

**Search history**

Search 1: FT=(SUBMERSIBLE~ AND PUMP~ AND CENTRIFUGAL~ AND ESP~ AND PORT~) (Results 471)  
Search 2: 1 and ventilation (Results 1)  
Search 3: 1 and hole\* (Results 79)  
Search 4: 1 and diffuser (Results 62)

**Title:** DEEP WELL ELECTRICAL **SUBMERSIBLE PUMP** WITH UPLIFT GENERATING IMPELLER MEANS

**Abstract:** Source: US5201848A An electrical downhole **centrifugal pump** for **pumping** fluids from a deep well includes a relatively small diameter **pump** housing which is suspended from a tubing string and including a series of impellers and **diffusers**. The impellers are mounted on a vertical shaft connected to a motor for driving the impellers relative to the **diffusers** on the housing. Upper and lower shrouds enclose the top and bottom surfaces of impeller blades rotating with the shaft. A first group of impellers are arranged to move freely longitudinally on the shaft while a second group are fixed to the shaft to prevent relative longitudinal motion. A lifting vane is formed on the outer surface of the upper shroud on the impellers which are fixed to the shaft. A net lifting force is thus applied to the shaft by those impellers of the second group having upthrust impellers to diminish the load carried by a **pump** shaft thrust bearing.

**Classifications:**

**International (IPC 8-9):** F04D13/08 F04D13/10 F04D29/04

F04D29/22 F04D29/54 (Advanced/Invention);

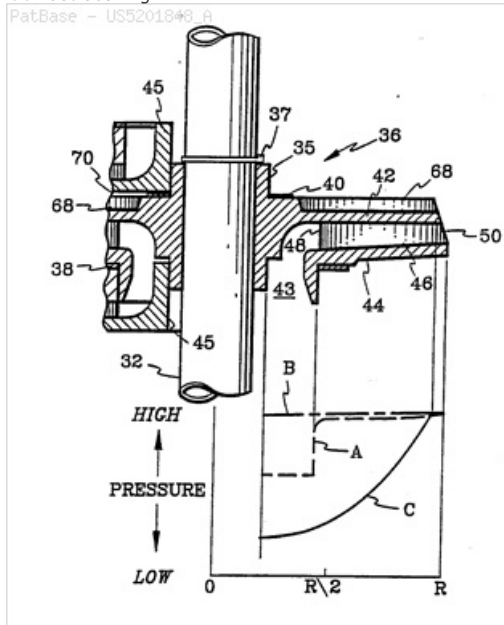
F04D13/06 F04D29/04 F04D29/18 F04D29/40 (Core/Invention)

**International (IPC 1-7):** F04D1/06 F04D13/08 F04D29/44 F04D29/54

**CPC:** F04D29/0416 F04D29/2266 F04D13/10 F05B2240/52

**European:** F04D13/10 F04D29/041 F04D29/04P2 F04D29/22D2  
R05B240/52

**US:** 415/199.1



**Family:**

| Publication number | Publication date | Application number | Application date |
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| CA2119147 AA       | 19940315         | CA19922119147      | 19920921         |
| GB2275507 A1       | 19940831         | GB19940006406      | 19920921         |
| GB2275507 B2       | 19950705         | GB19940006406      | 19920921         |
| GB9406406 A0       | 19940615         | GB19940006406      | 19920921         |
| NO941193 A         | 19940330         | NO19940001193      | 19940330         |
| NO941193 A0        | 19940330         | NO19940001193      | 19940330         |
| US5201848 A        | 19930413         | US19910770071      | 19911001         |
| WO9307393 A1       | 19930415         | WO1992US08056      | 19920921         |

**Priority:**

US19910770071 19911001 WO1992US08056 19920921

**Probable Assignee:** BAKER HUGHES INC

**Assignee(s):** (std): CONOCO INC

**Assignee(s):** POWERS MASTON L ; BAKER HUGHES INC

**Inventor(s):** (std): POWERS MASTON L

**Inventor(s):** MASTON L POWERS

**Agent(s):** OYEN WIGGS GREEN AND MUTALA LLP

**Designated states:** AT BE CA CH DE DK ES FR GB GR IE IT JP KR LU MC NL NO SE

**Title:** INDUSTRIAL VAPOR CONVEYANCE AND DEPOSITION

**Abstract:** Source: US2003041801A A process for deposition and condensation and reaction and separation and distillation employing at least two chambers separated by a diaphragm with at least one separation wall and at least one orifice or flow duct or plurality thereof, said process providing a controlled and stationary conveyance capacity of an uncondensed intermediary phase for a product or by-product with a controlled concentration, structure or microstructure, for example, said conveyance capacity relying on a controlled pressure of an atmosphere in the at least two chambers on both side of said diaphragm and on a novel diaphragm and condenser technology and a temperature control of one or more chamber walls or said diaphragm or parts of said diaphragm being transversed by said uncondensed intermediary phase. For a given pressure (difference) in the at least two chambers, surface roughness and form (such as cross and transverse section including widening, nozzle, funnel, flow and guide elements, heat exchanger, bifurcation and bend) and geometry including form and size of such structural part components of an orifice or flow duct or a combination of them affect the driving force for the resulting rate of conveyance and, for a given conveyance capacity, the resulting rate of deposition or condensation or reaction or separation or distillation via said uncondensed intermediary phase per orifice or flow duct. The new process includes (i) a condensation-free formation of a reservoir of an uncondensed phase under controlled flow conditions in front of a diaphragm, (ii) local pulse forces in an orifice or flow duct being controlled by local flow speed or local flow density or local flow pressure of said uncondensed phase to provide macroscopic control of an uncondensed intermediary and final phase or material and (iii) controlled conveyance and production rates under conditions of said local control and being independent from gravitational acceleration so orientation of individual modules or units or assembly of a production plant.

