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(54) Title: ROD LOADER ATTACHMENT

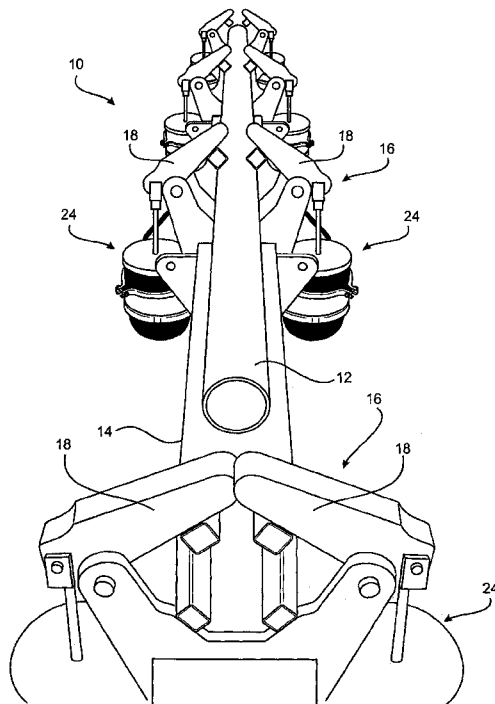


FIG. 1

(57) Abstract: A rod loader attachment (10) for loading an elongate rod or pipe (12). The attachment (10) comprises an elongate support member (14) designed to be positioned substantially parallel to a rod or pipe (12). A plurality of rod gripping units (16) is mounted at spaced intervals on the support member (14). Each rod gripping unit (16) comprises a pair of holding arms (18) for gripping the rod or pipe (12) between the holding arms (18). Each holding arm (18) in the rod gripping units (16) is independently activated by a spring actuator (24).

## **“ROD LOADER ATTACHMENT”**

### **Field of the Invention**

The present invention relates to a rod loader attachment for lifting rods or pipes from a horizontal position to a vertical position and relates particularly, although not exclusively, to such an attachment for lifting drill rods or drill pipes with a truck-mounted slewing crane used in the mining industry.

### **Background to the Invention**

When drilling a bore hole in the ground it is necessary to have a ready supply of drill rods or pipes on hand so that additional rods or pipes can be connected to the drill string as the drill machine bores deeper into the ground. The drill pipes are typically stored in a horizontal position on the bed of a truck on which the drill machine is mounted. In order to load each drill rod or pipe onto the drill string of the drilling machine it has to be lifted from a horizontal position to a vertical position.

In the prior art, loading of drill pipes is currently performed using hook and clamshell or winch line and lifting eyes to lift the pipe in and out of the drill table and to then lower it to the ground to be later retrieved using a fork lift or similar machine. Numerous serious accidents occur each year from the current rod handling techniques.

Every prior art rod handler currently available in the market place is limited through its ability to pick up and deliver only to fixed points; this is due to the mechanism used to hold the rod in place. The rod needs to be positioned correctly to allow the device to attach itself to hold the rod in place. Most prior art rod handlers use hydraulic pressure to activate the holding or lift mechanisms; however the failure of the oil supply system will cause the drill pipe to fall with serious potential for accidents and personal injury.

The KL Rod Loader, described in Australian Patent Application No 2007236557, is the most popular prior art rod handler unit available in the

market place. It uses a travelling arm with an engagement means to pick-up a length of drill pipe and delivers it to a pair of clamps. The engagement means is flexible with the pick-up point but can only deliver to one position.

The present invention was developed with a view to providing a rod loader attachment for lifting rods or pipes with a level of safety and versatility that is  
5 not currently available in the market.

References to prior art in this specification are provided for illustrative purposes only and are not to be taken as an admission that such prior art is part of the common general knowledge in Australia or elsewhere.

## 10 **Summary of the invention**

According to one aspect of the present invention there is provided a rod loader attachment for loading an elongate rod or pipe, the attachment comprising:

an elongate support member designed to be positioned substantially parallel  
15 to a rod or pipe; and,

a rod gripping unit mounted on the support member and comprising a pair of holding arms for gripping the rod or pipe between the holding arms.

Preferably the rod gripping unit is one of a plurality of rod gripping units mounted at spaced intervals along the length of the support member.

20 Advantageously each holding arm is spring activated wherein, in use, each holding arm is independently activated by a spring and stored energy in the spring is used to hold the rod or pipe in place. Preferably each spring activated holding arm is also provided with a release mechanism for overcoming the spring pressure and releasing the rod or pipe from between  
25 the holding arms. This arrangement provides a fail-safe feature in that in the event of a major system failure the holding arms will not release the rod or pipe. In one embodiment the release mechanism is pneumatically operated.

