



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
25.07.2007 Bulletin 2007/30

(51) Int Cl.:
E21B 17/10 (2006.01) E21B 10/26 (2006.01)

(21) Application number: **06001057.6**

(22) Date of filing: **18.01.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(71) Applicant: **Omni Oil Technologies**
Dubai (AE)

(72) Inventor: **Bassal, Adel Ali**
Jebel Ali
Dubai (AE)

(74) Representative: **Kandlbinder, Markus Christian et al**
Zeitler - Volpert - Kandlbinder
Patentanwälte
Herrnstrasse 44
80539 München (DE)

(54) **Conical downhole reamer**

(57) The present invention relates to a stabilizer tool to be used in oil well drilling. This drill string tool is typically mounted in the lower part of a drill string and is rotated by adding a rotating force to the drill string from the surface or by actuation of a down hole motor. The rotating drill bit produces a borehole at a diameter equal to the drill bit as the drilling proceeds downward. In many cases, earth formation can be relatively soft or subject or suffers a geometrical change. This change may take place due to absorbing moisture from the drilling mud. In such cases earth formation swells and closes on the drill string, choking the drill string rotary movement and producing potentially damaging torque. The present invention provides a hole reaming tool that has: - A body contains a through bore for passing drilling fluid.

- Outside of said body, it has a lower tapered part that holds hard reaming carbide buttons to ream the hole back to size. Above the tapered part is a straight stabilizing part which constrains and holds the drill string steady during the drilling operation.

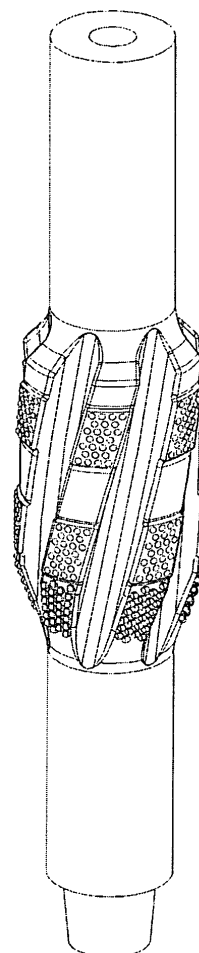


Fig (3)

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a *Stabilizer with Front Reamer* to be used to stabilize a drilling String during operation. The *Stabilizer with Front Reamer* of the present invention is directed to an arrangement that will stabilize the drilling string and at the same time to gauge the drilled hole to size. The flexibility of this invention allows for increasing or decreasing the front hole gauging capacity according to need.

BACKGROUND OF THE INVENTION

[0002] Both reamers and stabilizers have traditionally been employed in oil well drilling operations for the petroleum industry. Stabilizer with front reaming is to provide two main functions:

[0003] The first function provided by the described device is to act as a reamer. Reamer part is to cut formations to enlarge the bore hole to the desired size, which may be the original size of the bit in the case the drill bit wears to be under-gauged. However, even for new bits, reamers are employed to cut formations because the bit does not always drill a true circular bore hole and because of slight lateral shifting inherent in the drilling operation; that shifting leaves ledges and other distortions along the bore. Another need for a reamer is due to the interaction of drilling mud with the earth formation; which leads to formation swelling and hence diameter reduction.

[0004] The second function of this device is to keep the drill stem in the centre of the hole, which means the device acts as a stabilizer. Stabilizers are positioned above the drill bit to ensure that the drill bit - stabilizer assembly drill a straight hole of the desired diameter. Maintaining the drill stem centered has many benefits. The primary benefit is to minimize unintentional hole-angle directional drilling.

[0005] A stabilizer thereby extends the life of the drill bit by confining the drill string movement into the original hole size.

[0006] The present invention provides the public with an alternative to existing reamers.

