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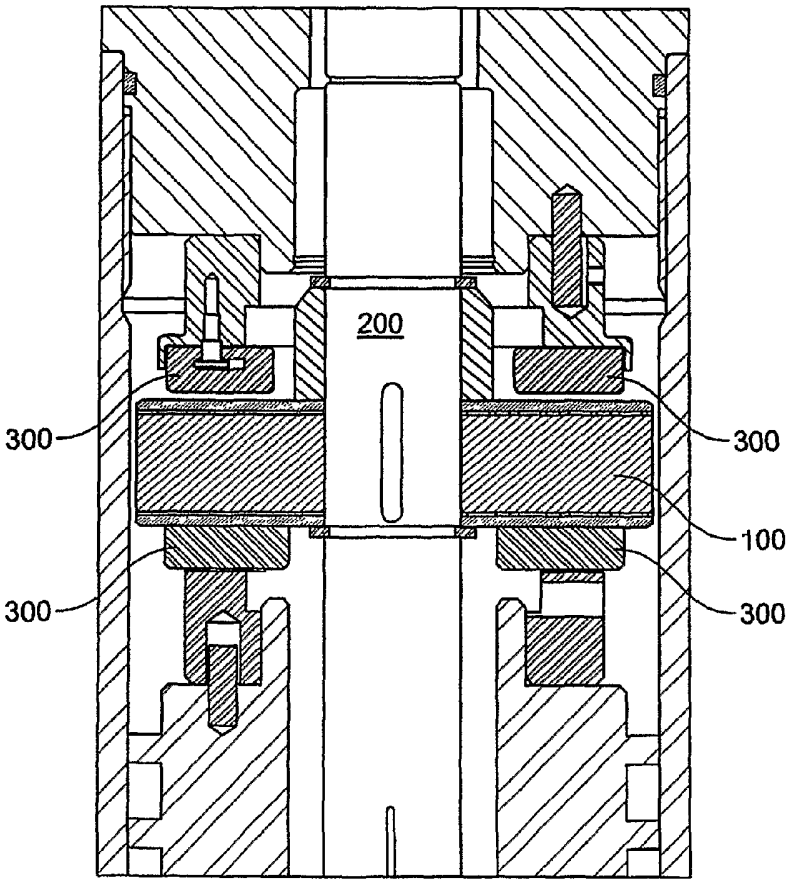
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(54) Title: HYDRODYNAMIC BEARING RUNNER FOR ELECTRIC SUBMERSIBLE PUMPS



(57) Abstract: An electrical submersible pump runner having a core layer and a wear layer affixed to the core layer. One embodiment of the invention provides an electrical submersible pump that includes a motor section and a centrifugal pump section. A seal section and rotary gas separator may also be included. The pump is powered by an electric cable that connects the pump. Located in a bore hole, to a power source on the surface. A thrust runner coated with a wear layer (e.g., polymer) is provided in the motor and/or seal section to reduce bearing temperature, provide longer bearing life, reduce costs, and facilitate overhaul. The runner may also function as a rotating up-thrust bearing when the runner is coated with a wear layer on one side that is formed with a bearing geometry. In this case, the up-thrust bearing may be eliminated.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/15918

A. CLASSIFICATION OF SUBJECT MATTER
IPC: **F04D 29/047**(2006.01),**29/057**(2006.01)

USPC: 415/104,107,229;384/907,625,590,420
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)
U.S. : 415/104,107,229;384/907, 625, 590, 420

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
None

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 3,567,504 A (HOPKINS et al.) 2 March 1971, Fig.s 1-7.	1, 2, 7, 8, 10, and 15-17 ---------- 3, 4, 5, 6, 9, 18, and 27
X	US 6,017,184 A (AGUILAR et al.) 25 January 2000, Fig. 6.	1, 8-10, and 15
Y	US 5,718,516 A (CHEEVER et al.) 17 February 1998, Fig. 1	1-4, 5-7, 9, and 15-18
Y	US 6,565,257 B1 (KENNEDY et al.) 20 May 2003, Figs. 1-3.	27
A	US 5,509,738 A (HAYNES et al.) 23 April 1996, Figs. 1-4.	1-40
A	US 4,208,472 A (CHO et al.) 17 June 1980, Figs. 1-2.	1-40

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Continuation of B. FIELDS SEARCHED Item 3:
East
search terms: bearing, thrust, runner, polymer, polyimide, wear, shaft