Preferably the pair of holding arms is pivotally mounted on a mounting bracket which is attached to the support member. Preferably the mounting

bracket comprises a pair of mounting arms, each mounting arm having a respective holding arm pivotally mounted thereon.

Preferably each holding arm is of elongate configuration and has a pivot aperture provided intermediate its length, and an actuation aperture provided at one end, and wherein a pivot pin pivotally couples the holding arm via the pivot aperture to its respective mounting arm. Preferably an actuator for pivoting the holding arm between a holding position and a release position is coupled to the actuation aperture of the holding arm.

Preferably each holding arm is provided with a toothed jaw at the other end for gripping the rod or pipe there between. Preferably each mounting arm is also provided with a toothed jaw for gripping the rod or pipe there between in cooperation with the holding arms.

Preferably the spring and the release mechanism for each holding arm are integrated in a spring actuator. Typically the spring actuator is similar to a pneumatically operated spring chamber used worldwide in truck brake applications. Preferably in the normal rest position the spring in the spring actuator is fully extended and applies spring pressure to the corresponding holding arm to push it to a holding position, and when the air pressure to the release mechanism in the spring actuator is increased it overcomes the spring pressure of the spring and the holding arm is free to pivot to a release position. Preferably each spring actuator is supported on the support member by means of a support bracket.

Preferably the support member is manufactured from a length of square section steel beam.

Typically there are four rod gripping units.

Throughout the specification, unless the context requires otherwise, the word "comprise" or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but

not the exclusion of any other integer or group of integers. Likewise the word "preferably" or variations such as "preferred", will be understood to imply that a stated integer or group of integers is desirable but not essential to the working of the invention.

5

### **Brief Description of the Drawings**

10 The nature of the invention will be better understood from the following detailed description of several specific embodiments of a rod loader attachment, given by way of example only, with reference to the accompanying drawings, in which:

15 Figure 1 is an end perspective view of a first embodiment of the rod loader attachment according to the present invention;

Figure 2 is a top perspective view of a single rod gripping unit in the rod loader attachment of Figure 1;

Figure 3 is a side perspective view of a rod gripping unit in the rod loader attachment of Figure 1, shown gripping a drill rod;

20 Figure 4 is a side perspective view of a spring actuator employed in the rod gripping units of the rod loader attachment of Figure 1;

Figure 5 is a plan view drawing of a mounting bracket employed in a rod gripping unit of the rod loader attachment of Figure 1;

25 Figure 6 is a plan view drawing of a holding arm employed in a rod gripping unit of the rod loader attachment of Figure 1; and,

Figure 7 is a plan view drawing of a support bracket employed in a rod gripping unit of the rod loader attachment of Figure 1.

### Detailed Description of Preferred Embodiments

A first embodiment of a rod loader attachment 10 in accordance with the invention, for loading an elongate rod or pipe 12 into a drilling machine, is illustrated in Figures 1 to 7. The rod loader attachment 10 comprises an elongate support member 14 designed to be positioned substantially parallel to a drill rod or drill pipe 12. The support member 14 is manufactured from a length of 200mm square section steel beam, and is adapted to be fitted to a truck-mounted slewing crane, (not illustrated) similar to those used in the mining industry around the world.

The rod loader attachment 10 further comprises a rod gripping unit 16 mounted on the support member 14 and comprising a pair of holding arms 18 for gripping the rod or pipe 12 between the holding arms 18. Preferably the rod gripping unit 16 is one of a plurality of rod gripping units 16 mounted at spaced intervals along the length of the support member 14, as can be seen most clearly in Figure 1. Typically four rod gripping units 16 are mounted on the support member 14. When the support member 14 is brought into close proximity and substantially parallel to a drill rod or drill pipe 12, the rod gripping units 16 may be activated to pick-up the drill rod or drill pipe 12, as will be described in more detail below. With the drill rod 12 firmly gripped in the rod gripping units 16, the support member 14 with the drill rod 12 held thereon can be rotated from a horizontal to a vertical plane, allowing the drill rod 12 to be fitted to the drill string of a drilling machine. The rod loader attachment 10 will allow movement of the drill pipe 12 from a horizontal plane to a vertical plane with the ability to rotate 360 Degrees – the rotation is typically performed via the slewing crane base.

