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(72) Inventor; and


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(54) Title: DRILL BIT WITH REPLACEABLE BLADES, FLUID PULSE AND FLUID COLLISION

(57) Abstract: A drill bit and turbine unit apparatus for drilling a bore which can accept one or more pressures of drilling fluid and/or one or more types of drilling fluid wherein it has two or more distinct and separate fluid paths through said bit which provides the intersection of some paired fluid expulsion points and has a rotating turbine unit for the pulsing of fluid at some of its expulsion points for enhanced hole advancement by increased drilling fluid velocity and cutting force to the material to be cut and has replaceable blades which interlock with each other and have retention means on more than one axis whereby the blades can be easily removed, refurbished and/or replaced.
A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - E21B 10/60, 10/61, 4/02, 10/62, 10/627, 10/633 (2014.01)

CPC - E21B 10/60, 10/61

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 10/60, 10/61, 4/02, 10/62, 10/627, 10/633 (2014.01)

CPC - E21B 10/60, 10/61

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

CPC - E21B 4/02, 10/18, 10/607, 10/622, 10/624, 10/627, 10/633

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


C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y -------</td>
<td>US 2010/0307833; A1 (Kolle et al.) 09 December 2010 (09.12.2010), entire document, especially Figs. 1, 7B, para [0026]-[0028], para [0035]</td>
<td>1, 3-4, 7, 9, 11-12, 15, 17, 19-20, 23</td>
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<td>A -------</td>
<td>US 2009/0308664; A1 (Nackerud) 17 December 2009 (17.12.2009), entire document, especially Figs. 1-2, 6-7, para [0009], [0058]-[0059]</td>
<td>1, 3-4, 7, 9, 11-12, 15, 17, 19-20, 23</td>
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<td>Y -------</td>
<td>US 2004/0089450; A1 (Slade et al.) 31 March 2004 (13.05.2004), Fig. 4c, para [0059]</td>
<td>4, 7, 12, 15, 20, 23</td>
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<td>A -------</td>
<td>WO 2010/142038; A1 (Strydom) 16 December 2010 (16.12.2010), Fig. 2a, pg. 9, In. 30-35</td>
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<td>A -------</td>
<td>US 2011/0000716; A1 (Corneau et al.) 06 January 2011 (06.01.2011), Figs. 1-2, para [0028]</td>
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<td>A -------</td>
<td>US 2008/0135295; A1 (Hall) 12 June 2008 (12.06.2008), Figs. 2-3b, para [0023]-[0024]</td>
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Further documents are listed in the continuation of Box C.

Date of the actual completion of the international search
04 September 2014 (04.09.2014)

Date of mailing of the international search report
03 October 2014

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