**Classifications:**

**International (IPC 8-9):** C22C21/00 C22C23/00 C22C23/06 C22C45/00 C23C14/14 C23C14/22 (Advanced/Invention);

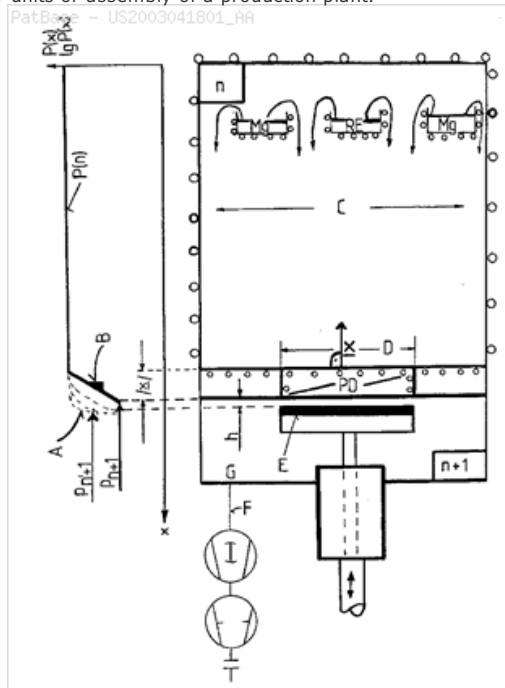
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**International (IPC 1-7):** C22C21/00 C22C23/00 C22C23/06 C22C45/00 C22F3/00 C23C14/14 C23C14/22 C23C14/54 C23C16/00 F15D1/02

**CPC:** Y10T137/85938 Y02T50/67 C23C14/14 C23C14/22

**European:** C23C14/14 C23C14/22 Y02T50/67

**US:** 118/715 118/718 118/718S 118/723 118/723VE 137/561.00A 137/561A 138/38 138/38S 138/4 138/40 138/40S 138/42 138/44 148/404 148/406 148/42 148/420 148/420S 148/437 148/437S 148/666 148/667 420/402 420/407 420/407S 427/248.1 427/248.100S 427/255.5 95/45 96/4

**Family:**

| Publication number | Publication date | Application number | Application date |
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| AU199537084 A1     | 19960304         | AU19950037084      | 19950719         |
| AU199539734 A1     | 19960304         | AU19950039734      | 19950731         |
| EP0772698 A1       | 19970514         | EP19950926967      | 19950719         |
| EP0815282 A2       | 19980107         | EP19950944461      | 19950731         |
| JP10506150 T2      | 19980616         | JP19960506141T     | 19950719         |
| US2003041801 AA    | 20030306         | US20010766644      | 20010123         |
| US2003183306 AA    | 20031002         | US20020265467      | 20021007         |
| US6248399 BA       | 20010619         | US19970776381      | 19970303         |
| US6544357 BA       | 20030408         | US19970776382      | 19970131         |
| US6908516 BB       | 20050621         | US20020265467      | 20021007         |
| US6941973 BB       | 20050913         | US20010766644      | 20010123         |
| WO9604409 A1       | 19960215         | WO1995EP02882      | 19950719         |
| WO9604410 A1       | 19960215         | WO1995EP03076      | 19950731         |

**Priority:**

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| EP19940111991 | 19940801 | EP19950926967 | 19950719 | EP19950944461 | 19950731 |
| WO1995EP03076 | 19950731 | US20010766644 | 20010123 | WO1995EP02882 | 19950719 |
| US19970776381 | 19970303 | US20020265467 | 20021007 | US19970776382 | 19970131 |

**Probable Assignee:** HEHMANN FRANZ IBURGER STRASSE

**Assignee(s):** (std): FRANZ HEHMANN ; HEHMANN FRANZ ; HEHMANN FRANZ DR ; WEIDEMANN MICHAEL

**Assignee(s):** HEHMANN FRANZ IBURGER STRASSE

**Inventor(s):** (std): HEHMANN FRANZ ; HEHMANN FRANZ DR ; WEIDEMANN MICHAEL ; MICHAEL WEIDEMANN ; FRANZ HEHMANN

**Agent(s):** FOLEY AND LARDNER LLP; FOLEY AND LARDNER

**Designated states:** AT AU BE CA CH CN DE DK ES FR GB GR IE IT JP KR LI LU MC NL PT RU SE US

**Title:** Production system and method for producing fluids from a well

**Abstract:** Source: US2003019633A A production system and method for producing fluids from a well are presented. The production system may include a **submersible pump** and a jet **pump**. The **submersible pump** may be arranged within the well. The jet **pump** may be arranged within the well downstream of the **submersible pump**. The jet **pump** may include a power fluid intake configured to receive a power fluid and a produced fluid intake configured to receive a produced fluid. The power fluid intake may be in fluid communication with the **submersible pump**. The produced fluid intake may be in fluid communication with gas within the well. In an embodiment, the produced fluid intake may be in fluid communication with separated gas within an annulus of the well. Beneficially, the system may allow, among other things, a **submersible pump** and a jet **pump** to be used in combination in high gas-liquid-ratio wells without installing a gas vent line.

**Classifications:**

**International (IPC 8-9):** E21B43/12 E21B43/38 (Advanced/Invention)

**International (IPC 1-7):** E21B33/03 E21B43/00 E21B43/12

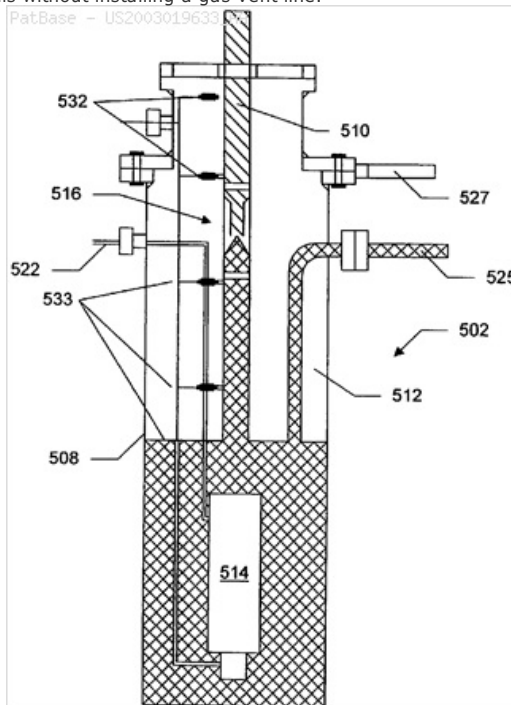
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**European:** E21B43/12B10 E21B43/12B12 E21B43/12B2

