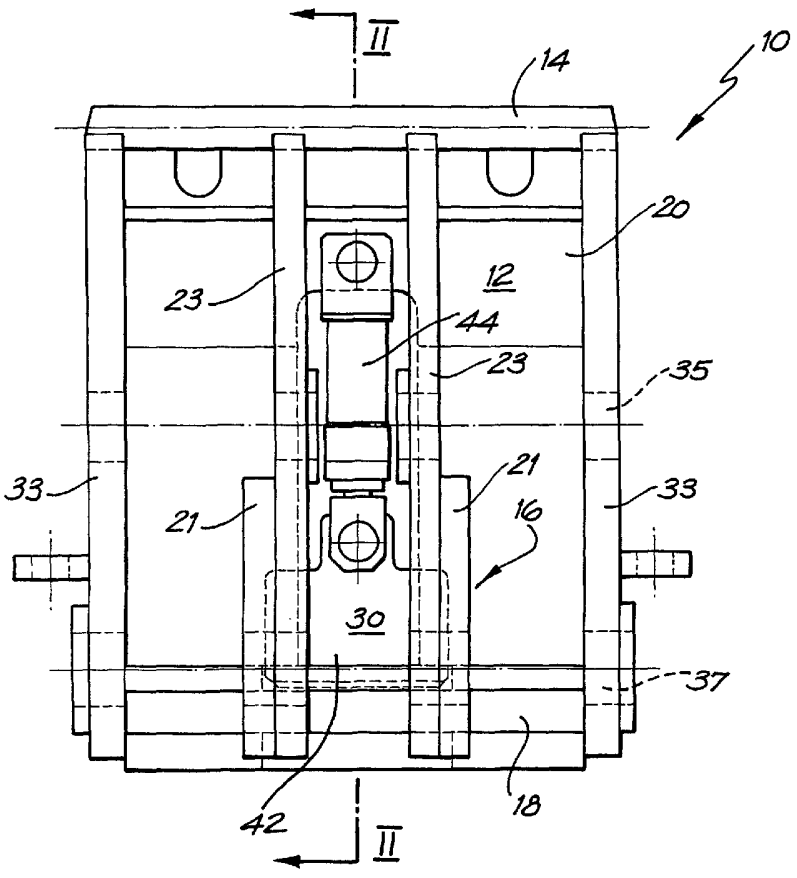
(74) Agent: **F.B. RICE & CO.**; 605 Darling Street, Balmain, NSW 2041 (AU).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,

[Continued on next page]

(54) Title: RAPID ATTACH SYSTEM



(57) Abstract: A receiver assembly (10) of a rapid attach system for attaching an attachment to a vehicle, the receiver assembly (10) co-operating with a mounting assembly of the rapid attach system, the receiver assembly (10) including a carrier (12) for mounting to one of the vehicle and the attachment to be attached to the vehicle, an engaging means (14) arranged on the carrier (12) for engaging with a mating formation of the mounting assembly, and a locking system (16) carried by the carrier (12), the locking system (16) defining a receiving means (18) for receiving a retaining element of the mounting assembly and the locking system (16) further including a locking member (30) for locking the retaining element in position relative to the receiving means (18).

WO 2004/029368 A1

SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

"Rapid attach system"

Field of the Invention

This invention relates to a rapid attach system. More particularly, the invention relates to components of a rapid attach system used to mount an attachment to a machine.

Background of the Invention

Heavy machinery, in particular LHD (Load Haul Dump) machines are used throughout the mining industry to move material around mines. The machines are only capable of carrying loads which an attaching system can withhold. Furthermore, the machines must remain stable whilst a full load is being carried by an attachment of the system. Clearly, a machine with a greater load carrying capability increases the efficiency and results in decreased costs associated with mining operations.

Furthermore, since these machines are highly specialised, to increase their efficiency and effectiveness within the mines, it is important that they are multi-functional. Thus the ability to interchange a variety of attachments with ease is important, in addition to a need for new methods that will increase load carrying capabilities of the attaching systems in order to increase the efficiency and productivity within the mines.

