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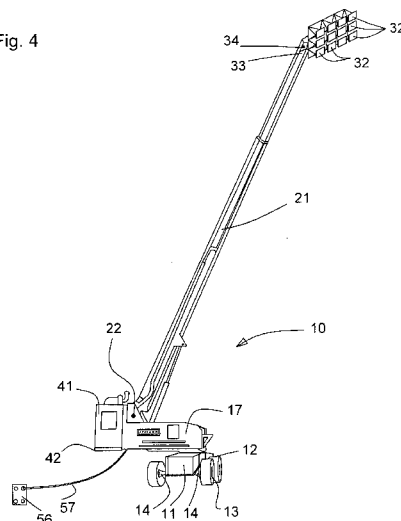
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Published:

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(54) Title: MOBILE LIGHTING APPARATUS

Fig. 4



(57) Abstract: Mobile lighting apparatus (10), including: a base (11); traction means (12, 13) connected to the base and engaging the ground for moving the base; traction drive means (14) connected to the traction means driving the traction means along the ground; a turret (17) mounted on the base for rotating movement relative thereto about a vertical axis (18); turret drive means for driving the turret about the vertical axis; electricity generation means (41) mounted to the turret for rotating movement therewith; an extendable boom (21) pivotally mounted to the turret adjacent its proximal end for movement relative thereto between a lowered position and a raised position; lighting means (31,32) connected to the boom at its distal end (33); and electricity communication means (51) connecting said lighting means to said electricity generation means. Also disclosed is a method of converting a lifting apparatus to the mobile lighting apparatus.



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MOBILE LIGHTING APPARATUSField of the invention

This invention relates to mobile lighting apparatus.

The invention has particular application to mobile lighting apparatus of the type in which an array of lights is mounted to a boom which can be raised when in a desired location or site for directing light onto a selected area and lowered for transport to another desired location or site.

Background of the invention

One known mobile lighting apparatus includes a trailer with a boom and an array of lights mounted thereon which can be raised from a lowered position in which the boom is horizontal and can be secured in that position to a raised position in which the boom is vertical and can be secured in the vertical position. Such apparatus provides for operation of the lights only when the boom is in the vertical position and only provides for securement of the boom in either the horizontal or vertical positions.

The present invention is aimed at providing mobile lighting apparatus which can be more easily moved from one site to another. The invention is also aimed at providing mobile lighting apparatus which can supply more powerful lighting at a greater height than previously known mobile lighting apparatus and be relatively easy to raise and lower.

Summary of the invention

With the foregoing in view, the present invention resides broadly in mobile lighting apparatus, including:

a base;

traction means operatively connected to said base and adapted to engage the ground for moving said base relative thereto;

traction drive means operatively connected to said traction means for driving said traction means along the ground;

a turret mounted on said base for pivoting or rotating movement relative thereto about a substantially vertical axis;

turret drive means for driving said turret about said substantially vertical axis;

electricity generation means mounted to said turret for pivoting or rotating movement therewith;

an extendable boom pivotally mounted to said turret at or adjacent its proximal end for movement relative thereto between a lowered position and a raised position;

lighting means operatively connected to said boom at or adjacent its distal end; and

electricity communication means connecting said lighting means to said electricity generation means.

Preferably, said electricity generation means includes an internal combustion engine with an alternator or generator coupled thereto. It is also preferred that said electricity generation means overhang said base such that in use, the electricity generation means is closer to the ground than the turret so that in cases where the traction means sinks into the ground the electricity generation means or a platform on which it is mounted engages the ground and supports the turret.

Preferably, said drive means includes one or more hydraulic motors drivingly connected to the traction means and driven by an internal combustion engine independently of the electricity generation means.

Preferably, said electricity communication means includes a power cable arranged to fold and unfold on a tray or rack mounted to said boom as said boom retracts and extends.

In another aspect, the invention resides broadly in a method of converting lifting apparatus to lighting apparatus as previously described, the lifting apparatus having a base, traction means operatively connected to the base and adapted

to engage the ground for moving the base relative thereto and traction drive means operatively connected to the traction means for driving the traction means along the ground, a turret mounted on the base for pivoting or rotating movement relative thereto about a substantially vertical axis and turret drive means for driving the turret about the substantially vertical axis, an extendable boom pivotally mounted at or adjacent its proximal end to the turret for movement relative thereto between a lowered position and a raised position, and a counterweight mounted to said turret to counter the weight of the boom, the method including:

connecting lighting means to said boom at or adjacent its distal end;

removing the counterweight at least in part and mounting electricity generation means to said turret in a predetermined position instead of the removed counterweight; and

electrically connecting the electricity generation means to the lighting means.

Preferably, said predetermined position is selected such that the electricity generation means acts as a suitable counterweight for the boom and the lighting means mounted thereon when fully extended.