E21B43/12B6 E21B43/38

**US:** 166/105 166/370 166/68 166/68S



**Family:**

| Publication number | Publication date | Application number | Application date |
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| AU200053283 A5     | 20001228         | AU20000053283D     | 20000605         |
| BRPI0011410 A      | 20020604         | BR2000PI11410      | 20000605         |
| EP1228311 A2       | 20020807         | EP20000938208      | 20000605         |
| EP1228311 A4       | 20030212         | EP20000938208      | 20000605         |
| NO20015968 A       | 20020207         | NO20010005968      | 20011206         |
| NO20015968 A0      | 20011206         | NO20010005968      | 20011206         |
| US2003019633 AA    | 20030130         | US20020216703      | 20020808         |
| US6497287 BA       | 20021224         | US20000589608      | 20000607         |
| US6705403 BB       | 20040316         | US20020216703      | 20020808         |
| WO0075510 A2       | 20001214         | WO2000US15708      | 20000605         |
| WO0075510 A3       | 20010510         | WO2000US15708      | 20000605         |

**Priority:**

US19990137846P 19990607  
WO2000US15708 20000605

US20000589608 20000607

US20020216703 20020808

**Probable Assignee:** UNIV TEXAS

**Assignee(s):** (std): UNIV TEXAS

**Assignee(s):** THE BOARD OF REGENTS THE UNIVERSITY OF TEXAS SYSTE ; SEPEHRNOORI KAMY ; CARVALHO PAULO M ; PODIO AUGUSTO L ; BOARD OF UNIV OF TEXAS SYSTEM ; THE BOARD OF REGENTS THE UNIVERSITY OF TEXAS SYSTEM ; BOARD OF REGENTS OF THE UNIVERSITY OF TEXAS SYSTEM ; BOARD OF REGENTS THE UNIVERSITY OF TEXAS SYSTEM ; BOARD OF REGENTS UNIV ; BOARD OF REGENTS UNIV OF TEXAS SYSTEM ; BOARD OF REGENTS UNIV OF TEXAS SYSTEMS

**Inventor(s):** (std): CARVALHO PAULO M ; PODIO AUGUSTO L ; SEPEHRNOORI KAMY

**Inventor(s):** KAMY SEPEHRNOORI ; PAULO M CARVALHO ; AUGUSTO L PODIO

**Designated states:** AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BY CA CF CG CH CI CM CN CR CU CY CZ DE DK DM DZ EE ES FI FR GA GB GD GE GH GM GN GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ LC LI LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX NZ NE NL NO NZ PL PT RO RU SD SE SG SI SK SL SN SZ TD TG TJ TM TR TT TZ UA UG UZ VN YU ZA ZW

**Title:** PRESSURIZED BEARING SYSTEM FOR **SUBMERSIBLE** MOTOR

**Abstract:** Source: US2002153789A A method and device are provided for stabilizing shaft bearings in a motor having a hollow shaft and holes communicating the shaft and the bearings. A lubricant **pump** is provided for pressurizing a volume of lubricant located within the motor housing, the **pump** having a set of impellers attached to a lower end of the shaft and rotating with the shaft, the impellers being located in the flow path of the lubricant. A **diffuser** is located upstream of and adjacent each impeller. The impellers increase the radial velocity of the lubricant, and this velocity is converted into a pressure head at the impeller outlet. The lubricant flows through the first **diffuser**, through the first impeller, through the second **diffuser**, and then flows through the second impeller and out into a reservoir. The pressure causes the lubricant to flow through the hollow shaft and through passages to stabilize the bearings.

**Classifications:**

**International (IPC 8-9):** F01D3/00 F04D13/08 F04D13/10 F04D29/04 F04D29/043 F04D29/047 F04D29/06 F04D29/10 F16C17/00 F16C32/06 F16C33/10 F16N7/36 H02K5/12 H02K7/08 H02K7/14 (Advanced/Invention);

H02K5/10 H02K5/132 (Advanced/Non-invention);

F04D29/04 F16C32/06 H02K7/08 H02K7/14 (Core/Invention)

**International (IPC 1-7):** F01D3/00 F04D13/08 F04D29/04 F04D29/06 F04D29/06 F04D29/10 F16C32/00 F16N7/14 F16N7/14 F16N7/36 F16N7/36 H02K5/10 H02K5/12 H02K5/16

**CPC:** F04D29/047 F04D13/10 F04D29/044 F04D29/061 F16C33/1085 H02K5/10 H02K5/132 H02K7/08 H02K7/083 H02K16/02 F04D29/043 F16C32/064 H02K7/14