Advantageously each holding arm 18 in the rod gripping units 16 is spring-activated wherein, in use, each holding arm 18 is independently activated by a spring 20 (not clearly visible) and stored energy in the spring is used to hold the rod or pipe 12 in place. Preferably each spring-activated holding arm 18 is also provided with a release mechanism 22 (not clearly visible) for

overcoming the spring pressure and releasing the rod or pipe 12 from between the holding arms 18. This arrangement provides a fail-safe feature in that in the event of a major system failure the holding arms 18 will not release the rod or pipe 12. In one embodiment the release mechanism is  
5 pneumatically operated.

Each holding arm 18 is preferably independently activated and can pivot between a holding position in which it presses against a drill rod 12, (as shown in Figures 1 and 3), and a release position in which it releases the drill rod 12 from the rod gripping unit 16.

10 In this embodiment the spring 20 and release mechanism 22 for each holding arm 18 are integrated in a spring actuator 24. The spring actuators 24 are similar to the pneumatically operated spring chambers used worldwide in truck brake applications. In the normal rest position the spring 20 in the spring actuator 24 is fully extended and applies spring pressure to the  
15 corresponding holding arm 18 to push it to the holding position. When the air pressure to the release mechanism 22 in the spring actuator 24 is increased it overcomes the spring pressure of spring 20 and the holding arm is free to pivot to the release position. Preferably each spring actuator 24 is supported on the support member 14 by means of a support bracket 26, as can be seen  
20 most clearly in Figures 1 and 4.

Each rod gripping unit 16 further comprises a mounting bracket 30, as illustrated in Figure 5, on which the pair of holding arms 18 is pivotally mounted. Each mounting bracket 30 is preferably welded to the support member 12. Preferably the mounting bracket 30 comprises a pair of  
25 mounting arms 32, each mounting arm 32 having a respective holding arm 18 pivotally mounted thereon. As can be seen most clearly in Figure 6, each holding arm 18 is preferably of elongate configuration and has a pivot aperture 34 provided intermediate its length, and an actuation aperture 36 provided at one end. A pivot pin 38 pivotally couples the holding arm via the  
30 pivot aperture 34 to its respective mounting arm 32. An actuation arm 40, of

the cooperating spring actuator 24, is pivotally coupled to the actuation aperture 36 of the holding arm 18.

As can be seen most clearly in Figures 1 and 3, in use, the holding arms 18 and mounting arms 32 cooperate to grip a drill pipe or rod 12 when the holding arms are activated to the holding position. Preferably each holding arm 18 is provided with a toothed jaw 42 for gripping the rod or pipe 12 there between. Preferably each mounting arm 32 is also provided with a toothed jaw 42 for gripping the rod or pipe there between. Different toothed jaws 42 are fitted or removed depending on the pipe diameter to be lifted.

10

A preferred method of loading drill rods or pipes using the rod loader attachment 10 will now be described with reference to the accompanying drawings. With the support member 14 suitably positioned adjacent a drill pipe 12, air is released from the spring actuators 24 and spring pressure moves the holding arms 18 against the drill pipe 12. The toothed jaws 42 attached to the holding arms 18 and mounting arms 32 contact the drill pipe 12 and hold it in place. The four sets of rod gripping units 16 act simultaneously and independently of each other. Once the air pressure is released from the system the drill pipe 12 is held securely in place and can now be lifted and moved into the required position.

Once the drill pipe 12 is moved to the required position air is reapplied to the spring actuators 24, the spring pressure is overcome, and the holding arms 18 move outwards to the release position so that the pipe 12 is released.

Now that a preferred embodiment of the rod loader attachment has been described in detail, it will be apparent that the described embodiment provides a number of advantages over the prior art, including the following:

- (i) It provides a way of lifting and loading rods and pipes that is safe, versatile and secure.

(ii) The spring activated rod gripping units provide a fail-safe feature in that in the event of a major system failure the holding arms will not release the rod or pipe.

(iii) It can be easily fitted to a conventional truck-mounted slewing crane or other suitable lifting machine.

5

It will be readily apparent to persons skilled in the relevant arts that various modifications and improvements may be made to the foregoing embodiments, in addition to those already described, without departing from  
10 the basic inventive concepts of the present invention. For example, the spring actuators could be hydraulically activated. Therefore, it will be appreciated that the scope of the invention is not limited to the specific embodiments described.