Summary of the Invention

According to a first aspect of the invention, there is provided a receiver assembly of a rapid attach system for attaching an attachment to a vehicle, the receiver assembly co-operating with a mounting assembly of the rapid attach system, the receiver assembly comprising:

a carrier for mounting to one of the vehicle and the attachment to be attached to the vehicle;

an engaging means arranged on the carrier for engaging with a mating formation of the mounting assembly; and

a locking system carried by the carrier, the locking system defining a receiving means for receiving a retaining element of the mounting assembly and the locking system further including a locking member for locking the retaining element in position relative to the receiving means.

The carrier may comprise a body portion including the engaging means and a mounting means for mounting the carrier to the vehicle or the attachment, as the case may be.

Furthermore, the engaging means may comprise a bar positioned proximate an operatively upper edge of the carrier, which in use engages with the mating formation of the mounting assembly.

The receiving means may comprise a pair of spaced, parallel members which define a channel. The members may have a pair of aligned openings.

The locking member may comprise a displaceable element which is displaceable relative to the carrier and may be received though the aligned openings in the receiving means for releasably locking the retaining element in position relative to the carrier. The displaceable element may be a tongue.

The locking system may include a displacing means for displacing the tongue. The displacing means may be fluid operable. For example, the fluid operable displacing means may be an hydraulic displacing means.

According to a second aspect of the invention, there is provided a mounting assembly of a rapid attach system for attaching an attachment to a vehicle, the mounting assembly co-operating with a receiver assembly of the rapid attach system, the mounting assembly comprising:

a support member to be secured to one of the vehicle and the attachment to be attached to the vehicle;

a mating formation arranged on the support member, the mating formation mating with an engaging means of the receiver assembly; and

a retaining element mounted in a spaced relationship relative to the mating formation on the support member to be received in, and locked in position relative to, a receiving means of the receiver assembly.

The support member may comprise a body portion and may carry the mating formation and the retaining element.

The mating formation may comprise a hook-like formation, which in use, engages with the engaging means, or bar, of the receiver assembly.

The retaining element may comprise a foot portion projecting from the support member. The foot portion may have an opening defined through it which, when received in the receiving means of the locking system lies in register with the openings of the receiving means. In use, the tongue passes through the aligned openings to lock the mounting assembly in position relative to the receiver assembly.

The invention extends also to a rapid attach system comprising a receiver assembly, as described above, in combination with a mounting assembly, also as described above.

Brief Description of the Drawings

The invention is now described by way of example with reference to the accompanying drawings in which:

Figure 1 shows a front view of a receiver assembly, in accordance with a first aspect of the invention, for a rapid attach system;

Figure 2 shows a cross-sectional, side view of the receiver assembly;

Figure 3 shows a front view of a mounting assembly, in accordance with a second aspect of the invention, for a rapid attach system; and

Figure 4 shows a cross sectional, side view of the mounting assembly.

Detailed Description of the Invention

Referring initially to Figures 1 and 2, a receiver assembly, in accordance with a first aspect of the invention, of a rapid attach system is illustrated and is generally designated by reference numeral 10.

The receiver assembly 10 of the rapid attach system co-operates with a mounting assembly 34, as shown in Figures 3 and 4 of the drawings, of the rapid attach system for attaching an attachment (not shown) to a vehicle (also not shown). Normally the receiver assembly 10 is carried on the vehicle with the mounting assembly 34 being arranged on the attachment. While the invention is described with reference to this configuration of the rapid attach system, it will be appreciated that the opposite configuration of the system could also apply in appropriate circumstances.

The receiver assembly 10 comprises a carrier 12 for mounting to the vehicle.

An engaging means in the form of a bar 14 is arranged on the carrier 12 for engaging with a mating formation 36 of the mounting assembly 34. The bar 14 extends along an operatively top edge of the carrier 12.

The carrier 12 comprises a body portion 20 including the engaging means 14 and a mounting arrangement 22 for mounting the carrier 12 to the vehicle.

Additionally, a locking system 16 is carried by the carrier 12 and defines a receiving means 18 for receiving a retaining element 38 of the mounting assembly 34. The locking system 16 includes a locking member 30 for locking the retaining element 38 in position relative to the receiving means 18.

