



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
**12.07.2000 Bulletin 2000/28**

(51) Int Cl.7: **E21B 10/60**

(43) Date of publication A2:  
**24.11.1999 Bulletin 1999/47**

(21) Application number: **99303972.6**

(22) Date of filing: **21.05.1999**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE**  
Designated Extension States:  
**AL LT LV MK RO SI**

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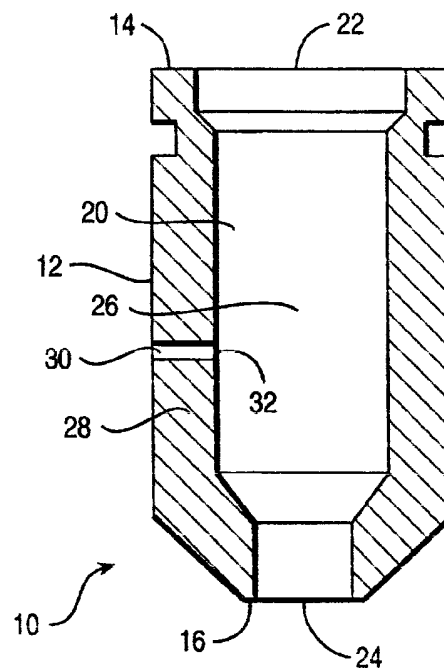
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(30) Priority: **22.05.1998 US 84066**  
**13.05.1999 US 311141**

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(54) **Side port nozzle in a PDC bit**

(57) Using a nozzle having both a main passageway and a side passageway in a fixed head drill bit, especially a PDC bit, provides increased cooling and cleaning power, especially to the outer cutting surfaces. Additionally, causing a smaller side port passageway in a jet nozzle to intersect a larger main passageway in the nozzle in a manner that does not contain a chamfer or taper creates a non-plugging side port. The side port can then be sized down smaller than the size of the expected largest particle present in the mud without causing problems.



**FIG. 1A**



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 99 30 3972

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                  |                                  |                                              |
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| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/> Y : particularly relevant if combined with another document of the same category<br/> A : technological background<br/> O : non-written disclosure<br/> P : intermediate document</p> <p>T : theory or principle underlying the invention<br/> E : earlier patent document, but published on, or after the filing date<br/> D : document cited in the application<br/> L : document cited for other reasons<br/> &amp; : member of the same patent family, corresponding document</p> |                                                                                                                  |                                  |                                              |

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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