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Search 2: TAC=("submersible pump" and bleed and port) (Results 7)

Search 3: TAC=(submersible and pump and seal and housing and bleed and port) (Results 5)

Search 4: TAC=(submersible and pump and bleed) and IC=(E21B 43/12 or F04D 13/08 or F04D29/08) (Results 1)

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Search 6: TAC=(submersible and pump and housing) and IC=(E21B 43/12 or F04D 13/08 or F04D29/08) (Results 97)

Title: **Submersible pump** set seal

**Abstract:** Source: US2140356A 1. In combination with a shaft that rotated, an inherently resilient washer cave shape surrounding the shaft and to the shaft by a liquid tight connection so that no liquid can flow along the shaft past the connection and so that the resilient washer rotates with the shaft, a stuffing box surrounding the shaft, packing material in the box, an annular follower surrounding the shaft adapted to place the packing material under compression, said follower having a washer engaging surface at one end thereof remote from the packing material, said washer being disposed on the shaft with the concavity toward the Washer engaging surface to thus rosiliently engage the washer engaging surface of the follower when the shaft is at rest, and means, mounted on the washer and at the periphery thereof to be responsive to the centrifugal forces produced in the washer by rotation of the shaft, adapted to distort the washer so that it moves out of engagement with the washer engaging surface on the follower,

**Classifications:**

**International (IPC 8-9):** F04D29/14 (Advanced/Invention);

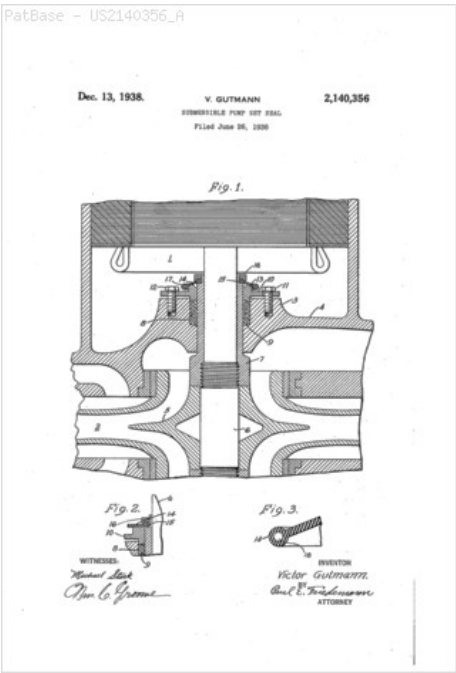
F04D29/08 (Core/Invention)

**International (IPC 1-7):** F04D29/14

**CPC:** F04D29/146

**European:** F04D29/14P

**US:** 277/377 277/402 277/403 277/510 384/135 415/174.2



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| US2140356 A        | 19381213         | US19360087355      | 19360626         |

**Priority:**

19350906

**Assignee(s):** (std): WESTINGHOUSE ELECTRIC AND MFG CO

**Assignee(s):** WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY

**Inventor(s):** (std): VICTOR GUTMANN

**Inventor(s):** GUTMANN VICTOR

Title: SEALING MEANS FOR SUBMERSIBLE ELECTRIC MOTOR-PUMP UNITS

**Abstract:** Source: US2418194A 1. In a, sealing means for a, submersible housing having a rotatable shaft extending therefrom, means providing a closed chamber sealed to said housing about said shaft with the latter extending through said chamber. Fluids in said housing and chamber, a rotatable sealing means sealing said chamber from the external submersible fluid along said shaft. said first and second named rotatable sealing means comprising a pair of rings concentric to and surrounding said shaft and secured and sealed to said housing and chamber means respectively, a second pair of rings secured and sealed to said shaft concentric to said first rings and in sliding sealed engagement therewith, means constantly urging said rings into said sliding sealed engagement, and fluid, tight pressure responsive means equalizing the pressures of the fluids in said housing and chamber, with each other and with the pressure of said external fluid. ' I '

**Classifications:**

**International (IPC 8-9):** F04D29/12 (Advanced/Invention);

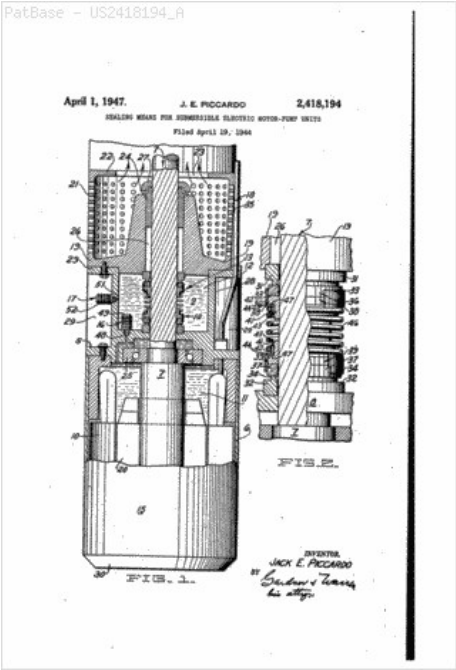
F04D29/08 (Core/Invention)

**International (IPC 1-7):** F04D29/12

**CPC:** F04D29/128 Y10S277/926

**European:** F04D29/12P2

**US:** 277/366 277/926



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| US2418194 A        | 19470401         | US19440531822      | 19440419         |