The receiving means 18 comprises a pair of spaced, parallel members 26 and 28 which define a channel 29. The members 26 and 28 define openings 32 and 34 respectively, the openings 32, 34 being aligned with each other.

The locking member 30 comprises a displaceable element in the form of a tongue 42 which is displaceable relative to the carrier 12 and is received though the

aligned openings 32 and 34 in the locking system 16. The tongue 42 releasably locks the retaining element 38 in position relative to the carrier 12, as will be described in greater detail below.

The locking system 16 includes a displacing means 44 for displacing the tongue 42. The displacing means 44 is an hydraulic piston/cylinder combination with the tongue 42 being carried on a free end of the piston of the combination.

In the retracted position of the combination 44 as illustrated in Figure 1, an end of the tongue 42 lies in the opening 32 so that the channel 29 remains unimpeded by the tongue 42 and the retaining element 38 can be inserted into, or removed from, the receiving means 18. In the extended position of the combination 44, the piston of the combination 44 lowers the tongue 42 which passes through the aligned openings 32, 34 and an opening 52 of the retaining element 38 to lock the retaining element 38 in the receiving means 18.

The mounting arrangement 22 has a pair of opposed side plates 23 extending at right angles to the body portion 20 and arranged on either side of the combination 44. Each side plate 23 defines an upper, reinforced bore 25 and a lower, reinforced bore 27. Adjacent to and outwardly of each side plate 23 is a reinforcing plate 21. Each reinforcing plate 21 defines a bore 31 which is aligned with the lower bore 27 of its associated side plate 23.

The mounting arrangement 22 further comprises a pair of opposed end plates 33 extending at right angles to the body portion 20 and arranged at opposite edges of the body portion 20. The end plates 33 define upper, aligned reinforced bores 35 and lower, aligned reinforced bores 37. The receiver assembly 10 is mounted on the vehicle by fasteners (not shown) received through the bores 25, 27, 31, 35 and 37.

Referring to Figures 3 and 4, the mounting assembly 34, in accordance with a second aspect of the invention, is described in greater detail.

The mounting assembly 34 comprises a support member 46 to be secured to the attachment to be attached to the vehicle. The support member 46 comprises a body portion 48 and carries the mating formation 36 and the retaining element 38.

The mating formation 36 is arranged at a top edge of the support member 46 to co-operate with the bar 14 of the receiver assembly 10 to mount the mounting assembly 34 on the receiver assembly 10. Moreover, the retaining element 38 is mounted on the support member 46 in a spaced relationship relative to the mating formation 36 to be received in, and locked in position relative to, the receiving means 18 of the receiver assembly 10 as described above.

The mating formation 36 comprises a hook-like formation 50 which, in use, hooks on to the bar 14 of the receiver assembly 10. The mounting assembly 34 comprises a pair of opposed end plates 54 arranged at right angles to the body portion 48. The end plates 54 abut the end plates 33 of the receiver assembly 10 to inhibit lateral displacement of the receiver assembly 10 and the mounting assembly 34 with respect to each other.

The retaining element 38 comprises a foot portion 40 projecting from the support member 46. The foot portion 40 defines the opening 52 which, when received in the receiving means 18 of the locking system 16, lies in register with the openings 32 and 34 of the receiving means 18. In use, the tongue 42 passes through the aligned openings 32, 34 and 52 to lock the mounting assembly 34 in position relative to the receiver assembly 10.

In use, the mounting assembly 34 is attached to an attachment and the receiver assembly 10 is arranged on a vehicle, more particularly, an LHD vehicle. To attach the mounting assembly 34 to the receiver assembly 10, the hook-like formation 50 of the mounting assembly 34 is hooked on to the bar 14 of the receiver assembly 10.

The foot portion 40 of the retaining element 38 of the mounting assembly 34 is received in the channel 29 of the receiving means 18 of the receiver assembly 10 while the tongue 42 is retracted so the tongue 42 does not impede the channel 29 of the receiving means 18. Once the retaining element 38 is located in the receiving means 18, the locking system 16 secures the mounting assembly 34. This is achieved by the combination 44 lowering the tongue 42 through the aligned openings 32, 34 and 52 locking the mounting assembly 34 in place.

