BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen
(D) [ ] No distribution

D E C I S I O N
of 26 May 2003

Case Number: T 0442/00 - 3.2.3

Application Number: 93101796.6

Publication Number: 0569663

IPC: E21B 10/46

Language of the proceedings: EN

Title of invention:
Improved anti-whirl drill bit

Applicant:
BAKER HUGHES INCORPORATED

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56, 123(2)

Keyword:
"Inventive step - (yes) after amendment"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0442/00 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 26 May 2003

Appellant: BAKER HUGHES INCORPORATED
3900 Essex Lane
Suite 1200
P.O. Box 4740
Houston, Texas 77210-4740 (US)

Representative: Busse & Busse
Patentanwälte
Postfach 12 26
D-49002 Osnabrück (DE)

Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 21 October 1999 refusing European patent application No. 93 101 796.6 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: C. T. Wilson
Members: J. B. F. Kollar
J. P. B. Seitz

Summary of Facts and Submissions

I. With decision of 21 October 1999 the Examining Division refused European patent application No. 93 101 796.6 in the light of

(D1) EP-A-0 384 734

on the grounds of lack of inventive step, Article 56 EPC.

II. Against the above decision of the Examining Division the applicant - appellant in the following - lodged an appeal on 17 December 1999 paying the fee on the same day and filing the statement of grounds of appeal on 11 February 2000 together with new claims 1 to 8.

III. Following the Board's Communication pursuant to Article 11(2) of the rules of procedure of the Boards of Appeal in which the Board raised objections under Article 123(2) EPC the appellant filed on 8 May 2003 a new main claim and a new description adapted thereto.

The new claim 1 reads as follows:

"1. An anti-whirl rotary drag bit for drilling subterranean formations, said drag bit (10) comprising:

- a bit body including a bit face portion (26) having a profile (42) extending to a gage portion (14) of the bit body located above said bit face portion of the bit body of the bit (10) oriented during drilling, the bit face portion (26) extending to the gage portion (14) via an intervening flank-portion (40) of the bit face portion (26) of said bit body,

- a bearing zone (12) located on said gage portion (14) of said bit body at one side of said bit body,

- a first plurality of cutters (16-24) extending outwardly from said profile (42) of said bit body a first height and being located on the cutting zone of said bit face portion (26) said cutting zone designating the area of the bit face portion (26) other than a flank portion (40) adjacent said bearing zone (12), said first plurality of cutters (16-24) for generating a directed side force vector toward said bearing zone (12) by said first plurality of cutters (16-24) on said cutting zone engaging portions of said subterranean formations during said drilling thereof, characterized by
a second plurality of cutters (34,36,38;136;236;336) located on said flank portion (40) adjacent said bearing zone (12)of said bit face portion (26) extending outwardly from said profile (42) of said bit body a lesser height than the first height of said first plurality of cutters (16-24)."

IV. The appellant requests to set aside the decision under appeal and to grant the patent on the basis of

- claim 1 submitted with letter of 8 May 2003

- claims 2 to 8 filed with letter of 10 February 2000

- description pages 1 to 10 submitted with letter of 8 May 2003

- drawings Figures 1 to 4 as originally filed.

V. The appellant's arguments can be summarized as follows:

D1 does not disclose or suggest an anti-whirl drag bit having a second plurality of cutters having a lesser height than the first plurality of cutters located on the flank portion of the bit body which, in turn, is located adjacent and below the bearing pad on the gage portion of the bit body.

D1 discloses in drawing Figures 1 through 3B a generic drill bit body having a bearing pad 20 which may extend down onto a rounded face portion of the bit body and which may have cutters therein generating less force than the cutters in the cutting zone. Alternatively, the drill bit as shown in drawing Figure 15 of D1 has a bearing pad created by removal of cutters 16, 17, 18, 10, 11, 12, 9 and 7 from the bit body which suggests that the bearing pad extends from the gage portion of the bit through at least a portion of the flank of the bit body. The drill bit of Figure 15 of D1 thus does not disclose anything more than the description of the prior art as set forth in the specification, column 1, line 42 to column 2, line 25 of the A1 print.