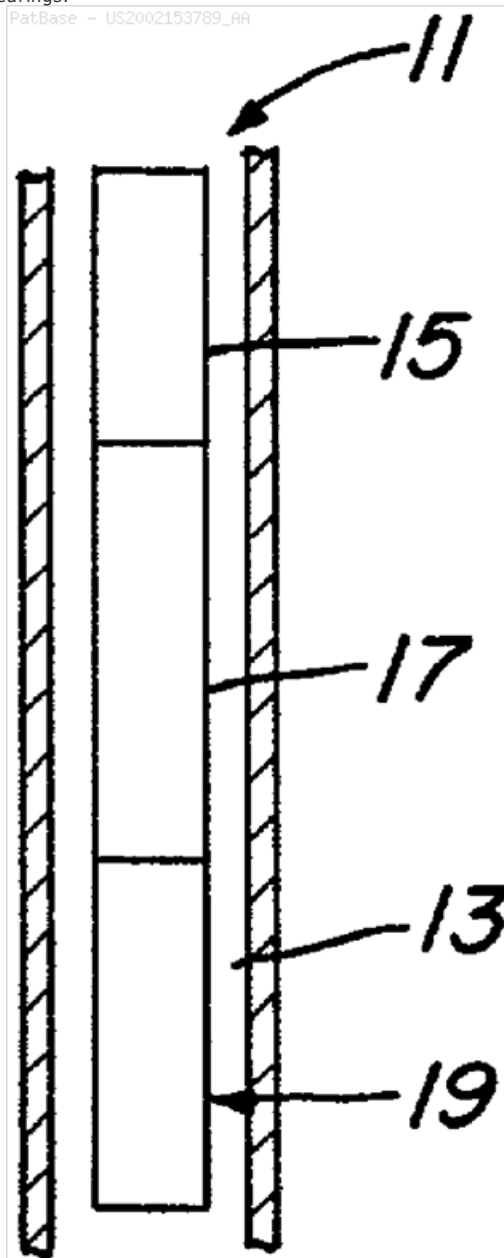
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H02K7/08 H02K7/08C H02K7/14 T02K16/02 T02K5/10 T02K5/132

**US:** 166/385 166/385S 310/87 310/87P 310/90 310/90P 310/90S

415/199.1 415/199.100S 417/423.3 417/423.300S



**Family:**

| Publication number | Publication date | Application number | Application date |
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| CA2382739 AA       | 20021019         | CA20022382739      | 20020419         |
| CA2382739 C        | 20061121         | CA20022382739      | 20020419         |
| CA2617657 AA       | 20080201         | CA20062617657      | 20060815         |
| CA2617657 C        | 20110712         | CA20062617657      | 20060815         |
| GB200208997 A0     | 20020529         | GB20020008997      | 20020419         |
| GB200802042 A0     | 20080312         | GB20080002042      | 20060815         |
| GB2377972 A1       | 20030129         | GB20020008997      | 20020419         |
| GB2377972 B2       | 20031126         | GB20020008997      | 20020419         |
| GB2442417 A1       | 20080402         | GB20080002042      | 20060815         |
| GB2442417 B2       | 20110216         | GB20080002042      | 20060815         |
| SG104314 A1        | 20040621         | SG20020002329      | 20020419         |
| US2002153789 AA    | 20021024         | US20010838741      | 20010419         |
| US2004080224 AA    | 20040429         | US20030684969      | 20031014         |
| US2005269885 AA    | 20051208         | US20050203838      | 20050815         |
| US7492069 BB       | 20090217         | US20050203838      | 20050815         |
| WO07022125 A1      | 20070222         | WO2006US31727      | 20060815         |

**Priority:**

CA20022382739 20020419 US20010838741 20010419 US20030684969 20031014  
WO2006US31727 20060815 US20050203838 20050815

**Probable Assignee:** BAKER HUGHES INC

**Assignee(s):** (std): BAKER HUGHES INC ; KNOX DICK L ; SOUKUP GEORGE

**Assignee(s):** SOUKUP GEORGE C ; ATOMIC AUSTRIA GMBH

**Inventor(s):** (std): DICK L KNOX ; GEORGE SOUKUP ; KNOX DICK L ; SOUKUP GEORGE ; SOUKUP GEORGE C

**Inventor(s):** KNOX DICK

**Agent(s):** SIM AND MCBURNEY; JAMES E BRADLEY BRACEWELL AND GIULIANI LLP; BRACEWELL AND GIULIANI LLP

**Designated states:** AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ  
DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GW HN HR HU ID IE IL IN IS IT JP KE  
KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD MG MK ML MN MR MW MX MZ NA NE NG NI  
NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN SY SZ TD TG TJ TM TN TR TT TZ  
UA UG US UZ VC VN ZA ZM ZW

**Title:** BIOCIDES IMPREGNATION OF COATINGS FOR ESP COMPONENTS

**Abstract:** Source: US2003106687A An electric **submersible pump** has one or more components coated with a biocide-incorporated coating for the purpose of controlling the activity of bacteria. The **portions** exposed to well fluid are coated for inhibiting bacteria from growing. Both **centrifugal** and progressing cavity **pumps** are applicable.

**Classifications:**

**International (IPC 8-9):** B08B17/00 C09D5/14 C09K8/54

E21B43/12 (Advanced/Invention);

B08B17/00 C09D5/14 C09K8/54 E21B43/12 (Core/Invention)

