



- (51) International Patent Classification:  
*B66F 9/22* (2006.01)      *F15B 21/14* (2006.01)  
*E02F 9/22* (2006.01)
- (21) International Application Number:  
PCT/US2013/020833
- (22) International Filing Date:  
9 January 2013 (09.01.2013)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
61/584,650      9 January 2012 (09.01.2012)      US  
61/584,630      9 January 2012 (09.01.2012)      US
- (71) Applicant: **EATON CORPORATION** [US/US]; 1111 Superior Avenue, Eaton Center, Cleveland, OH 44114-2584 (US).
- (72) Inventors: **HOXIE, Benjamin, Maxfield**; 10740 55th Avenue N., Plymouth, MN 55442 (US). **MEEHAN, Timothy, Isaac**; 1237 Night Trail, Waconia, MN 55387 (US).
- (74) Agent: **BRUESS, Steven, C.**; Merchant & Gould P.C., P.O. box 2903, Minneapolis, MN 55402-0903 (US).
- (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, BN, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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.

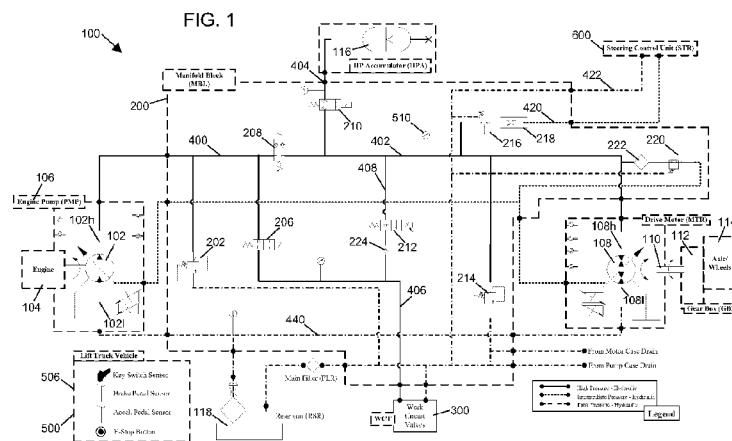
- (84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

- (88) Date of publication of the international search report:  
26 September 2013

(54) Title: PROPEL CIRCUIT AND WORK CIRCUIT COMBINATIONS FOR A WORK MACHINE



(57) Abstract: A hydraulic circuit architecture (100) for a work vehicle (50) includes a pump (102), a work circuit (300), a propel circuit (400, 108), and a circuit selector (206, 208, 210, 212). The work circuit (300) is connected to an actuator for driving a work component of the work vehicle. The propel circuit (400, 108) includes a motor (108) that is adapted to be connected to a drive train (110, 112, 114) of the work vehicle (50). The propel circuit (400, 108) also includes an accumulator (116). The circuit selector (206, 208, 210, 212) selectively connects the pump (102) to the work circuit (300) and the propel circuit (400, 108). The hydraulic circuit architecture is operable in a first mode and a second mode. In the first mode, the propel circuit is connected to the pump and the work circuit is disconnected from the pump. In the second mode, the work circuit is connected to the pump and the propel circuit is disconnected from the pump. When the hydraulic circuit architecture is in the second mode, stored energy from the accumulator can be used to drive the motor to cause propulsion of the work vehicle.

WO 2013/106431 A3

# INTERNATIONAL SEARCH REPORT

International application No PCT/US2013/020833
---

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> INV. B66F9/22 E02F9/22 F15B21/14 ADD.		
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) B66F E02F F15B		
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) EPO-Internal, WPI Data		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/246082 A1 (MIKI MASATOSHI [JP] ET AL) 3 November 2005 (2005-11-03) figure 2	1-3, 10
Y	----- DE 10 2010 010472 A1 (DAIMLER AG [DE]) 8 September 2011 (2011-09-08) the whole document	1, 6-19
Y	----- DE 10 2008 021889 A1 (BOSCH GMBH ROBERT [DE]) 5 November 2009 (2009-11-05) figures	1, 6-19 4, 5
A	----- DE 198 34 765 A1 (HYDRAULIK RING GMBH [DE]) 3 February 2000 (2000-02-03) the whole document	13
Y	----- DE 101 51 831 A1 (STILL GMBH [DE]) 8 May 2003 (2003-05-08) the whole document	13-19
	-----	
<input 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	Date of mailing of the international search report	
11 April 2013	29/07/2013	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Laurer, Michael	

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2013/020833

## 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.:  
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:
  
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 all searchable 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 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.:

see additional sheet(s)

### 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**

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

1. claims: 1-19

This group is directed to a hydraulic circuit architecture and tries to solve the problem in a mobile working vehicle comprising two hydraulic circuits which may be selectively supplied with hydraulic fluid from a single hydraulic pump, wherein in case of selective supply of hydraulic fluid to the first hydraulic circuit, the second hydraulic circuit may be supplied with fluid from a hydraulic accumulator within said second hydraulic circuit.

---

2. claims: 20-27

This group is directed to a hydraulic circuit architecture and tries to solve the problem in a mobile working vehicle comprising two hydraulically isolated circuits (claim 20) or two circuits which are not in fluid communication (claim 27), wherein means are provided which transfer energy from a hydraulic accumulator in one hydraulic circuit to the other hydraulic circuit.

---

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2013/020833
---

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005246082 A1	03-11-2005	CN 1685161 A EP 1571352 A1 JP 2004190845 A US 2005246082 A1 WO 2004055386 A1	19-10-2005 07-09-2005 08-07-2004 03-11-2005 01-07-2004
-----			
DE 102010010472 A1	08-09-2011	DE 102010010472 A1 WO 2011110207 A1	08-09-2011 15-09-2011
-----			
DE 102008021889 A1	05-11-2009	DE 102008021889 A1 WO 2009132765 A1	05-11-2009 05-11-2009
-----			
DE 19834765 A1	03-02-2000	DE 19834765 A1 EP 0978440 A2 US 6223763 B1	03-02-2000 09-02-2000 01-05-2001
-----			
DE 10151831 A1	08-05-2003	NONE	
-----			