The terms "horizontal" and "vertical" are intended to describe the orientation of the particular axis or component being referred to when the apparatus is at rest on a level horizontal surface even though the axis or component may not be geometrically exactly vertical or horizontal. Further, such terms are not intended to limit the apparatus to use in any particular orientation.

Brief description of the invention

In order that the invention may be more easily understood and put into practical effect, reference will now be made to the accompanying drawings wherein:

Fig. 1 is a perspective view of lighting apparatus according to the invention from one side with the turret in the travelling position and the boom in the fully lowered position and fully retracted;

Fig. 2 is a perspective view of the apparatus of Fig. 1 from the other side with the turret in the travelling position and the boom in the partly raised position and fully extended;

Fig. 3 is a perspective view of the apparatus of Fig. 1 from the rear with the turret in the travelling position and the boom in the same partly raised position and fully extended as in Fig. 2;

Fig. 4 is a perspective view of the apparatus of Fig. 1 from the rear with the turret turned through ninety degrees from the travelling position and the boom in the almost fully raised position and fully extended.

Fig. 5 is a perspective view of the apparatus of Fig. 1 from the rear with the turret turned through ninety degrees from the travelling position and the boom in the almost fully lowered position and fully extended.

Fig. 6 is a perspective view of the light assembly which is mounted to the outer end of the boom of the apparatus of Fig. 1;

Fig. 7 is a perspective view of the part of the turret showing the generator and the platform on which it is mounted; and

Fig. 8 is a perspective view of part of another lighting apparatus according to the invention from one side with the turret in the travelling position and the boom in the fully lowered position and fully retracted.

Detailed description of the invention

The lighting apparatus 10 illustrated in Fig. 1 has been converted from lifting apparatus according to the method previously described. Apparatus 10 includes a base (or chassis) 11 which is supported on two spaced apart front

wheels 12 and two spaced apart rear wheels 13 which are drivingly connected to respective hydraulic traction motors 14 in known manner for providing motive power to the wheels. The front wheels are arranged to pivot about respective vertical or inclined axes for steering the apparatus in the usual manner of four wheeled vehicles of this type.

A turret 17 is mounted on the base 11 for pivoting (or rotating) movement about a vertical axis 18 also in known manner for apparatus of this type and driven by a hydraulic motor (not visible in the drawings). An extendable boom 21 is mounted to the turret for up and down movement about a horizontal pivot pin 22 also in known manner for apparatus of this type.

A diesel engine driven hydraulic pump (not visible in the drawings) is mounted in the turret for supplying hydraulic fluid to drive the hydraulic traction motors and the hydraulic motor for pivoting the turret, as well as hydraulic rams for raising, lowering and extending and retracting the boom 21 in known manner.

A lighting frame 31 having an array of lights 32 mounted thereon is connected to the outer end 33 of the boom by a pivot pin 34 for up and down movement relative to the boom with a hydraulic ram 36 arranged to selectively raise and lower the frame.

The lights in the array are powered by a diesel engine driven generator unit 41 which is bolted to a support frame 42 extending from the rear of the turret. Advantageously, the generator unit is mounted in a predetermined position so as to provide a suitable counterweight to the boom, the lighting frame and the lights attached thereto.

A power cable 51 extends from the generator unit 41 on a "cat rack" type tray beside the boom (although in some embodiments it passes through the boom) and is connected at

one end to a distribution box 52 mounted on the lighting frame 32. Additional smaller cables distribute power from the distribution box to individual lights 53 mounted on the frame.

The lighting apparatus 110 illustrated in Fig. 8 is similar to the one illustrated in Fig. 1 in many respects and accordingly corresponding features are referenced by corresponding numbers except prefaced by a "1". In this apparatus, the generator unit 141 is mounted on a steel frame 162 which is connected to the bottom of the turret 117 by two spaced apart steel members 164 welded to the turret at location 165. Additionally, a large foot plate 166 extends fully across the width of the turret under the generator frame and is welded thereto and adapted to support the turret if one or both of the tracks 167 sink too far into the ground. Advantageously, once the turret is supported by the plate 166, the turret and boom can be operated largely in the normal manner irrespective of the base having sunk into the ground. In this apparatus, the protective cover has been removed from the generator unit engine and the engine 140 and close coupled generator 145 can be seen with the fuel tank 146 mounted in the frame 162.

In use, when temporary lighting is required at a site, for example for machinery breakdown repairs, road works, sporting events and the like, the lighting apparatus is transported to the site by truck where it is unloaded via ramps in known manner. The apparatus can then be driven to the desired position under its own motive power by operation of a controller on the turret or by a remote controller connected to the turret by a cable or wireless controller for controlling the engine driven hydraulic pump. When the apparatus is in the desired location, the boom can be raised and extended to a desired elevated position by actuating the

relevant control valves and then the generator can be started to supply power to the lights.