### Claims

1. A rod loader attachment for loading an elongate rod or pipe, the  
5 attachment comprising:  
  
an elongate support member designed to be positioned substantially parallel  
to a rod or pipe; and,  
  
a rod gripping unit mounted on the support member and comprising a pair of  
holding arms for gripping the rod or pipe between the holding arms.
- 10 2. A rod loader attachment as defined in claim 1, wherein the rod gripping  
unit is one of a plurality of rod gripping units mounted at spaced intervals  
along the length of the support member.
3. A rod loader attachment as defined in claim 1 or claim 2, wherein each  
holding arm is spring activated wherein, in use, each holding arm is  
15 independently activated by a spring and stored energy in the spring is used  
to hold the rod or pipe in place.
4. A rod loader attachment as defined in claim 3, wherein each spring  
activated holding arm is also provided with a release mechanism for  
overcoming the spring pressure and releasing the rod or pipe from between  
20 the holding arms.
5. A rod loader attachment as defined in claim 4, wherein the release  
mechanism is pneumatically operated.
6. A rod loader attachment as defined in any one of the preceding claims,  
wherein the pair of holding arms is pivotally mounted on a mounting bracket  
25 which is attached to the support member.
7. A rod loader attachment as defined in claim 6, wherein the mounting  
bracket comprises a pair of mounting arms, each mounting arm having a  
respective holding arm pivotally mounted thereon.

8. A rod loader attachment as defined in claim 7, wherein each holding arm is of elongate configuration and has a pivot aperture provided intermediate its length, and an actuation aperture provided at one end, and wherein a pivot pin pivotally couples the holding arm via the pivot aperture to its  
5 respective mounting arm.
9. A rod loader attachment as defined in claim 8, wherein an actuator for pivoting the holding arm between a holding position and a release position is coupled to the actuation aperture of the holding arm.
10. A rod loader attachment as defined in claim 7, wherein each holding  
10 arm is provided with a toothed jaw for gripping the rod or pipe there between.
11. A rod loader attachment as defined in claim 10, wherein each mounting arm is also provided with a toothed jaw for gripping the rod or pipe there between in cooperation with the holding arms.
- 15 12. A rod loader attachment as defined in claim 4, wherein the spring and the release mechanism for each holding arm are integrated in a spring actuator.
13. A rod loader attachment as defined in claim 12, wherein the spring  
20 actuator is similar to a pneumatically operated spring chamber used worldwide in truck brake applications.
14. A rod loader attachment as defined in claim 13, wherein in the normal rest position the spring in the spring actuator is fully extended and applies spring pressure to the corresponding holding arm to push it to a holding position, and when the air pressure to the release mechanism in the spring  
25 actuator is increased it overcomes the spring pressure of the spring and the holding arm is free to pivot to a release position.
15. A rod loader attachment as defined in claim 14, wherein each spring actuator is supported on the support member by means of a support bracket.

16. A rod loader attachment as defined in any one of the preceding claims, wherein the support member is manufactured from a length of square section steel beam.
- 5 17. A rod loader attachment as defined in claim 2, wherein there are four rod gripping units.