The present invention of the amended claim 1 specifically sets forth and distinguishes the claimed invention from the example of drawing Figure 15 of D1. That is, a bearing pad located solely or only on the gage portion of the drill bit having a second plurality of cutters having a lesser height than the first plurality of cutters being located in the flank portion of the bit body adjacent and below the bearing zone. This results in an anti-whirl drill bit having a greater penetration rate and lesser bearing pad wear than that achieved by D1 in either the drill bit of

drawing Figure 1 through 3B or the drill bit of drawing Figure 15.

Reasons for the Decision

1. The appeal is admissible.

2. *Article 123(2) EPC*

The features "first flank region" and "second flank region" of the flank portion being deleted from the main claim filed with the letter of 10 February 2000 results in that claim 1 now on file is not open to an objection under Article 123(2) EPC.

3. *Inventive step*

3.1 The invention relates to improvements in bit design for so-called "anti-whirl" bits. As is known from the prior art, cf. column 1, line 42 ff of the A1 print, one solution of the problem caused by bit whirl has been to focus or direct the imbalance forces as a resultant side force vector to a particular side of the bit via changes in cutting element placement and orientation and bit mass location and to cause the bit to ride on a low friction bearing zone or pad on the gage of the side of the bit, thus substantially reducing the drill bit/bore hole wall tangential forces which induce whirl - cf. D1.

According to the present application, it has been suggested in the prior art that the bearing zone on the bit gage may include cutting elements of different sizes than the cutters located in the cutting zone of

the bit, which extends over the bit face from the center thereof outwardly to the gage except in the flank area of the face adjacent the beating zone.

The use of anti-whirl bits having a cutter-devoid bearing zone and adjacent profile has resulted in excessive wear of the bearing zone as well as of the cutters on the flank of the bit, which shortens bit life even when cutting elements in the cutting zone of the bit still have significant life remaining. According to the description (see column 2, the second paragraph) this problem manifests itself especially when the bit has to ream to reach the bottom of the hole.

3.2 Starting from document D1, on which the preamble of claim 1 is based, the objective problem to be solved by the invention is the provision of an anti-whirl drill bit having cutters placed on the bit profile in such a manner that the remaining capabilities and wear resistance of the bit to high side loads is enhanced without adversely affecting the anti-whirl tendencies of the bit.

3.3 The Board is satisfied that this problem is solved by the means specified in the characterising portion of claim 1.

There is no incentive in the prior art documents cited in the case which would have led the skilled person staring from D1 to the concept of providing additional cutters (designated 34, 36 and 38 in Figure 1) on the profile of the bit adjacent bearing zone 12 in a flank region 40 of the bit. In particular, there is no suggestion in the cited prior art that the additional

cutters should have a lesser height than the plurality of cutters located in the cutting zone of the body.

This arrangement forms the inventive idea relying on the recognition that said arrangement of the bearing zone cutters (34, 36, 38...) results in that the flank region 40 adjacent the bearing zone 12 and the cutting zone 26 gain different characteristics which provide special and surprising effects, such as resisting the tendency of the bit to tilt, cock or wobble in the bore hole, and an extension of the bit life. These results are unexpected since normally a skilled person would have relied on bits having a cutter-devoid bearing zone since it formed part of the technical knowledge of the person skilled in the art (see for example D1) that the removal of cutters provided a very acceptable high speed drill bit that exhibited no destructive whirling. Thus, the prior art could not provide a pointer towards the concept of the cutters arrangement claimed in the present application.

3.4 Hence, the subject-matter of the independent claim 1 is neither known from, nor rendered obvious by the available prior art. Claim 1 together with dependent claims 2 to 8 relating to preferred embodiments, therefore meet the requirements of Article 52(1) EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to grant a patent with the following documents:

   - claim 1 submitted with letter of 8 May 2003,

   - claims 2 to 8 filed with letter of 10 February 2000,

   - description pages 1 to 10 submitted with letter of 8 May 2003 and

   - drawings Figures 1 to 4 as originally filed.

The Registrar: The Chairman:

A. Counillon C. T. Wilson