In the apparatus illustrated in Fig. 1 the generator unit has a 50KVA generator and the array of lights require 24KW so it will be appreciated that the generator has sufficient capacity to provide for a more powerful array of lights if desired. The boom of the apparatus illustrated is selected to be able to hold the array of lights at a height of approximately 20 metres above the ground. However, apparatus of greater or lesser lighting power and greater or lesser boom length could be constructed if desired.

The foregoing description has been given by way of illustrative example of the invention and many modifications and variations which will be apparent to persons skilled in the art may be made without departing from the spirit and scope of the invention as defined by the appended claims.

CLAIMS

1. Mobile lighting apparatus, including:

a base;

traction means operatively connected to said base and adapted to engage the ground for moving said base relative thereto;

traction drive means operatively connected to said traction means for driving said traction means along the ground;

a turret mounted on said base for pivoting or rotating movement relative thereto about a substantially vertical axis;

turret drive means for driving said turret about said substantially vertical axis;

electricity generation means mounted to said turret for pivoting or rotating movement therewith;

an extendable boom pivotally mounted to said turret at or adjacent its proximal end for movement relative thereto between a lowered position and a raised position;

lighting means operatively connected to said boom at or adjacent its distal end; and

electricity communication means connecting said lighting means to said electricity generation means.

2. Mobile lighting apparatus according to Claim 1, wherein said electricity generation means includes an internal combustion engine and an alternator or generator coupled thereto.

3. Mobile lighting apparatus according to Claim 1 or Claim 2, wherein said electricity generation means overhangs said base.

4. Mobile lighting apparatus according to Claim 3, wherein said electricity generation means is mounted on a platform which overhangs the base and the platform is arranged to

engage the ground upon the traction means sinking to a predetermined depth so as to support the turret.

5. Mobile lighting apparatus according to any one of the preceding claims, wherein said drive means includes one or more hydraulic motors drivingly connected to said traction means and driven by an internal combustion engine independently of said electricity generation means.

6. Mobile lighting apparatus according to any one of the preceding claims wherein said electricity communication means includes a power cable arranged to fold and unfold on a tray or rack mounted to said boom as said boom retracts and extends.

7. Mobile lighting apparatus according to Claim 6 wherein said electricity communication means is mounted on a "cat rack" style folding system.

8. A method of converting lifting apparatus to lighting apparatus, the lifting apparatus having a base, traction means operatively connected to the base and adapted to engage the ground for moving the base relative thereto and traction drive means operatively connected to the traction means for driving the traction means along the ground, a turret mounted on the base for pivoting or rotating movement relative thereto about a substantially vertical axis and turret drive means for driving the turret about the substantially vertical axis, an extendable boom pivotally mounted at or adjacent its proximal end to the turret for movement relative thereto between a lowered position and a raised position, and a counterweight mounted to said turret to counter the weight of the boom, the method including:

connecting lighting means to said boom at or adjacent its distal end;

removing the counterweight at least in part and mounting electricity generation means to said turret in a predetermined position instead of the removed counterweight;

and electrically connecting the electricity generation means to the lighting means.

9. A method according to Claim 8, wherein said predetermined position is selected such that the electricity generation means acts as a suitable counterweight for the boom and the lighting means mounted thereon when fully extended.

10. Lighting apparatus as hereinbefore described with reference to the accompanying drawings.

11. A method of converting lifting apparatus to lighting apparatus as hereinbefore described with reference to the accompanying drawings.