SUMMARY OF THE INVENTION

[0007] Therefore according to a first aspect of the present invention there is provided a reamer for use in association with a stabilizing element to the drill stem and a drill bit in drilling a hole in a rock formation, said stabilizer with front reaming (1) having:-

- a body having a through going bore (2) for passage of drilling fluids there through; said body having a conical lower part (3) adapted from connection to a drill string and a generally reamer part of diameter gradually smaller than said upper part, and

- said stabilizer part including plurality of wear surfaces (4),(5) located on an outer surface thereof that bear against a surrounding drill hole surface and a plurality of spaced apart, axially extending spiral flutes (6) cut into said outer surface; wherein said wear surfaces include two or more stabilizing bands (4),(5) axially spaced along the stabilizer part.

[0008] The adoption of two or more bearing points, represented by the wear surfaces provides for stability in the position of the reamer and thereby the drill assembly. Preferably, stabilizing bands axially spaced along the stabilizer part are separated by a region of reduced diameter (7).

[0009] By arranging hard reaming carbide inserts (8) along the length of the conical body, the reamer is thus in use, brought to bear against the drilled hole-wall at circumferentially spaced positions. The surface of the reamer rubs against the hole-wall thereby ensuring to ream hole back to gauge.

[0010] Preferably, said wear surfaces are all studded with a plurality of hardwearing studs, for example carbide surface studs.

[0011] The stabilizer with front reaming of the present invention may be embodied as either a near bit stabilizer reamer in which the reamer part is adjacent the drill bit in use, or alternatively as a string Stabilizer reamer in which the reaming part is spaced along the drilling string from the drill bit.

[0012] Preferably, said spaced apart, axially extending spiral flutes cut into said outer surface are cut at a low angle relative to thereby minimize the extent of helical movement in fluid moving along the flutes.

[0013] In a particularly preferred embodiment of the present invention the spaced apart axially and spirally extending spiral flutes cut into said outer surface are milled out, and the distance between adjacent axially spaced wear surfaces are arranged such that, around the circumference of the reamer, a wear surface engages the surrounding hole wall at some point.

DESCRIPTION OF DRAWINGS

[0014] The above and other objects, features, and advantages of the present invention will be apparent from the following accompanying drawings. In the drawings:

Figure (1) shows the outer profile of the tool. It shows a conical reaming part and two stabilizing bands.

Figure (2) shows the tool after milling of the spiral flutes and insertion of wear inserts.

Figure (3) shows a three dimensional representation of the final assembled device.

Claims

1. Stabilizers and Reamers are traditionally used in oil

well drilling. These two tools are common in oil field drilling operations. The current invention relates to a new tool that can perform as a stabilizer for the drill string, and has a leading reamer that reams a wide range of diameters up to nominal bit size. The front Reamer is designed on a conical body.

2. A stabilizer is used in oil well drilling. Said stabilizer includes an outer surface symmetrical to the axis of rotation; said outer surface is generally parallel to said axis of rotation; said surface also includes a plurality of hard carbide inserts or other hard material to slow down wear on the stabilizer outer surface due to continuous rotation of the drill string and the contact with the well walls. 10
3. A stabilizer-Reamer body as in claims 1 and 2 wherein there are right hand spiral grooves, each having an angular width and they have a depth of several millimeters depending on the necessary mud flow required. 15
4. Reamers are to cut formations to enlarge the bore hole to hole nominal size, which in most cases the original bit size, as in some cases the drill bit wears down to be under nominal size. However, even for new bits, reamers are employed to cut formations because the bit does not always drill a true circular bore hole because of slight lateral shifting inherent in the drilling operation; that shifting leaves ledges and other distortions along the bore. Another need for reamers is due to the interaction of drilling mud with the earth formation; which leads to formation swelling and hence hole diameter reduction. 25
5. For the current invention, the reamer part is designed on a conical body as in claim 1 has the advantages of gradual engagement with the earth formation at any required rate - depending on the angle of the conical part - to ream the drilled hole, and open hole back to nominal size. 30
6. Opening the drilled hole back to nominal diameter as in claim 3 eliminates and/or reduces the interference between the stabilizer part and the hole formations. This results in reduction of the required torque to rotate the drill string, and consequently reduces forces, and heat generation due to friction with the well walls. 35
7. A Reamer conical section at the bottom of the stabilizer section wherein the surface converges at an angle generally varies according to required reaming capacity. 40
8. A Reamer as in the above claim wherein hard dome tungsten carbide inserts are arranged circumferentially on the conical part around said axis of rotation. 45

9. A Reamer conical part is to ensure gradual Reamer-Formation engagement and removal of excess or swollen formation.

- 5 10. A reaming stabilizer for use in boreholes including;
 - a body having respective recesses helically cut around an axis of rotation
 - said Stabilizer having an outer surface symmetrical to the axis of rotation, said outer surface having a plurality of tungsten carbide inserts flush with the surface.
 - Said body has a conical part below the said stabilizer that has a polarity of arrangement of Tungsten carbide Domes protruding from the surface to gradually ream the drilled hole.

