

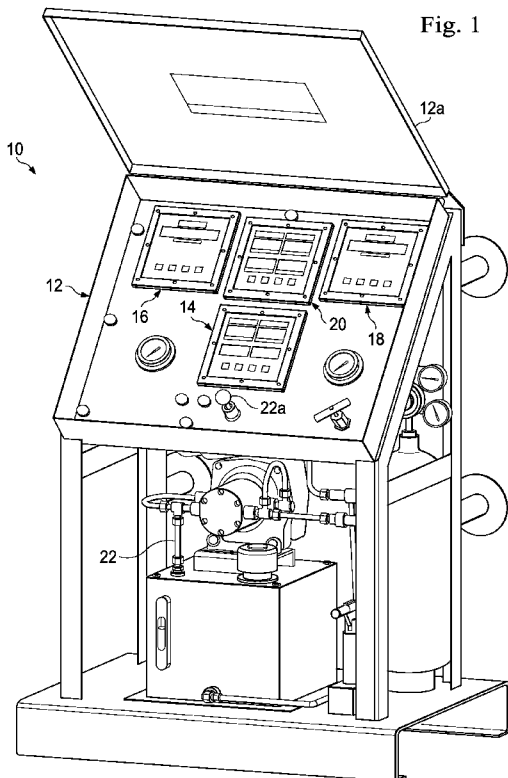


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[Continued on next page]

(54) Title: CONTROL PANEL, AND DIGITAL DISPLAY UNITS AND SENSORS THEREFOR



(57) Abstract: A digital display unit (14, 16, 18 or 20) includes a microcontroller (94) to process information received from one or more sensors (30, 32, 40, 42, 54 and 56), a display (96a, 96b, 96c or 96d), and a switch (108, 156 or 180) in communication with the microcontroller so that the microcontroller displays an output on the display that is specific to a type of sensor, which type may be selected from a position sensor, a pressure sensor, and a stroke counter. The digital display unit may be part of a choke control panel (10). The microcontroller and the display may be disposed in an enclosure (74), and an electrical power source (76a and 76b) may be disposed in the enclosure to supply electrical power to the microcontroller and the one or more sensors. A digital hydraulic choke position sensor assembly (30 or 32) and a digital pressure sensor assembly (54 or 56) are also described, which may be used in a system (24) for drilling an oil or gas well.

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

— 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))

**Published:**

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20 March 2014

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US2013/040530

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(8) - E21B 47/00 (2013.01)

USPC - 166/321

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)

IPC(8) - E21B 34/00; 47/00, 47/06 (2013.01)

USPC - 166/244.1, 250.12, 321

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

CPC - E21B 34/00; 47/00, 47/06 (2013.01)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Google, Orbit, Google Patents

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X		19
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Y	US 2006/0201671 A1 (ROGERS et al) 14 September 2006 (14.09.2006) entire document	1-18, 20-32
Y	US 2010/0249540 A1 (LISOGURSKI) 30 September 2010 (30.09.2010) entire document	1-18, 20-23, 25-32
Y	US 2010/0233950 A1 (BENKERT et al) 16 September 2010 (16.09.2010) entire document	1-18, 20, 21, 23-32
Y	US 2005/0092523 A1 (MCCASKILL et al) 05 May 2005 (05.05.2005) entire document	3-6, 15, 16, 22, 23, 29-32
Y	US 2003/0051881 A1 (VINEGAR et al) 20 March 2003 (20.03.2003) entire document	5, 6, 31, 32
Y	US 2011/0285647 A1 (IMAMURA et al.) 24 November 2011 (24.11.2011) entire document	7-9, 17, 18, 24-32
Y	US 2011/0139851 A1 (MCCUEN) 16 June 2011 (16.06.2011) entire document	5, 6, 31
A	US 2012/0024531 A1 (SUTER) 02 February 2012 (02.02.2012) entire document	1-32

Further documents are listed in the continuation of Box C.

\* 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

27 December 2013

Date of mailing of the international search report

**14 JAN 2014**

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INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2013/040530

**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 extra 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 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.:  
1-32

**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**

International application No.

PCT/US2013/040530

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-32, drawn to a system and apparatus for outputting information on a display specific to recognized sensors.

Group II, claims 33-40, drawn to a digital hydraulic choke position sensor assembly.

Group III, claims 41-47, drawn to a digital pressure sensor assembly.

The inventions listed as Groups I, II and III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature of the Group I invention: receiving information from first and second sensors, recognizing the type of sensors, and outputting information on a first and second display that is specific to the recognized first and second sensor as claimed therein is not present in the invention of Groups II and III. The special technical feature of the Group II invention: a digital hydraulic choke position sensor that determines the choke position by sensing movement of a first rod as claimed therein is not present in the invention of Groups I or III. The special technical feature of the Group III invention: a digital pressure sensor assembly comprising a cover with end portions, a connector and pressure transducer as claimed therein is not present in the invention of Groups I or II.

Groups I, II and III lack unity of invention because even though the inventions of these groups require the technical feature of a sensor, a housing, and outputting digital information relating to the sensor, this technical feature is not a special technical feature as it does not make a contribution over the prior art in view of US 2012/0024531 A1 (SUTER) 02 February 2012 (02.02.2012).

US 2012/0024531 A1 to SUTER discloses a sensor (abstract, para 15), a housing, and outputting digital information relating to the sensor (housing for controlling operation of the back pressure control system and a display located on the housing for displaying data values received from sensors, para 44-45).

Groups II and III lack unity of invention because even though the inventions of these groups require the technical feature of a system comprising an assembly comprising components which extend within a longitudinally extending passage, this technical feature is not a special technical feature as it does not make a contribution over the prior art in view of US 2012/0024531 A1 (SUTER) 02 February 2012 (02.02.2012).

US 2012/0024531 A1 to SUTER discloses an assembly (para 15) comprising components which extend within a longitudinally extending passage (housing having inlet, outlet and chamber, para 15; housing includes extending passage, para 22-23, Fig. 1; see p29).

Since none of the special technical features of the Group I, II or III inventions are found in more than one of the inventions, unity of invention is lacking.