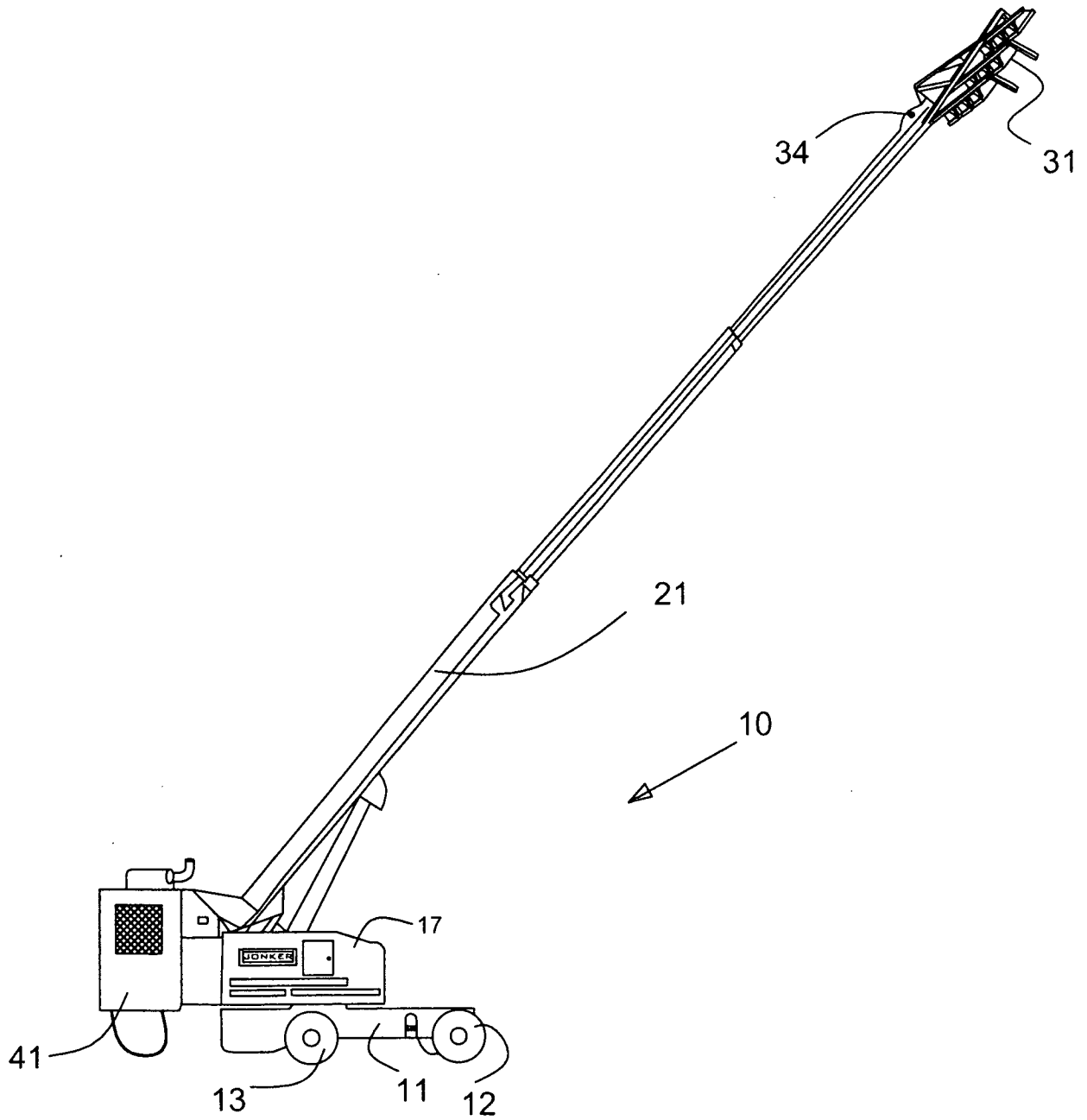


Fig. 2

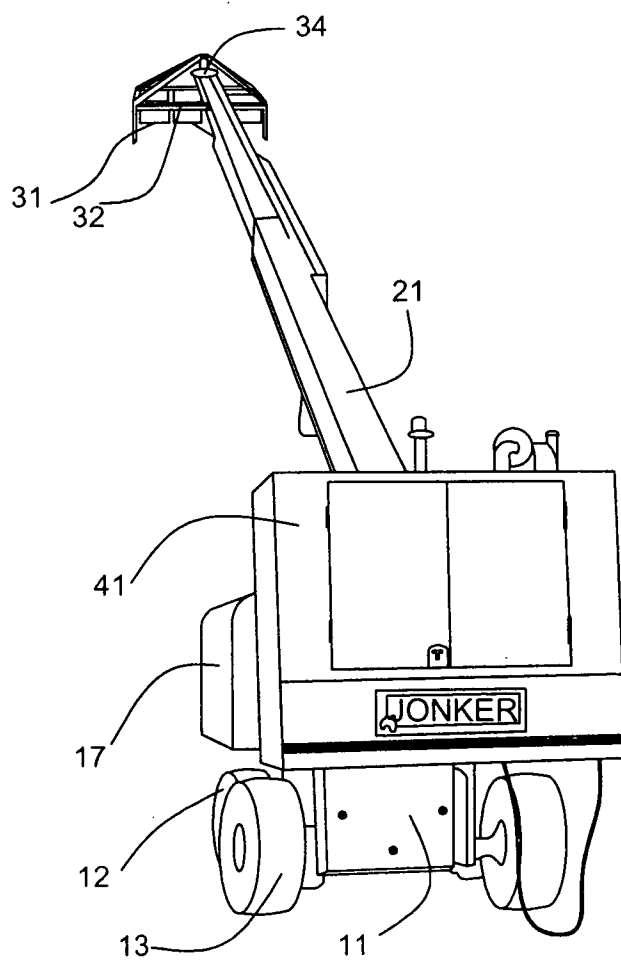


Fig. 3