A Stabilizer with front reaming capacity substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings is a new concept for reaming stabilizers.

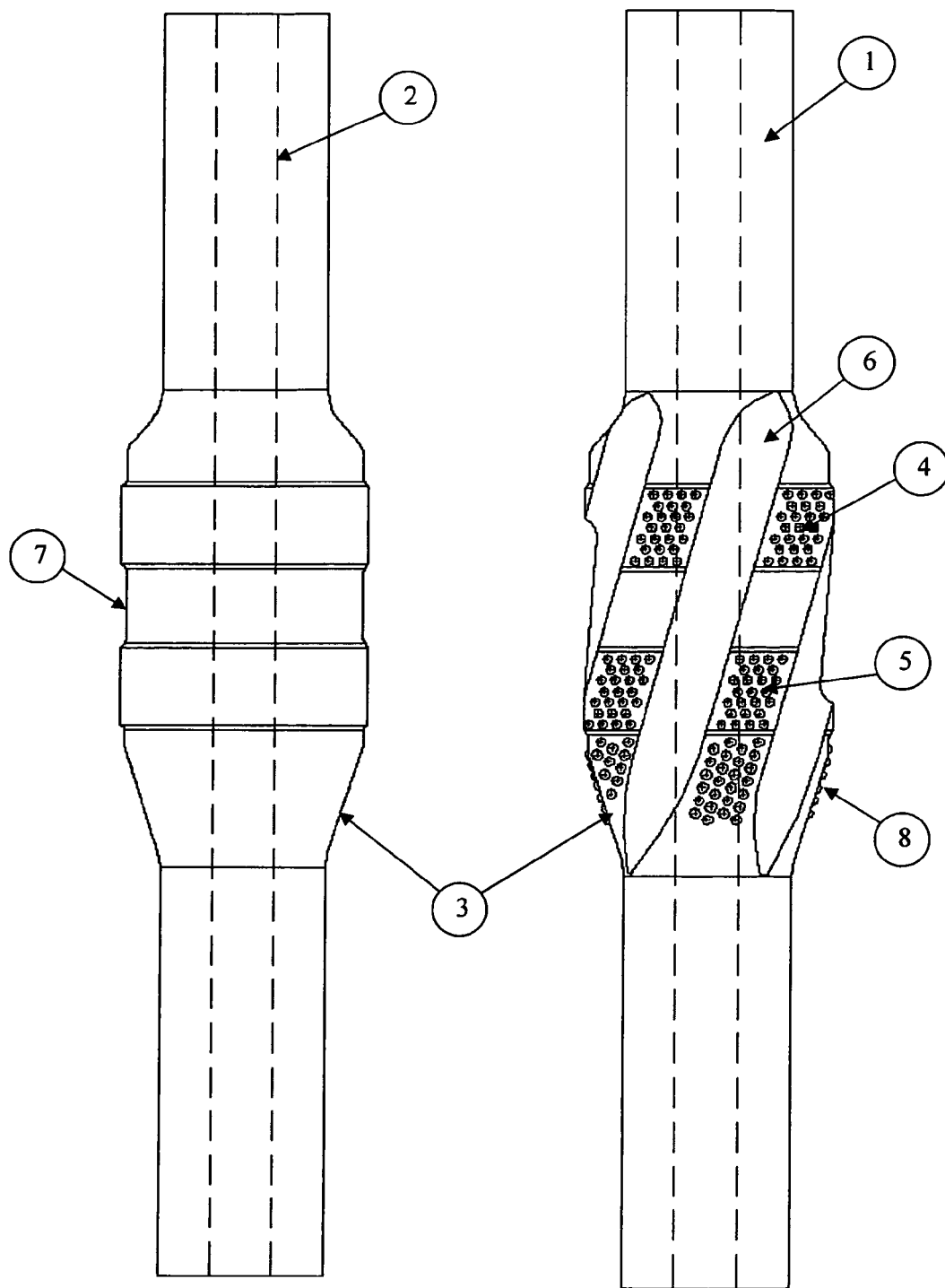


Fig (1)