**International (IPC 1-7):** A61L2/16 E21B37/06

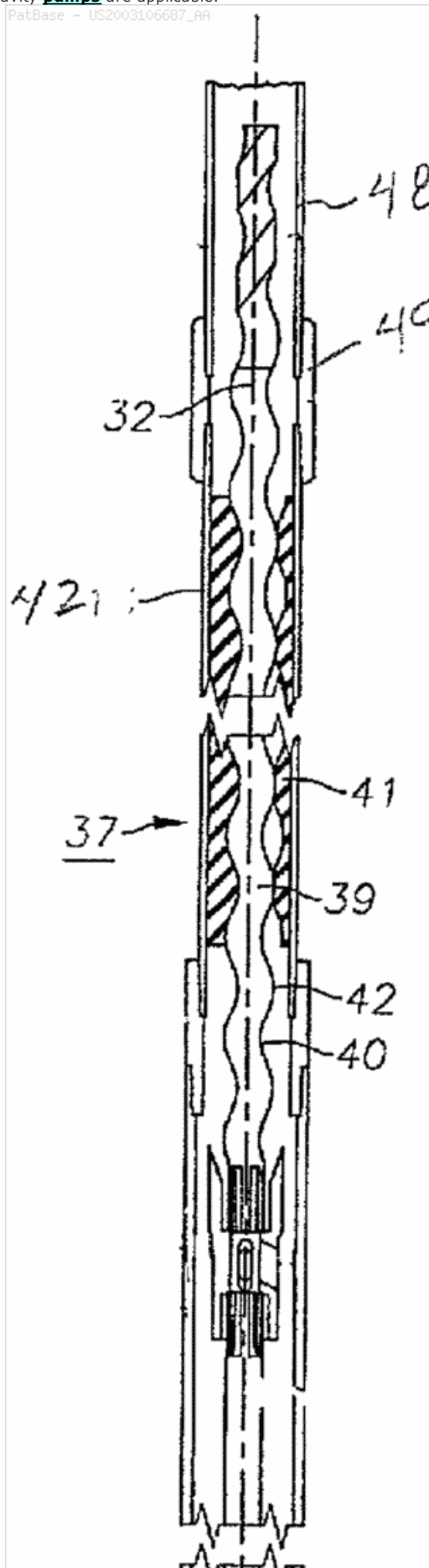
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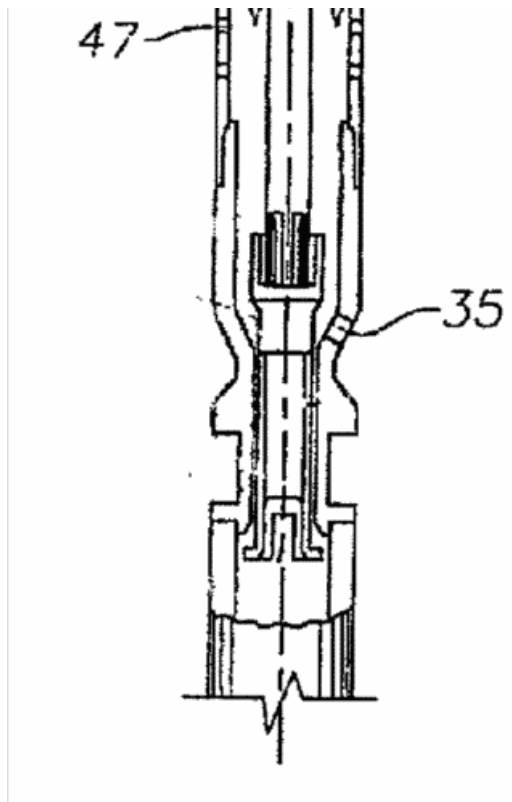
**European:** C09D5/14 C09K8/54 E21B43/12B10

**US:** 166/105 166/105.1 166/242.2 166/246 166/304 166/310

166/902 417/572 422/1 422/14 422/28 422/36 422/37 422/6 422/7

PatBase - US2003106687\_RR





**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| US2003106687 AA    | 20030612         | US20010016393      | 20011210         |
| US2004081578 AA    | 20040429         | US20030687476      | 20031016         |
| US7144549 BB       | 20061205         | US20030687476      | 20031016         |

**Priority:**

US20010016393 20011210      US20030687476 20031016

**Probable Assignee:**

BAKER HUGHES INC

**Assignee(s):** (std):

ADAMS DAN L ; BAKER HUGHES INC

**Inventor(s):** (std):

ADAMS DAN L

**Agent(s):**

BRACEWELL AND GIULIANI LLP

**Title:** ELECTRIC **SUBMERSIBLE PUMP** WITH SPECIALIZED GEOMETRY FOR **PUMPING** VISCOUS CRUDE OIL

**Abstract:** Source: US2003155128A A **centrifugal pump** has impellers for **pumping** low flow, high viscous materials. The impellers have high exit angles greater than 30 degrees and preferably greater than 50 degrees. The impellers and **diffusers** have specific geometry that varies with viscosity. The **pump** has zones of impellers and **diffusers** with the exit angles and geometry in the zones differing from the other zones. The exit angles decrease and geometry varies in a downstream direction to account for a lower viscosity occurring due to heat being generated in the **pump**. One design employs small diameter impellers and high rotational speeds.

**Classifications:**

**International (IPC 8-9):** E21B43/00 E21B43/12 F04B25/00 F04B49/06 F04D13/08 F04D7/04 (Advanced/Invention);

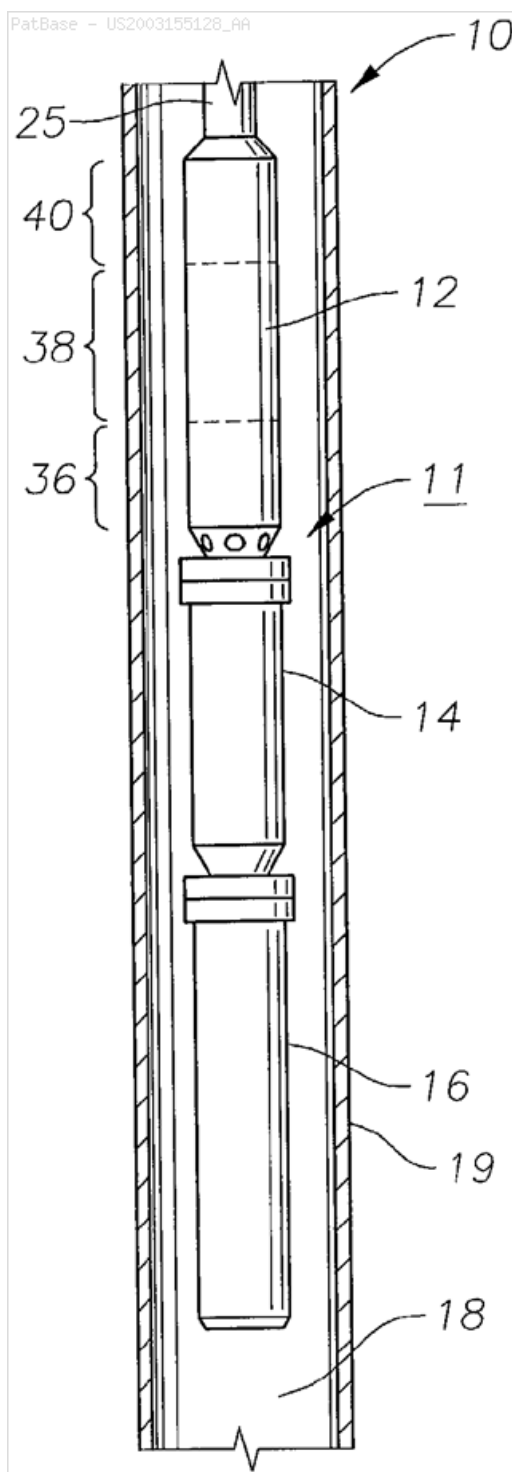
E21B43/00 E21B43/12 F04B25/00 F04B49/06 F04D13/06 F04D7/00 (Core/Invention)