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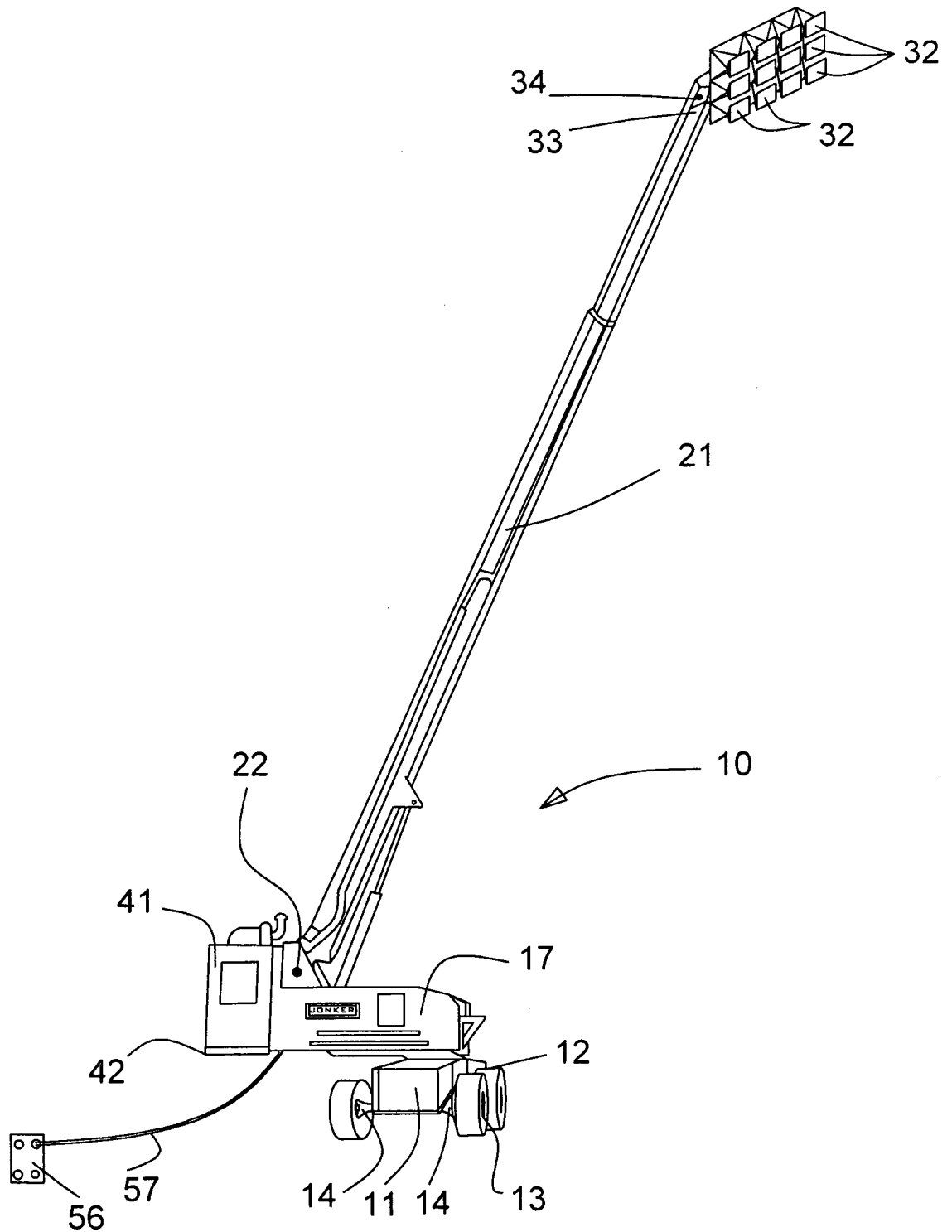