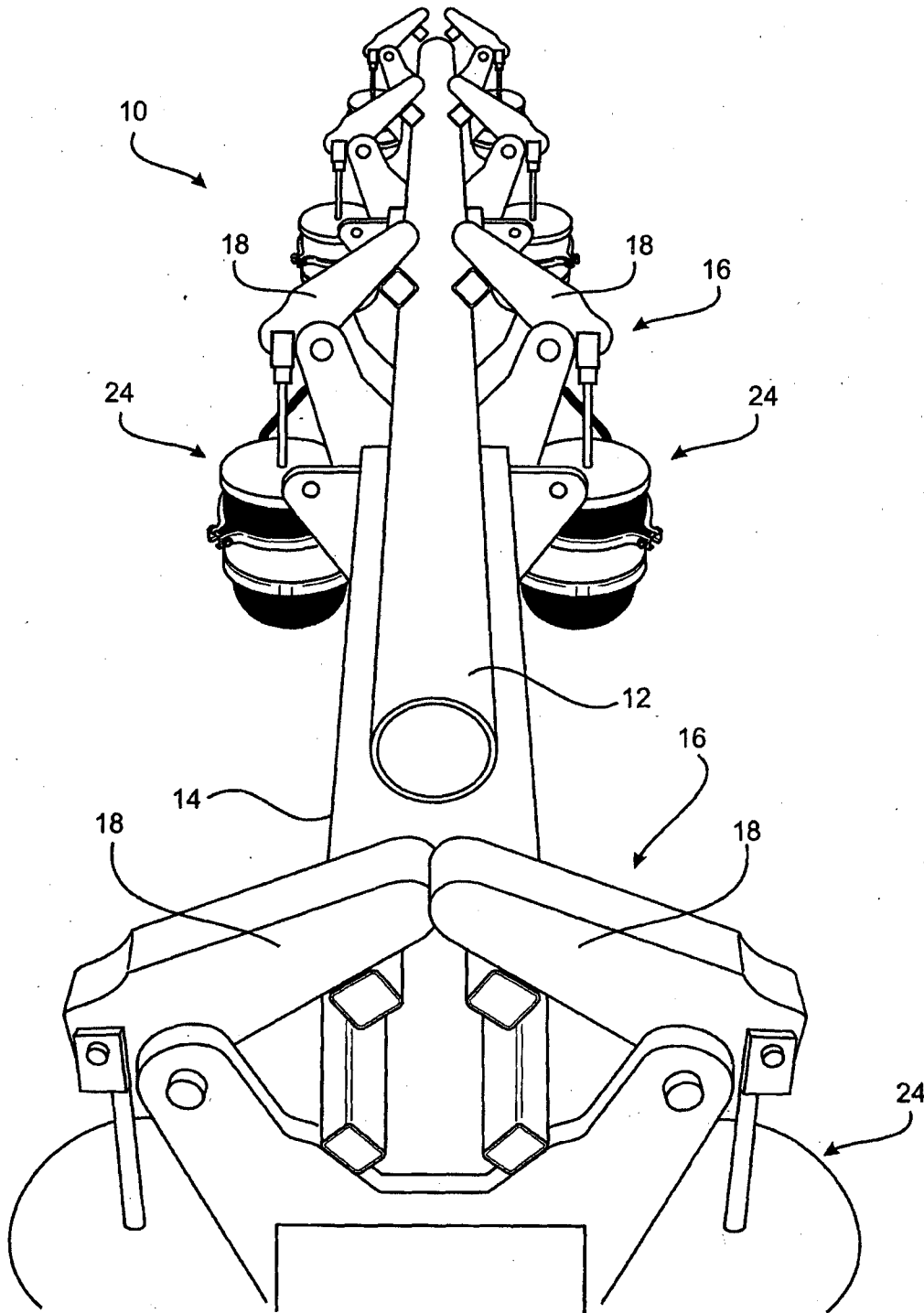


FIG. 1

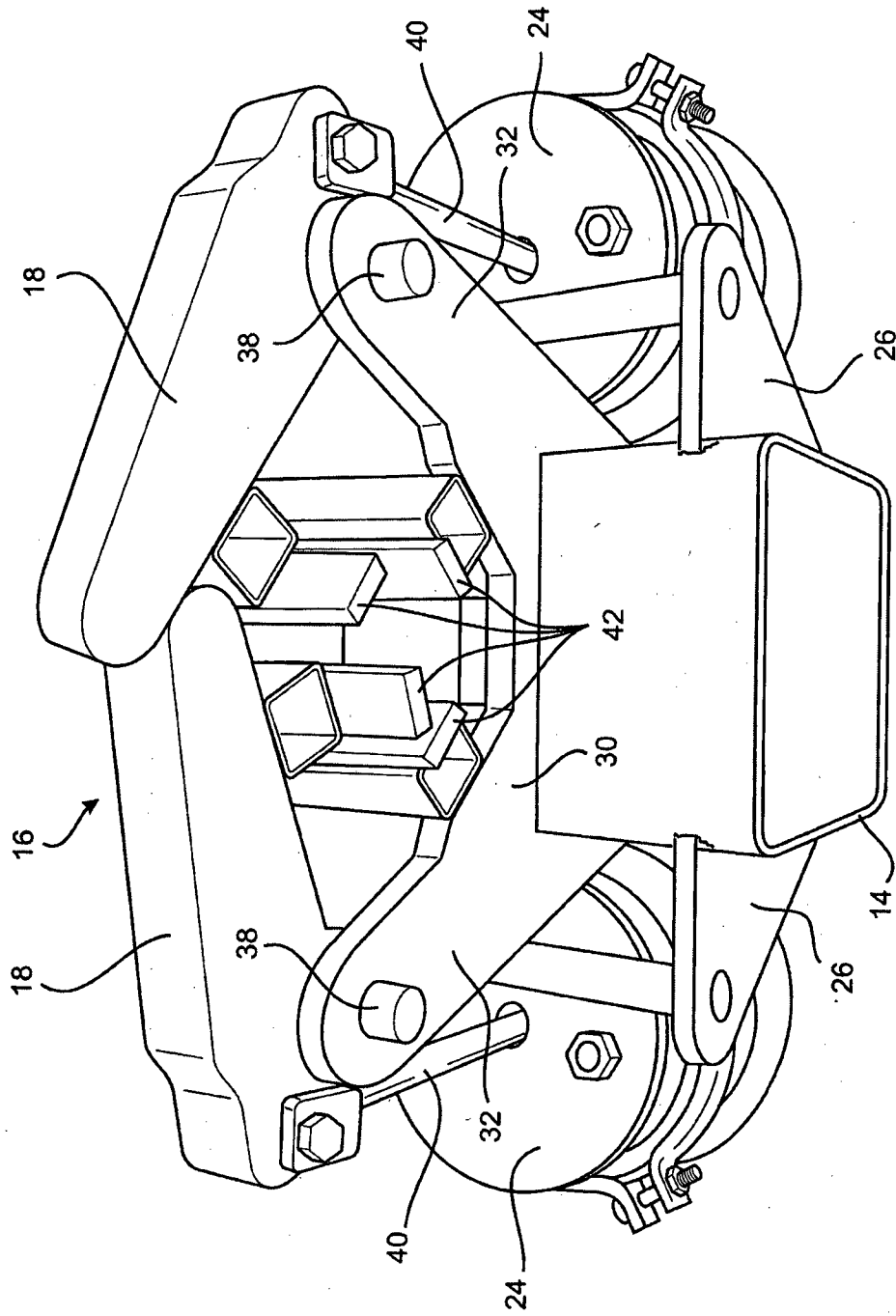


FIG. 2

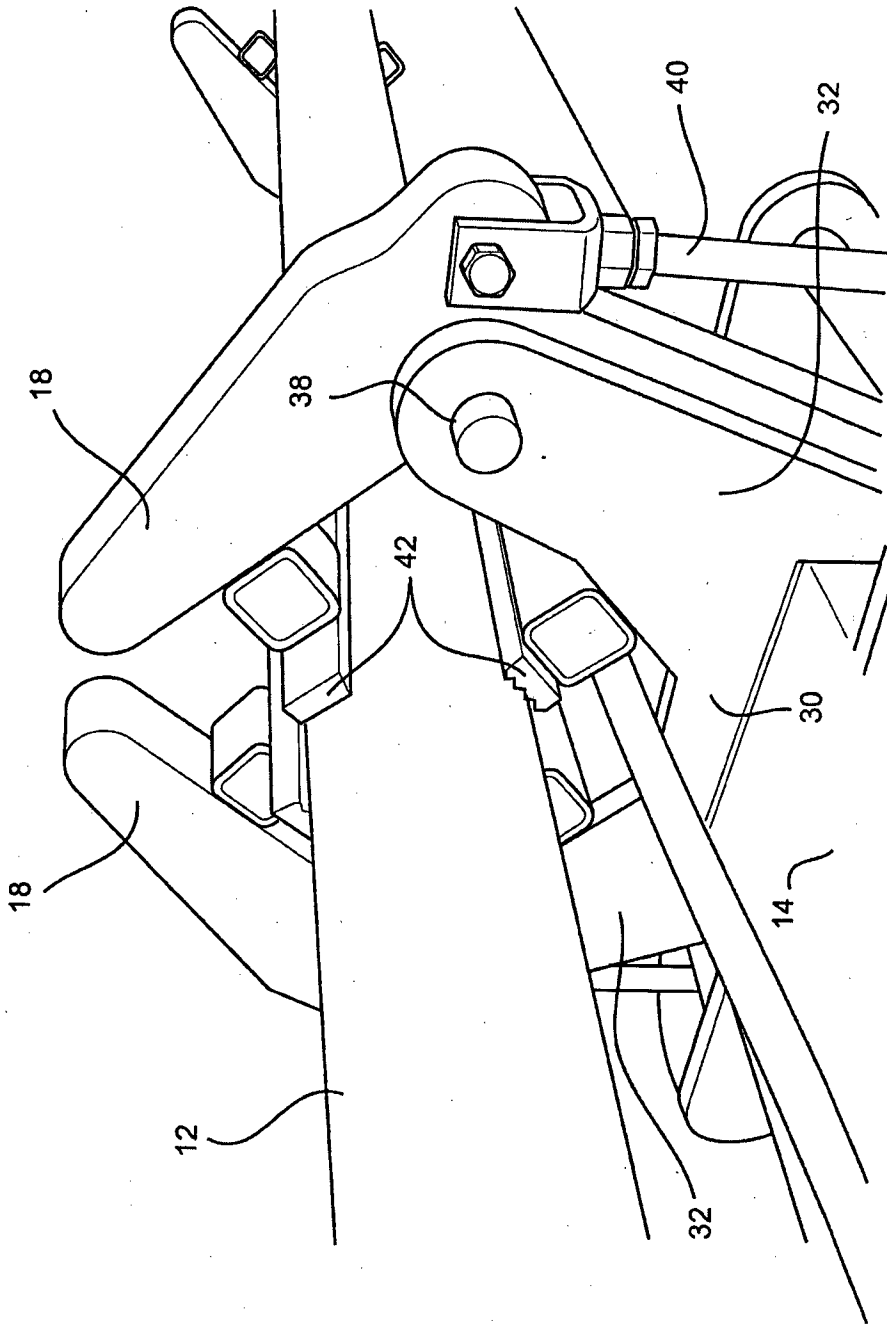


FIG. 3

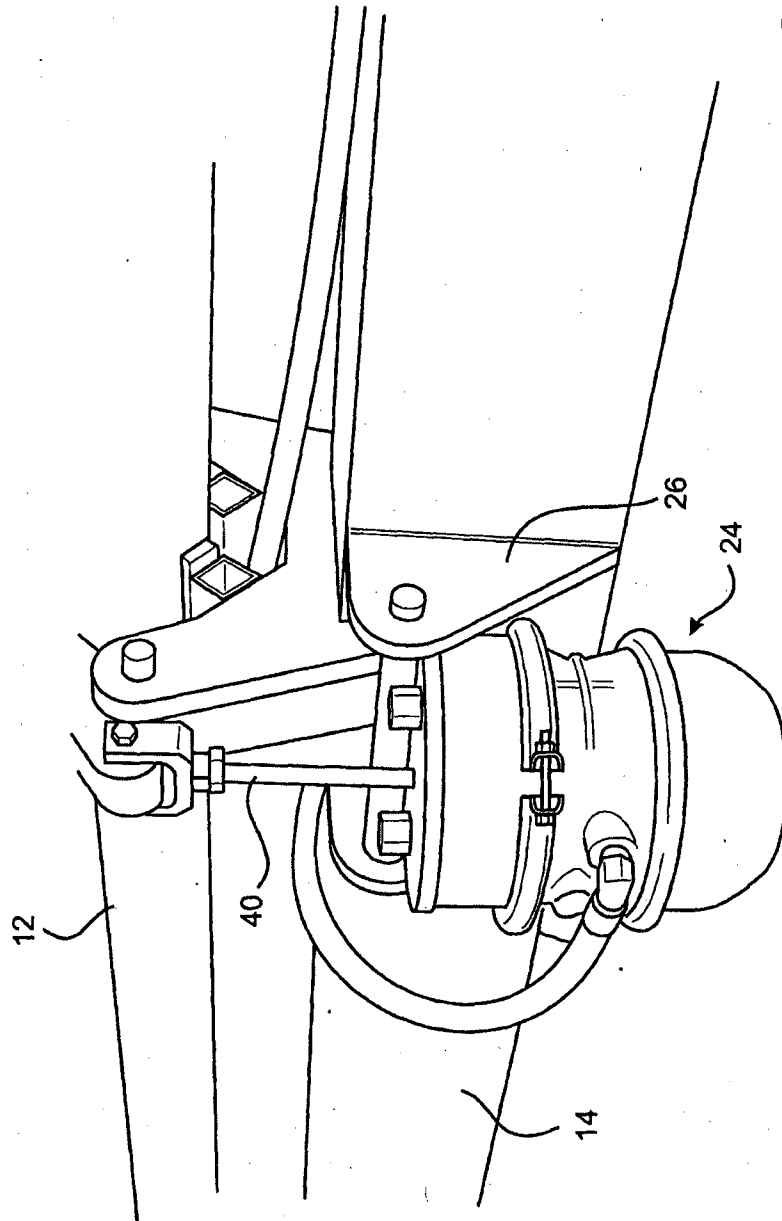


FIG. 4

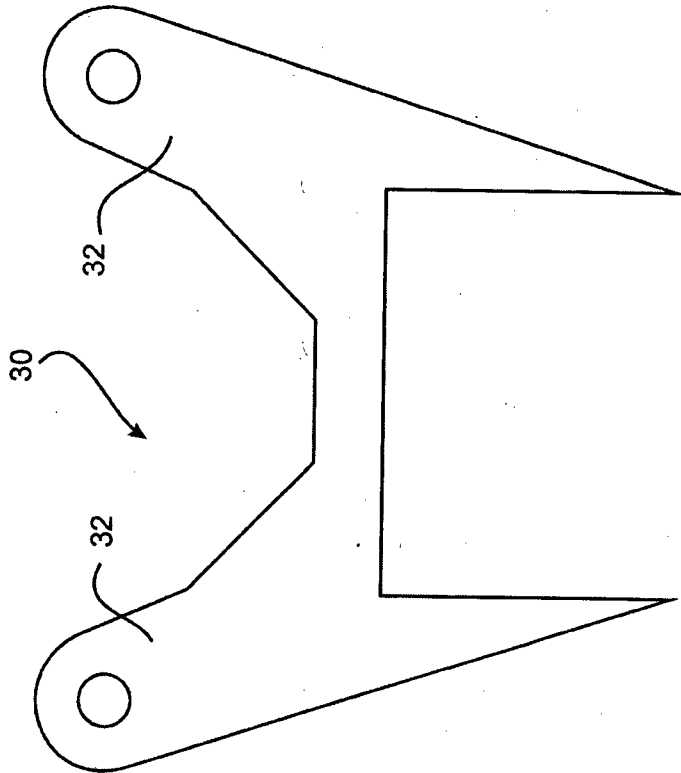


FIG. 5

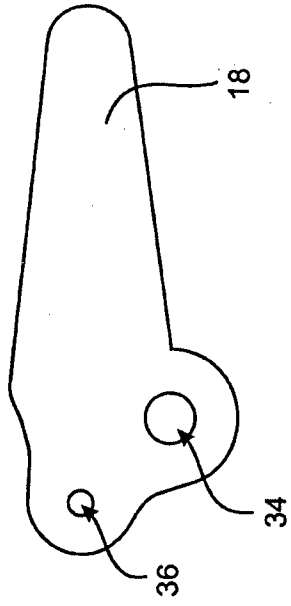


FIG. 6

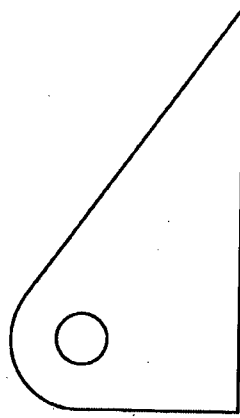


FIG. 7

## INTERNATIONAL SEARCH REPORT

International application No.

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<b>A. CLASSIFICATION OF SUBJECT MATTER</b> <b>E21B 19/14 (2006.01) E21B 19/15 (2006.01)</b>		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