**International (IPC 1-7):** E21B43/00 F04B25/00 F04B49/06 F04D7/04

**CPC:** E21B43/128

**European:** E21B43/12B10

**US:** 166/105 166/369 166/68 166/68.5 417/242.2 417/247 417/266 417/44.1 417/53



**Family:**

| Publication number | Publication date | Application number | Application date |
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| CA2419458 AA       | 20030820         | CA20032419458      | 20030219         |
| CA2419458 C        | 20090804         | CA20032419458      | 20030219         |
| CA2659492 AA       | 20030820         | CA20032659492      | 20030219         |
| CA2659492 C        | 20130423         | CA20032659492      | 20030219         |
| US2003155128 AA    | 20030821         | US20020079374      | 20020220         |
| US2005034872 AA    | 20050217         | US20040946892      | 20040922         |
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| US7409997 BB       | 20080812         | US20040946892      | 20040922         |

**Priority:**

CA20032419458 20030219 CA20032659492 20030219 CA20092419458 20090421  
US20020079374 20020220 US20040946892 20040922

**Probable Assignee:** BAKER HUGHES INC

**Assignee(s):** (std): BAKER HUGHES INC

**Assignee(s):** GAY FARRAL D ; JAMES MARK C ; VANDEVIER JOSEPH E

**Inventor(s):** (std): GAY FARRAL D ; JAMES MARK C ; VANDEVIER JOSEPH E

**Inventor(s):** GAY FARRAL ; VANDEVIER JOSEPH ; JAMES MARK

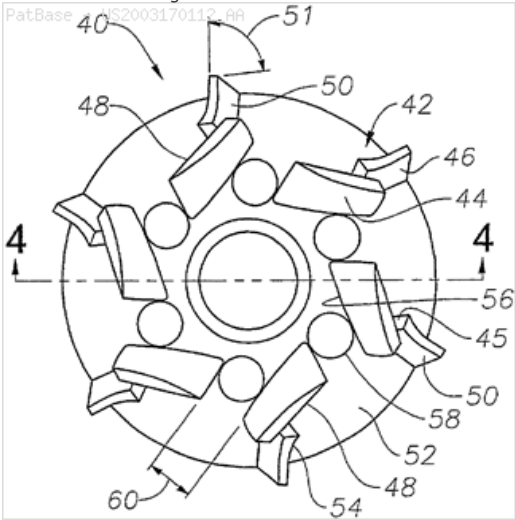
**Agent(s):** SIM AND MCBURNEY; JAMES E BRADLEY BRACEWELL AND PATTERSON LLP; BRACEWELL AND PATTERSON LLP; BRACEWELL AND GIULIANI LLP

Title: **Submersible pump** impeller design for lifting gaseous fluid

**Abstract:** Source: US2003170112A A gas-handling **centrifugal pump** has impellers for **pumping** gaseous materials containing up to 50 percent by volume free gas. The impellers have split vanes with high exit angles up to about 90 degrees and preferably greater than 50 degrees. The split vanes define flow passages that contain large diameter balance holes that typically range between 45 percent to 100 percent of the width between each split vane. The gas-handling **centrifugal pump** can be used as a charge **pump** for a **centrifugal pump** in a lower tandem configuration within a well.

**Classifications:**

**International (IPC 8-9):** F04D1/00 F04D13/10 F04D29/22 F04D29/24 F04D31/00 (Advanced/Invention); F04D1/00 F04D13/06 F04D29/18 F04D31/00 (Core/Invention)  
**International (IPC 1-7):** F01D1/02 F04D1/00 F04D29/22 F04D29/24 F04D31/00  
**CPC:** F04D29/2288 F04D29/242 F04D31/00  
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**Family:**

| Publication number | Publication date | Application number | Application date |
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| CA2477293 AA       | 20040823         | CA20032477293      | 20030304         |
| CA2477293 C        | 20080520         | CA20032477293      | 20030304         |
| RU2004129596 A     | 20050910         | RU20040129596      | 20030304         |
| RU2309297 C2       | 20071027         | RU20040129596      | 20030304         |
| US2003170112 AA    | 20030911         | US20020091238      | 20020305         |
| US2004047728 AA    | 20040311         | US20030656411      | 20030905         |
| US6676366 BB       | 20040113         | US20020091238      | 20020305         |
| US6893207 BB       | 20050517         | US20030656411      | 20030905         |
| WO03076811 A1      | 20030918         | WO2003US06546      | 20030304         |