The mounting assembly 34 is detached from the receiver assembly 10 by retracting the tongue 42 of the locking system 16 to enable the foot portion 40 of the mounting assembly 10 to be removed from the channel 29 of the receiving means 18.

It is an advantage of the system that a rapid attach system, comprising the receiver assembly 10 and the mounting assembly 34, is provided which facilitates rapid changing of attachments on vehicles, in particular, LHD's. In addition, the arrangement of the components of the receiver assembly 10 and mounting assembly 34 reduce the likelihood of the mounting assembly 34 being detached from the receiver assembly 10 thereby improving the safety of the rapid attach system. Also, different attachments can rapidly be mounted on, and removed from, the LHD with the system acting as a universal rapid attach system.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific

embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

CLAIMS:

1. A receiver assembly of a rapid attach system for attaching an attachment to a vehicle, the receiver assembly co-operating with a mounting assembly of the rapid attach system, the receiver assembly including:

a carrier for mounting to one of the vehicle and the attachment to be attached to the vehicle;

an engaging means arranged on the carrier for engaging with a mating formation of the mounting assembly; and

a locking system carried by the carrier, the locking system defining a receiving means for receiving a retaining element of the mounting assembly and the locking system further including a locking member for locking the retaining element in position relative to the receiving means.

2. The receiver assembly according to claim 1, in which the carrier comprises a body portion including the engaging means and a mounting means for mounting the carrier to one of the vehicle and the attachment.

3. The receiver assembly according to claim 1 or claim 2, in which the engaging means comprises a bar positioned proximate an operatively upper edge of the carrier, the bar, in use, engaging the mating formation of the mounting assembly.

4. The receiver assembly according to any one of the preceding claims, in which the receiving means comprises a pair of spaced, parallel members which define a channel.

5. The receiver assembly according to claim 4, in which the members have a pair of aligned openings.

6. The receiver assembly according to claim 5, in which the locking member comprises a displaceable element which is displaceable relative to the carrier and is received though the aligned openings in the receiving means for releasably locking the retaining element in position relative to the carrier.

7. The receiver assembly according to any one of the preceding claims, in which the locking system includes a displacing means for displacing the locking member.

8. The receiver assembly according to claim 7, in which the displacing means is fluid operable.

9. A mounting assembly of a rapid attach system for attaching an attachment to a vehicle, the mounting assembly co-operating with a receiver assembly of the rapid attach system, the mounting assembly including:

a support member to be secured to one of the vehicle and the attachment to be attached to the vehicle;

a mating formation arranged on the support member, the mating formation mating with an engaging means of the receiver assembly; and

a retaining element mounted in a spaced relationship relative to the mating formation on the support member to be received in, and locked in position relative to, a receiving means of the receiver assembly.

10. The mounting assembly according to claim 9, in which the support member comprises a body portion and carries the mating formation and the retaining element.

11. The mounting assembly according to claim 9 or claim 10, in which the mating formation comprises a hook-like formation which, in use, engages with the engaging means of the receiver assembly.

12. The mounting assembly according to any one of claims 9 to 11, in which the retaining element comprises a foot portion projecting from the support member.

13. The mounting assembly according to claim 16, in which the foot portion has an opening defined through it which, when received in the receiving means of the locking system, lies in register with aligned openings of a receiving means of the receiver assembly.

14. The mounting assembly according to claim 13, in which the aligned openings are used to lock the support member in position relative to the receiver assembly.

15. The mounting assembly according to claim 18, in which the support member is locked in position relative to the receiver assembly, in use, by a locking member passing through the aligned openings.

16. In combination

a receiver assembly as claimed in any one of claims 1 to 8; and

a mounting assembly as claimed in any one of claims 9 to 15.