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)		
Derwent WPI & EPODOC: IPC & CPC E21B 19/14/low with keywords; tube, rod, pipe, load, handle, manoeuvre, elongate, long, length, rack, support, frame, bin, store, trough, grip, grapple, clamp, hold, arm, handle, finger, bias, spring, resilient, fail, safe, secure, and the like.		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
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Date of the actual completion of the international search 16 April 2013	Date of mailing of the international search report 16 April 2013	
Name and mailing address of the ISA/AU  AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au Facsimile No.: +61 2 6283 7999	Authorised officer  Jude Fernando AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832419	

**INTERNATIONAL SEARCH REPORT**

International application No.

C (Continuation).

DOCUMENTS CONSIDERED TO BE RELEVANT

**PCT/AU2013/000034**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0269133 A1 (LITTLE) 08 December 2005 Abstract, para 0040, 0052, 0093, 0117; All figures, Fig 1, 19, 21a & 21b in particular	1-17
A	US 2009/0297326 A1 (DAVIDSON) 03 December 2009 Abstract, para 0008-0009; Figure 1	3-5, 12-15

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/AU2013/000034**

This Annex lists known 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.

<b>Patent Document/s Cited in Search Report</b>		<b>Patent Family Member/s</b>	
<b>Publication Number</b>	<b>Publication Date</b>	<b>Publication Number</b>	<b>Publication Date</b>
US 2005/0269133 A1	08 Dec 2005	AU 2005202267 A1	22 Dec 2005
		AU 2005202267 B2	14 Jul 2011
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		WO 2009149156 A2	10 Dec 2009

**End of Annex**

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

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