Fig. 4

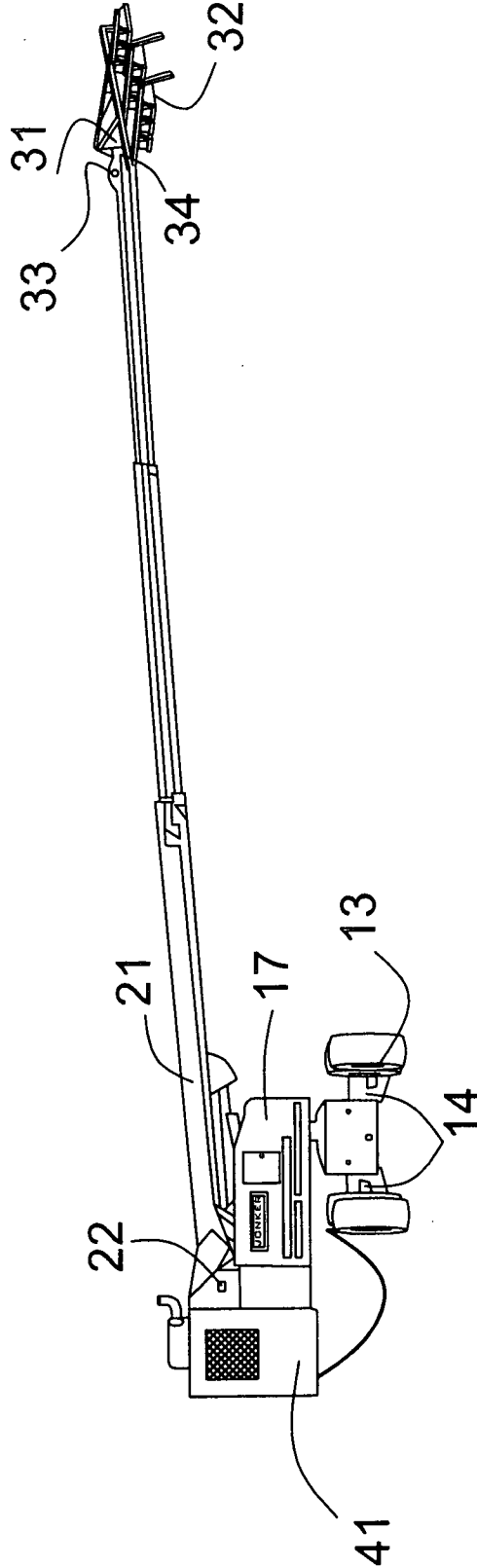


Fig. 5

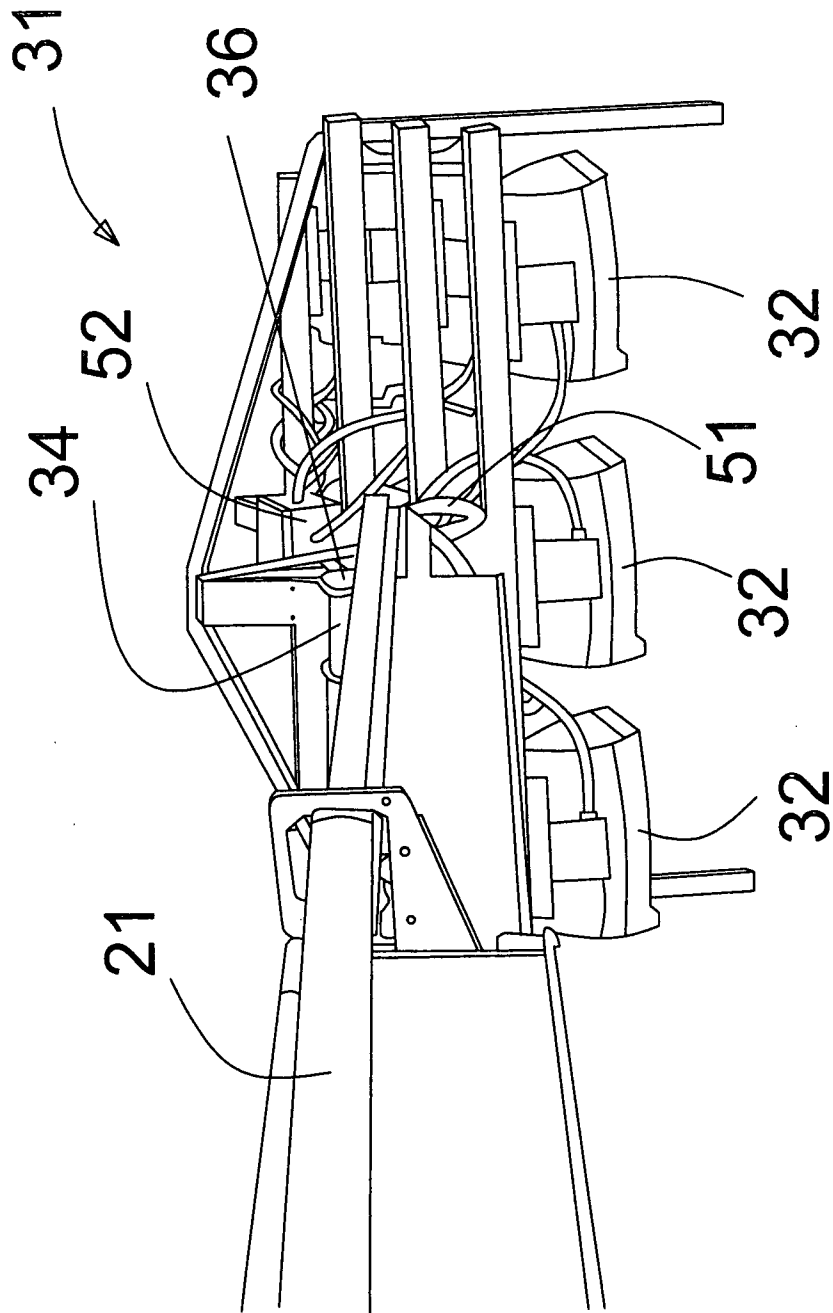