**Priority:**

US20020091238 20020305      US20030656411 20030905      WO2003US06546 20030304

**Probable Assignee:** BAKER HUGHES INC

**Assignee(s):** (std): BEJKE KH JUZ INKORPOREJTED ; KAO ALAN LIN ; BAKER HUGHES ; BAKER HUGHES INC

**Assignee(s):** KAO LIN

**Inventor(s):** (std): KAO ALAN LIN ; KAO LIN ; LIN KAO

**Inventor(s):** LIN' KAO

**Agent(s):** SIM AND MCBURNEY; BRACEWELL AND PATTERSON LLP

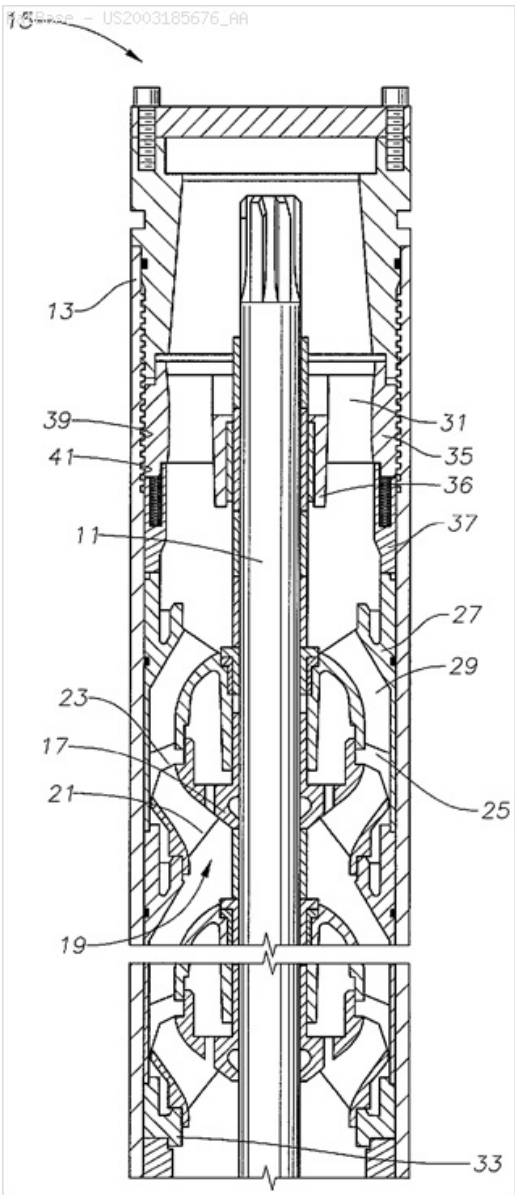
**Designated states:** AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NE NL NO NZ OM PH PL PT RO RU SC SD SE SG SI SK SL SN SZ TD TG TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW

Title: **Pump diffuser** anti-spin device

**Abstract:** Source: US2003185676A In a downhole **centrifugal pump, diffusers** are stacked one on top of each other inside of tubular **pump** housing without contacting the **pump** drive shaft or impellers. A first compressive device applies a pre-compressive force to a stack of **diffusers** to prevent the **diffusers** from rotating inside the tubular housing of the **pump** with the drive shaft. A second compressive device located between the first compressive device and the stack of **diffusers** applies another compressive load on the stack of **diffusers** in the event the first compressive device ceases to apply the compressive load.

**Classifications:**

**International (IPC 8-9):** F04D1/06 F04D13/08 F04D29/00 F04D29/62 (Advanced/Invention); F04D1/00 F04D13/06 F04D29/00 F04D29/60 (Core/Invention)  
**International (IPC 1-7):** F04D1/06 F04D13/08 F04D13/10 F04D29/00 F04D29/44  
**CPC:** F04D1/063 F04D29/628  
**European:** F04D1/06B F04D29/62P  
**US:** 415/199.2 415/214.1 415/224.5



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| CA2422414 AA       | 20030918         | CA20032422414      | 20030318         |
| CA2422414 C        | 20080603         | CA20032422414      | 20030318         |
| GB200306172 A0     | 20030423         | GB20030006172      | 20030318         |
| GB2387876 A1       | 20031029         | GB20030006172      | 20030318         |
| GB2387876 B2       | 20040526         | GB20030006172      | 20030318         |
| US2003185676 AA    | 20031002         | US20020100544      | 20020318         |
| US6726449 BB       | 20040427         | US20020100544      | 20020318         |

**Priority:**

CA20032422414 20030318      US20020100544 20020318

**Probable Assignee:** BAKER HUGHES INC

**Assignee(s):** (std): BAKER HUGHES INC ; JAMES MARK CHRISTOPHER ; SHAFER TERRY WAYNE

**Assignee(s):** BAKERS HUGHES INC

**Inventor(s):** (std): JAMES MARK C ; JAMES MARK CHRISTOPHER ; SHAFER TERRY W ; SHAFER TERRY WAYNE

**Inventor(s):** TERRY W SHAFER ; MARK C JAMES

**Agent(s):** SIM AND MCBURNEY

**Title:** CROSSOVER TWO-PHASE FLOW **PUMP**

**Abstract:** Source: US2006245945A A hydrocarbon well **pump** has impellers and **diffusers** configured with inner and outer sections. The central section contains impeller passages configured for **pumping** liquid. The outer section contains turbine blades for compressing gas. A cylindrical sidewall separates the two sections. A driven shaft rotates the central and outer sections in unison.

