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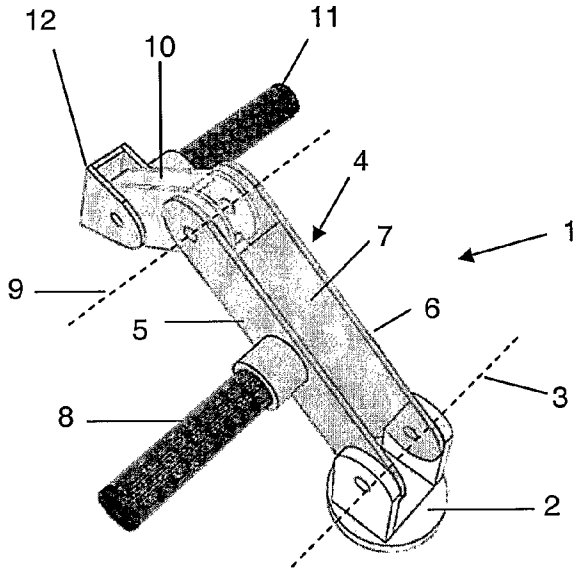
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(88) Date of publication of the international search report:
27 March 2008

(54) Title: CONTROL SYSTEM FOR EARTH MOVING AND WORKING APPARATUS



(57) Abstract: A control system (1) for earth moving or working apparatus (14) such as an excavator comprises a first control arm (4), a second control arm (10) and an end member (12), pivotally connected to as to emulate the working arms (16, 17) and bucket (18) of the excavator. The first and second control arms (4, 10) are provided with handles (8, 11) projecting laterally outwards in opposite directions so that the positions of the first and second control arms can be altered by a user. The handle (11) on the second control arm (10) can also be twisted to control movement of the end member (12). These movements are translated into control of hydraulic actuators (18, 19, 20) for controlling the working arms (16, 17) and bucket (18) of the excavator. The control arms (4,10) can be moved to a position in which the handles (8, 11) are axially aligned, for steering of the excavator (14) during transit. The control system (1) maybe detachable from the excavator (14). Haptic feedback may be provided.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2007/002217

A. CLASSIFICATION OF SUBJECT MATTER
INV. E02F9/20 E02F3/43

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)
E02F G05B B25J

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 practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 880 304 A (STRICKLAND JR WILLIAM A) 29 April 1975 (1975-04-29) figures	1,2
Y	EP 1 335 074 A (BAMFORD EXCAVATORS LTD [GB]) 13 August 2003 (2003-08-13) figures	1,2
Y	JP 01 171784 A (TAMAGAWA SEIKI CO LTD) 6 July 1989 (1989-07-06) the whole document	1,2
A	US 5 995 893 A (LEE JIN HAN [KR] ET AL) 30 November 1999 (1999-11-30) cited in the application the whole document	1

☐ 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 document 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
13 September 2007	12/02/2008

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Laurer, Michael

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2007/002217

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.: 12-14
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:

see FURTHER INFORMATION sheet PCT/ISA/210

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:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an 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 reportcovers 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.:

1-2, 10, 11

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 12-14

Claims 12-14 contain references to the description and/or the drawings and are therefore not clear. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/GB2007 /002217

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-2,10,11

   directed to a mimical control apparatus for controlling an earth moving or working apparatus and the associated method and further the earth moving or working apparatus including said mimical control apparatus, the mimical control apparatus comprising interconnected control arms as a scaled down representation of the working arm assembly of the earth moving or working apparatus, the control arm comprising manipulation members extending from the first and second control arms in opposite direction
   wherein the mimical control apparatus and the working arm assembly ist rotatbale about a vertical axis;

   ---

2. claim: 3

   directed to a mimical control apparatus for controlling an earth moving or working apparatus and the associated method and further the earth moving or working apparatus including said mimical control apparatus, the mimical control apparatus comprising interconnected control arms as a scaled down representation of the working arm assembly of the earth moving or working apparatus, the control arm comprising manipulation members extending from the first and second control arms in opposite direction
   wherein a member representing the working implement of the working arm assembly is provided at the second control arm element for rotation about the axis of the second manipulation member;

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3. claim: 4

   directed to a mimical control apparatus for controlling an earth moving or working apparatus and the associated method and further the earth moving or working apparatus including said mimical control apparatus, the mimical control apparatus comprising interconnected control arms as a scaled down representation of the working arm assembly of the earth moving or working apparatus, the control arm comprising manipulation members extending from the first and second control arms in opposite direction
   wherein first and second control arm members are alignable so as the first and second manipulation members are aligned;

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4. claims: 5,9

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

directed to a mimical control apparatus for controlling an earth moving or working apparatus and the associated method and further the earth moving or working apparatus including said mimical control apparatus, the mimical control apparatus comprising interconnected control arms as a scaled down representation of the working arm assembly of the earth moving or working apparatus, the control arm comprising manipulation members extending from the first and second control arms in opposite direction
wherein at least a part of the manipulation members is rotatable about a horizontal axis to control a further function of the earth mover;

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5. claim: 6

directed to a mimical control apparatus for controlling an earth moving or working apparatus and the associated method and further the earth moving or working apparatus including said mimical control apparatus, the mimical control apparatus comprising interconnected control arms as a scaled down representation of the working arm assembly of the earth moving or working apparatus, the control arm comprising manipulation members extending from the first and second control arms in opposite direction
wherein the control apparatus is dettachable;

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6. claims: 7-8

directed to a mimical control apparatus for controlling an earth moving or working apparatus and the associated method and further the earth moving or working apparatus including said mimical control apparatus, the mimical control apparatus comprising interconnected control arms as a scaled down representation of the working arm assembly of the earth moving or working apparatus, the control arm comprising manipulation members extending from the first and second control arms in opposite direction
wherein means for feedback are provided at the control apparatus;

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2007/002217

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3880304 A	29-04-1975	NONE	
EP 1335074 A	13-08-2003	GB 2385111 A	13-08-2003
		US 2003152452 A1	14-08-2003
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