Fig. 6

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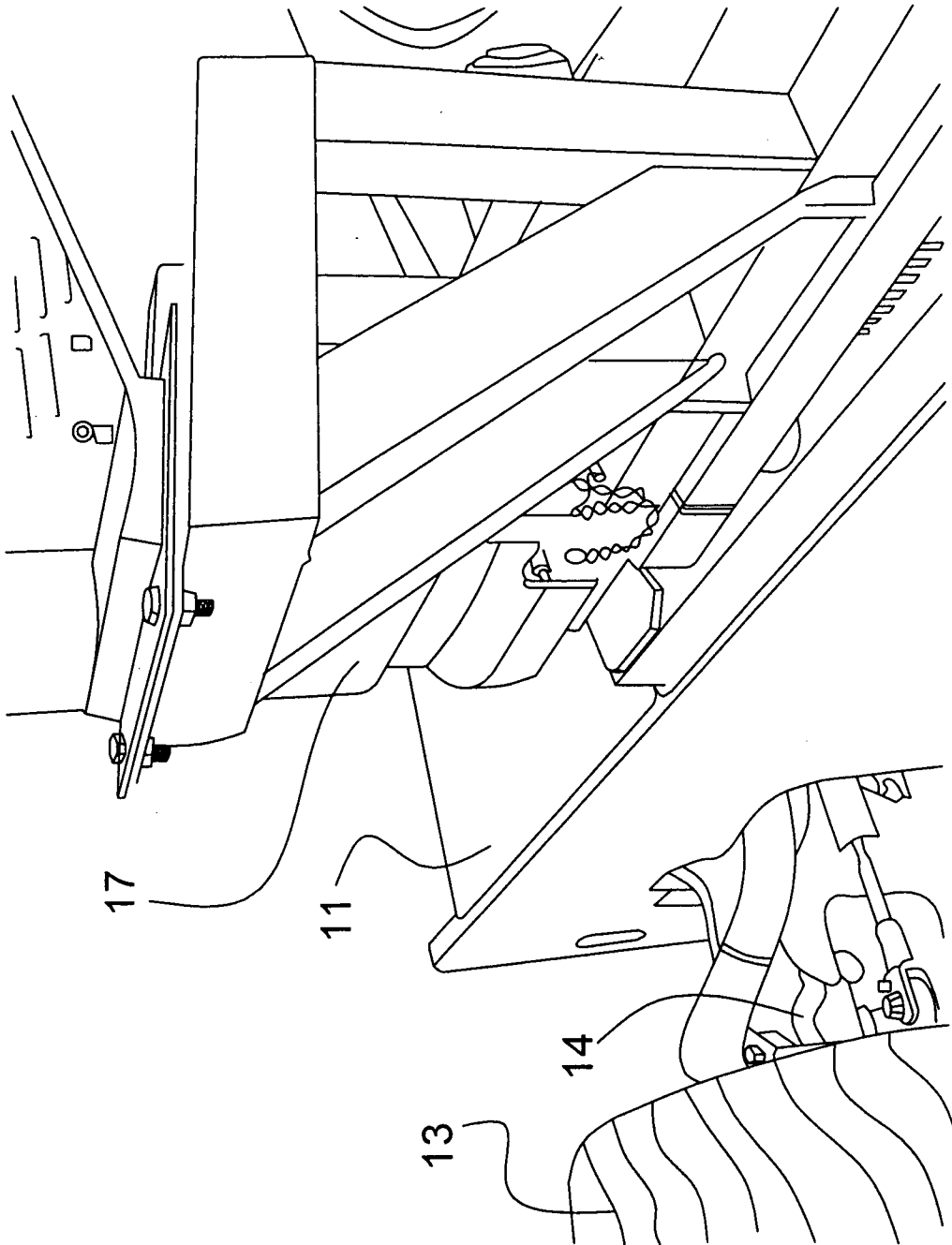