Fig (2)

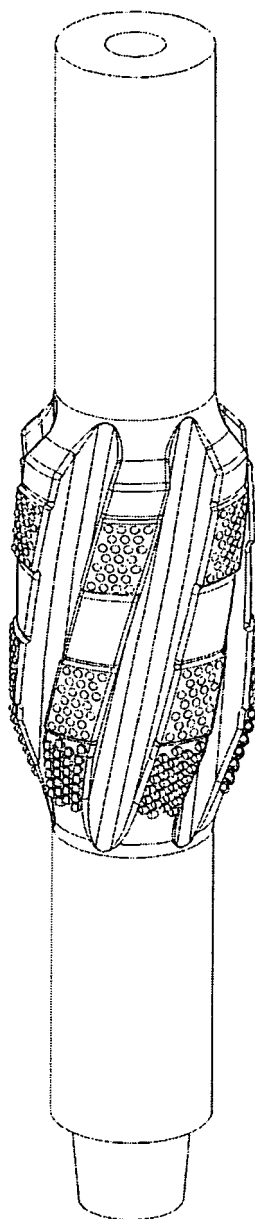


Fig (3)



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 00 1057

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 385 669 A (KNUTSEN ET AL) 31 May 1983 (1983-05-31) * figure 1 *	1-10	INV. E21B17/10 E21B10/26
X	WO 2004/029402 A (TRANSCO MANUFACTURING AUSTRALIA PTY LTD; BASSAL, ADEL, ALI) 8 April 2004 (2004-04-08) * page 4 - page 6 * * figures 1-3 *	1-10	
X	US 3 285 678 A (GARRETT WILLIAM R ET AL) 15 November 1966 (1966-11-15) * figures 1,6 *	1-10	
X	US 4 610 316 A (BOAZ ET AL) 9 September 1986 (1986-09-09) * figure 1 *	1-10	
X	GB 2 333 542 A (* DOWNHOLE PRODUCTS PLC) 28 July 1999 (1999-07-28) * abstract *	1-10	
X	SMITH SERVICES: "Double Diamond Combo Tool"[Online] 2002, XP002382805 Retrieved from the Internet: URL: http://www.siismithservices.com/files/Stabilizer_-_Double_Diamond®_Combo_Tool_Product_Bulletin.pdf [retrieved on 2005-05-29] * the whole document *	1-10	TECHNICAL FIELDS SEARCHED (IPC)
A	GB 2 133 062 A (* GROOM INTERNATIONAL LIMITED) 18 July 1984 (1984-07-18) * abstract * * page 1, line 11 - page 2, line 39 * * figures 1,2 *	1-10	E21B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 29 May 2006	Examiner Schouten, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

9
EPO FORM 1503 03/02 (P04C01)



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 00 1057

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 3 237 705 A (JR. EDWARD B. WILLIAMS,) 1 March 1966 (1966-03-01) * figure 2 *	1-10	
A	US 2 217 592 A (KRICK ARTHUR E ET AL) 8 October 1940 (1940-10-08) * figure 5 *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 29 May 2006	Examiner Schouten, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

9
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 00 1057

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

29-05-2006

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4385669	A	31-05-1983	CA 1154430 A1	27-09-1983

WO 2004029402	A	08-04-2004	NONE	

US 3285678	A	15-11-1966	NONE	

US 4610316	A	09-09-1986	NONE	

GB 2333542	A	28-07-1999	NONE	

GB 2133062	A	18-07-1984	NONE	

US 3237705	A	01-03-1966	NONE	

US 2217592	A	08-10-1940	NONE	