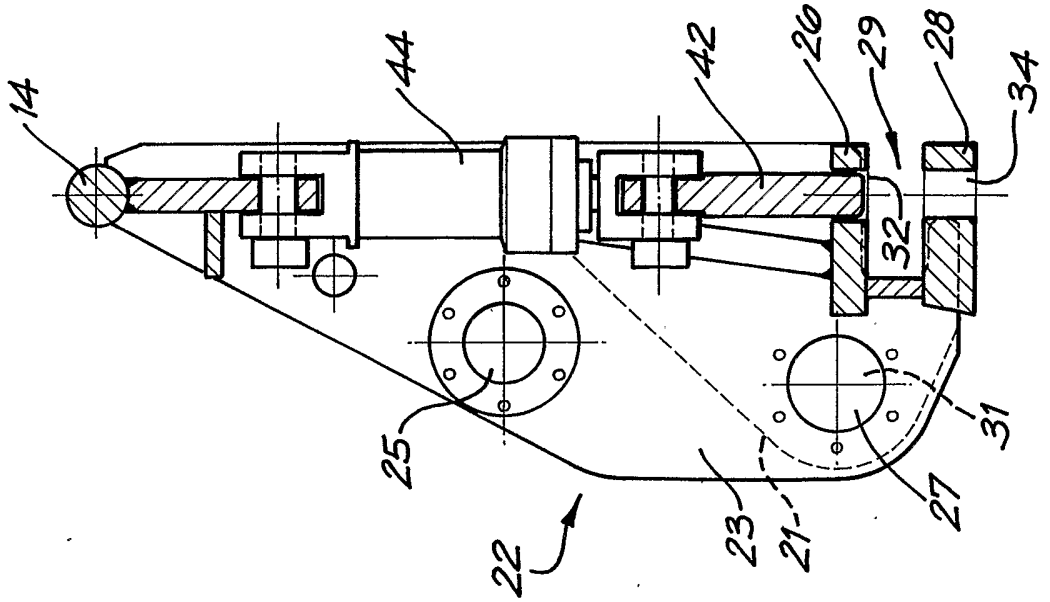

14
44
42
26
29
28
34
32
25
31
27
23
21
22

FIG. 2

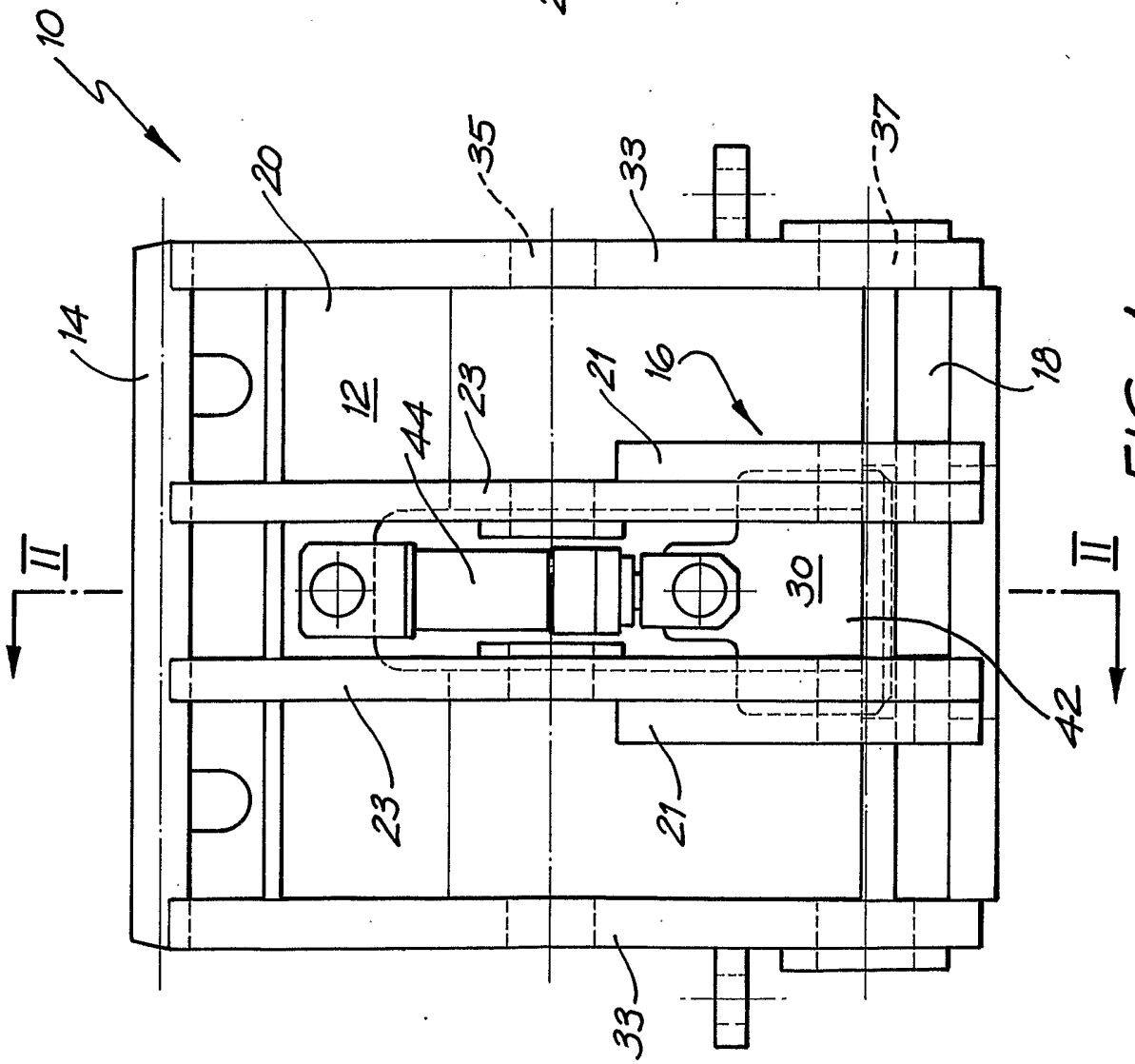

10
20
35
33
37
14
12
23
44
21
16
18
II
II
30
42
23
21
33

FIG. 1

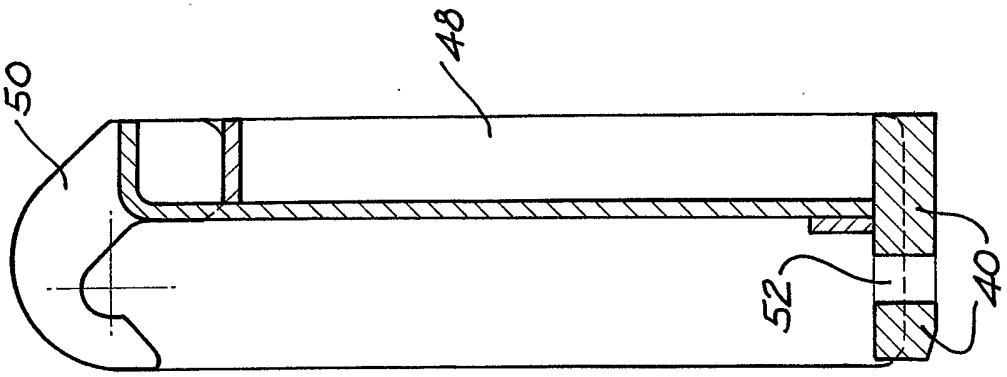


FIG. 4

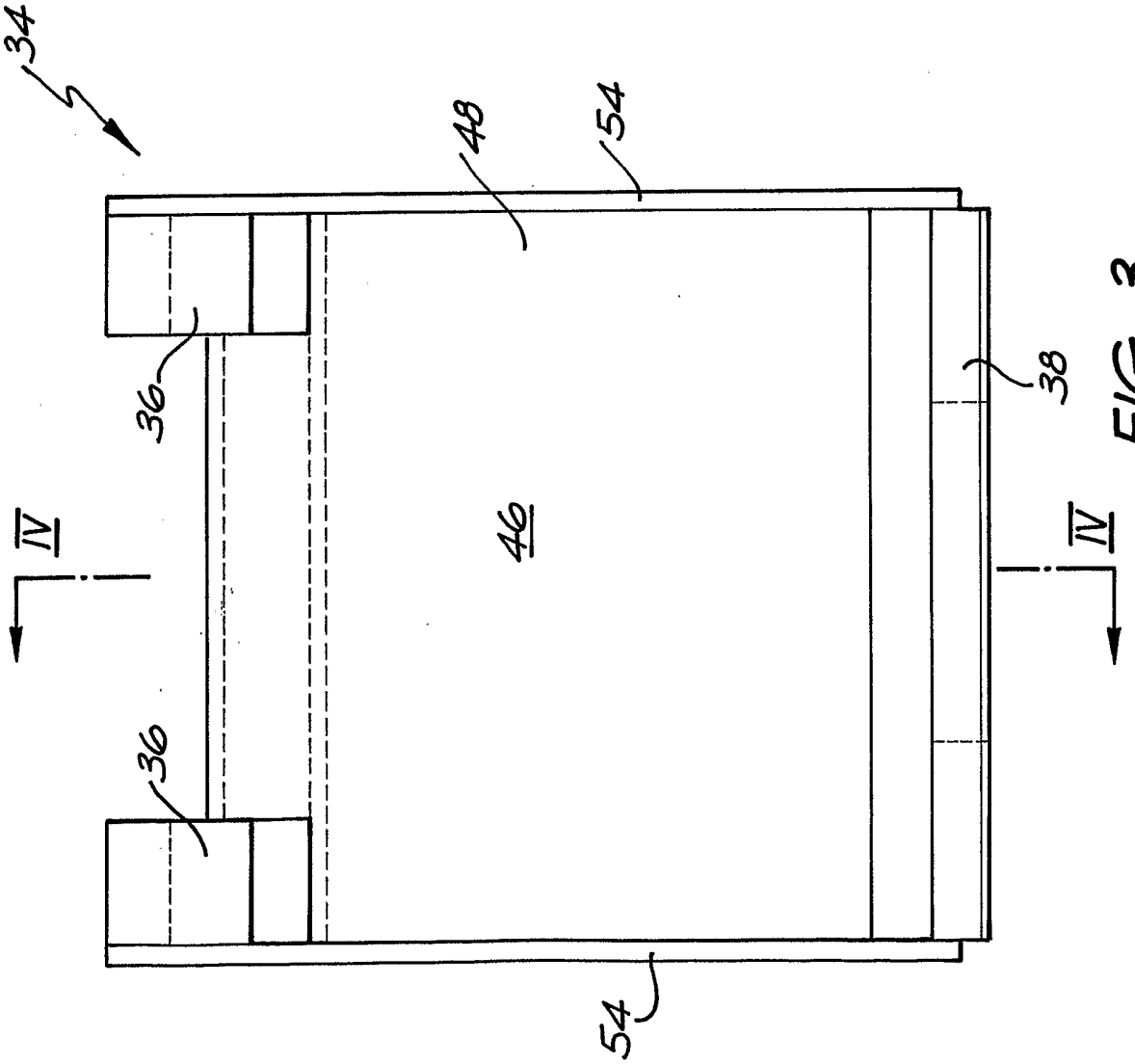


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU03/00485

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: E02F 3/36, 3/96, 9/00; E21C 27/30; B60D 7/00

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)
DWPI: IPC /IC F16M, B60P, B60D, A01B, E02F, E21C and key words VEHICLE, MUCKING, EXCAVATE etc., ATTACH, CONNECT etc., ATTACHMENT, IMPLEMENT etc., LOCK, RETAIN, SECURE etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 616084 A (TREVI BENNE S.R.L.) 21 September 1994 Whole document	1-16
X	WO 85/04917 A (KARLSSON) 7 November 1985 Whole document	1-16
X	WO 83/03629 A (TOGA SYSTEM AB) 27 October 1983 Whole document	1-16
X	GB 2256631 A (DUNBAR) 16 December 1992 Whole document	1-7, 9-16

☐ Further documents are listed in the continuation of Box C ☒ See patent family annex

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"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)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"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
"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
"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
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 May 2003	15 MAY 2003
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. (02) 6285 3929	Authorized officer **L. DESECAR** Telephone No : (02) 6283 2381

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU03/00485

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					
EP	616084	IT	1263342				
WO	83/03629	AU	14730/83	EP	118556	IT	1163238
		NO	834510	SE	8202259		
GB	2256631	NONE					
WO	85/04917	NONE					

END OF ANNEX