Fig. 7

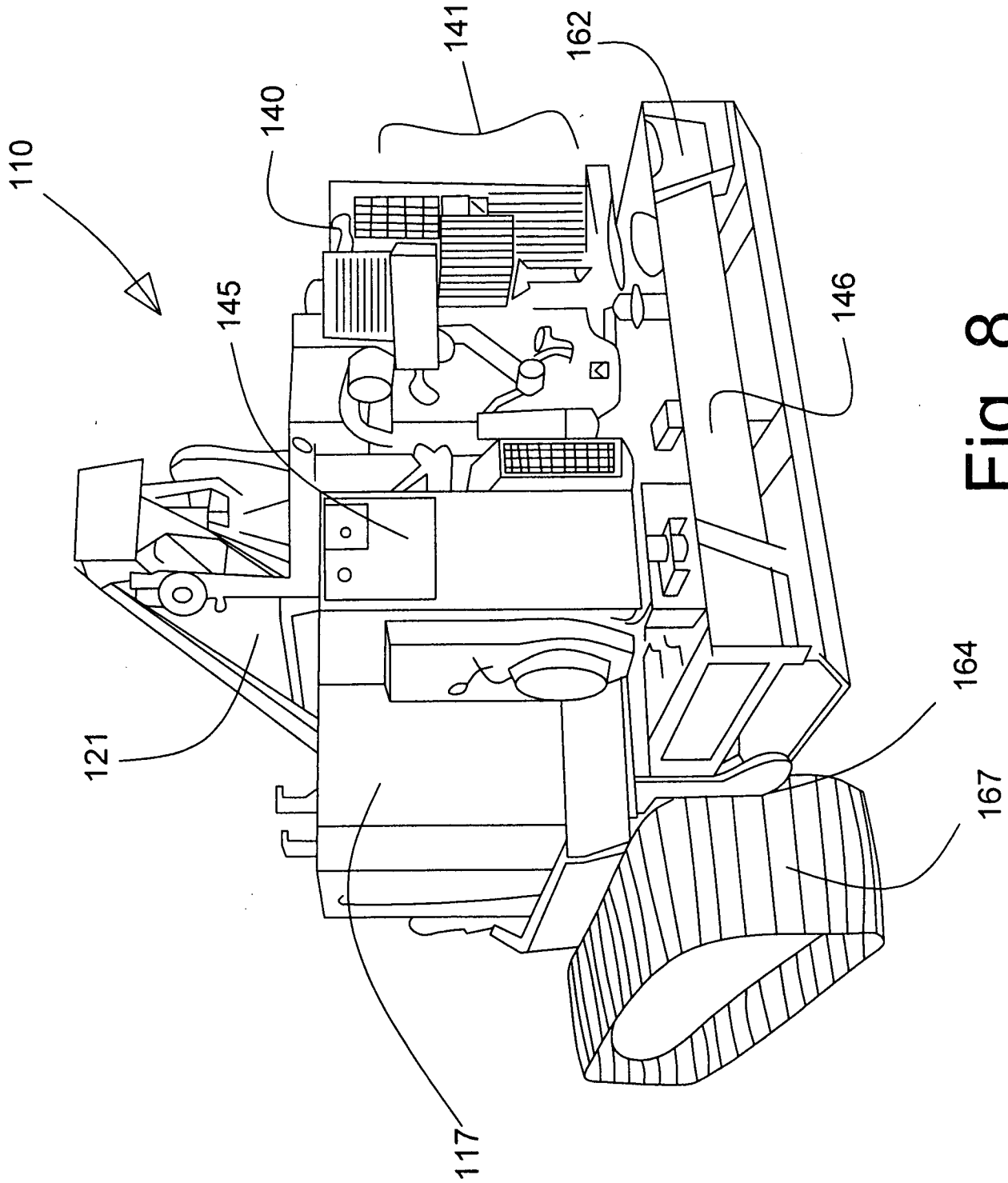


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2010/001132

A. CLASSIFICATION OF SUBJECT MATTER		
Int. Cl.		
<i>F21V 21/22</i> (2006.01) <i>F21L 2/00</i> (2006.01) <i>B60P 3/18</i> (2006.01) <i>F21V 21/00</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, ESP@CE, GOOGLE SCHOLAR: keywords (mobile, lighting, telescopic, boom, turret, platform, generator) and similar terms		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 09-226447 A (KOMATSU LTD et al) 2 September 1997 (English translation from http://www.ipdl.inpit.go.jp/homepg_e.ipdl) See the abstract, fig 1-3, paragraphs 10-17	1-3,6,7 5,8,9
Y	US 4160492 A (JOHNSTON) 10 July 1979 See the abstract, fig 1-2	5
Y	JP 2003-063778 A (TADANO LTD) 5 March 2003 (English translation from http://www.ipdl.inpit.go.jp/homepg_e.ipdl) See the abstract, paragraphs 26-28, fig1-12	8,9
A	US 4712167 A (GORDIN et al) 8 December 1987 See column 4 lines 10-15 and fig 1	
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C		<input checked="" type="checkbox"/> 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	"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 27 October 2010	Date of mailing of the international search report 3 NOV 2010	
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. +61 2 6283 7999	Authorized officer Ian Barrett AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No : +61 2 6283 2189	

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2010/001132

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 09-306226 A (JUPITER KK et al) 28 November 1997 (English translation from http://www.ipdl.inpit.go.jp/homepg_e.ipdl) See abstract, fig 2	

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.: **10 and 11**
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 claims do not comply with Rule 6.2(a) because they rely 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/AU2010/001132

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
JP 9226447	NONE
US 4160492	GB 2007402
JP 2003063778	NONE
US 4712167	NONE
JP 9306226	NONE

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

END OF ANNEX