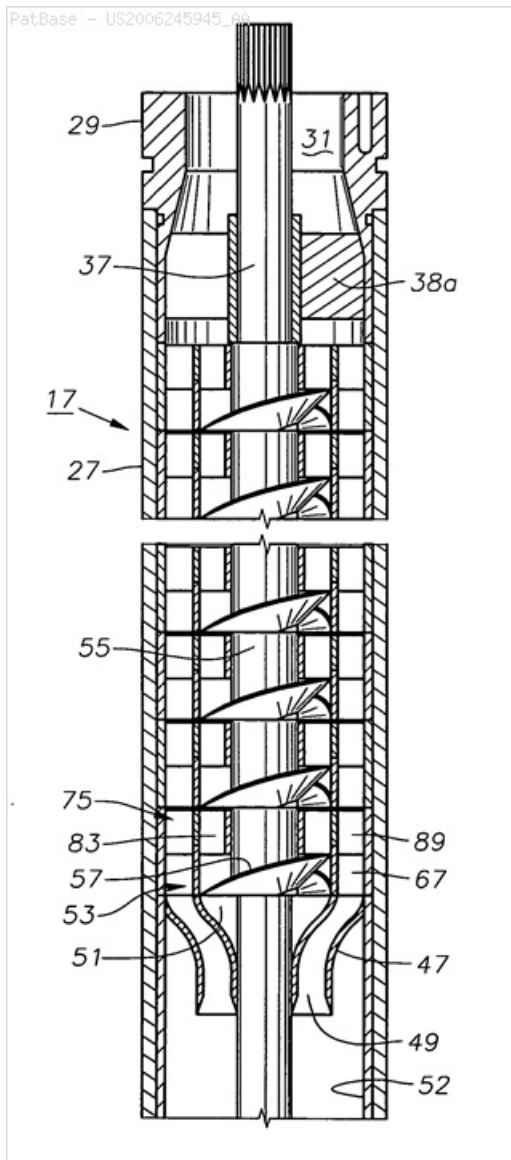
**Classifications:**

**International (IPC 8-9):** E21B43/00 F04B17/00 F04D1/04 F04D13/00 F04D13/10 F04D17/06 F04D29/18 F04D29/22 F04D29/28 F04D29/44 F04D31/00 (Advanced/Invention); E21B43/00 F04B17/00 F04D1/00 F04D13/00 F04D13/06 F04D17/00 F04D29/18 F04D29/28 F04D29/44 (Core/Invention)

**CPC:** E21B43/128 F04D31/00 F04D19/022

**European:** F04D19/02B F04D31/00

**US:** 166/105.5 415/169.1 415/187 415/188 415/199.1 415/199.2 415/199.3 415/199.5 415/209.1 417/405 417/410.4 417/423.1 417/423.3



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| CA2543460 AA       | 20061014         | CA20062543460      | 20060413         |
| CA2543460 C        | 20091222         | CA20062543460      | 20060413         |
| RU2006113143 A     | 20071027         | RU20060113143      | 20060419         |
| RU2409767 C2       | 20110120         | RU20060113143      | 20060419         |
| US2006245945 AA    | 20061102         | US20050105831      | 20050414         |
| US7445429 BB       | 20081104         | US20050105831      | 20050414         |

**Priority:**

CA20062543460 20060413 US20050105831 20050414

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**Assignee(s):** WILSON BROWN L ; BROWN DONN J

**Inventor(s):** (std): BRAUN DONN DZH ; BROWN DONN J ; WILSON BRAUN LAJL ; WILSON BROWN L ; WILSON BROWN LYLE

**Inventor(s):** WILSON BROWN ; BROWN DONN

**Agent(s):** SIM AND MCBURNEY; JAMES E BRADLEY BRACEWELL AND GIULIANI LLP; BRACEWELL AND GIULIANI LLP

**Title:** **CENTRIFUGAL PUMPS** HAVING NON-AXISYMMETRIC FLOW PASSAGE CONTOURS, AND METHODS OF MAKING AND USING SAME

**Abstract:** Source: US2007116560A **Centrifugal pumps** and methods of making and using them are disclosed. One inventive **pump** includes a plurality of flow passages, at least one **pump** component having one or more non-axisymmetric flow passage contours defined at least in part by non-equal blade or vane heights. This abstract allows a searcher or other reader to quickly ascertain the subject matter of the disclosure. It will not be used to interpret or limit the scope or meaning of the claims. 37 CFR 1.72(b).

**Classifications:**

**International (IPC 8-9):** F04D1/00 F04D1/04 F04D13/10 F04D29/22 F04D29/24 F04D29/44 (Advanced/Invention);

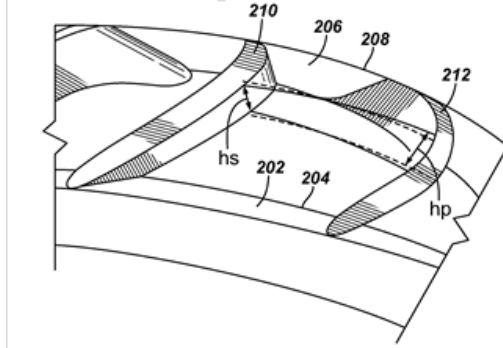
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**CPC:** F04D29/548 F04D29/2216 F04D29/2222 F04D29/22 F04D29/448

**European:** F04D29/22 F04D29/22B3 F04D29/22B4 F04D29/44P3 F04D29/54P

**US:** 415/206 415/208.3 415/211.2 416/203

PatBase - US2007116560\_AA



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| AU2006233233 AA    | 20070607         | AU20060233233      | 20061027         |
| AU2006233233 BB    | 20100211         | AU20060233233      | 20061027         |
| CA2566710 AA       | 20070521         | CA20062566710      | 20061031         |
| CA2566710 C        | 20100427         | CA20062566710      | 20061031         |
| GB200621897 A0     | 20061213         | GB20060021897      | 20061103         |
| GB2432400 A1       | 20070523         | GB20060021897      | 20061103         |
| GB2432400 B2       | 20081001         | GB20060021897      | 20061103         |
| RU2006140979 A     | 20080527         | RU20060140979      | 20061120         |
| RU2444647 C2       | 20120310         | RU20060140979      | 20061120         |
| US2007116560 AA    | 20070524         | US20050164372      | 20051121         |
| US7326037 BB       | 20080205         | US20050164372      | 20051121         |

**Priority:**

CA20062566710 20061031 US20050164372 20051121

**Probable Assignee:** SCHLUMBERGER TECHNOLOGY CORP

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**Assignee(s):** SHLJUMBERGER TEKNOLODZHI BV ; SCHLUMBERGER HOLDINGS LTD ; SCHLUMBERGER CANADA LTD ; ESLINGER DAVID M

**Inventor(s):** (std): EHSLINDZHER DEHVID M ; ESLINGER DAVID M

**Inventor(s):** DAVID M ESLINGER

**Agent(s):** GRIFFITH HACK; SMART AND BIGGAR; SCHLUMBERGER RESERVOIR COMPLETIONS; MCGOFF KEVIN BRAYTON; WENDT JEFFREY L; GALLOWAY BRYAN P; KEVIN BRAYTON; BRYAN P; JEFFREY L