**Priority:**

US19440531822 19440419

**Assignee(s):** (std): SHASTA PUMP COMPANY

**Assignee(s):** SHASTA PUMP CO

**Inventor(s):** (std): PICCARDO JACK E

Title: SHAFT SEAL FOR SUBMERSIBLE PUMPS

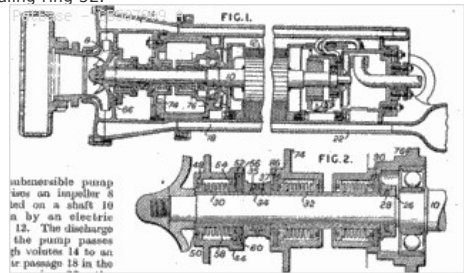
**Abstract:** Source: GB587909A 587,909. Centrifugal pumps; stuffing-box substitutes. ELECTRICAL ENGINEERING and MANUFACTURING CORPORATION. Nov. 6, 1944, No. 21695. Convention date, Nov. 6, 1943. [Classes 110 (i) and 122 (v)] A submersible pump comprises an impeller 8 mounted on a shaft 10 drive motor 12. The discharge from through volutes 14 to an annular passage 18 in the motor casing 22; the volutes 14 are spaced apart to allow free access of the liquid in which the pump is immersed to the sealing devices around the shaft 10. A packing 28, comprising two rings 26 with packing material between them, is fitted to the shaft and packing 34, comprising three rings with packing rings 35, 37 placed between them, is fitted between the two sleeves. Partitions 74, 76 in the motor housing form an oil container that is sealed on the sleeve 32 by pairs of pressure rings forced apart by bellows and one ring of each pair engaging packing rings 86, 90. The back of the impeller 8 is sealed by engaging a packing ring 66 and the impeller housing is sealed to the sleeve 30 by pressure rings 48, 54 pressed apart by bellows 58 and engaging through packing rings 50, 56 the flange 44 and the sealing ring 52.

Classifications:

**International (IPC 8-9):** F04D13/08 F04D29/12 F16J15/36 (Advanced/Invention); F04D13/06 F04D29/08 F16J15/36 (Core/Invention)

**CPC:** F04D13/086 F04D29/126 F16J15/36

**European:** F04D13/08 F04D29/12P F16J15/36



Family:

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| GB587909 A         | 19470508         | GB19440021695      | 19441106         |

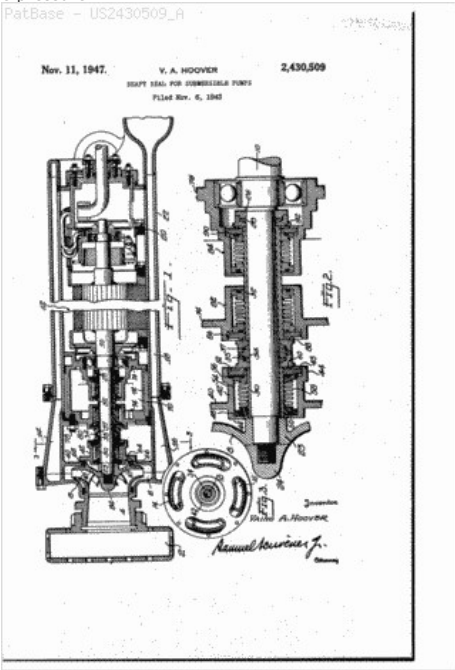
**Assignee(s):** (std): ELECTRICAL ENGINEERING AND MFG

**Assignee(s):** ELECTRICAL ENGINEERING AND MFG CORP

**Title:** Shaft seal for **submersible pumps**

**Abstract:** Source: US2430509A 1. A **submersible pump** comprising an elongated cylindrical casing having spaced concentric walls forming therebetween an annular passage for fluid having an intake opening and a delivery opening, a motor within the casing, an impeller adjacent one end of the casing, a shaft drivingly connecting the motor to the impeller, sealing means surrounding said shaft, and an annular series of volute passages surrounding said sealing means and shaft and connected to deliver fluid **pumped** by said impeller to said annular passage, said volute passages being spaced from each other whereby fluid in which the **pump** is submerged may pass therebetween into free contact with said sealing means to thereby cause said sealing means to be subject only to the submergence pressure.

**Classifications:**  
**International (IPC 8-9):** F04D29/12 (Advanced/Invention);  
F04D29/08 (Core/Invention)  
**International (IPC 1-7):** F04D29/12  
**CPC:** F04D29/126  
**European:** F04D29/12P  
**US:** 277/500 310/87 415/172.1 417/423.3



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| US2430509 A        | 19471111         | US19430509291      | 19431106         |

**Priority:**

US19430509291 19431106

**Assignee(s):** (std): ELECTRICAL ENGINEERING AND MFG

**Assignee(s):** ELECTRICAL ENGINEERING AND MFG CORP ; ELECTRICAL ENGINEERING AND MFG CORPORATI

**Inventor(s):** (std): HOOVER VAINO A

Title: HERMETICALLY SEALED SUBMERSIBLE PUMPING STRUCTURE

**Abstract:** Source: US2449772A 1, In a submersible pumping structure, a housing, a rotative drive crank in said housing, a fluid-tight wall between said drive crank and said driven crank and having a deformable portion, said fluid tight wall being connected in fluid tight relationship to said housing, and a nutating operating connection between said drive crank and said driven crank for transmitting rotary motion from the drive crank to the driven crank, said operating connection extending through said deformable portion and being fixedly connected therewith to provide a fluid-tight joint between the deformable portion and said operating connection, said drive crank and driven crank being positioned to rotate about a common axis, said nutating operating connection comprising a shaft-like member arranged with its longitudinal axis at an angle to said common axis, said deformable portion being fixed to said shaft-like member in a plane at right angles to the longitudinal axis of the shaft-like member, said driven crank having a bell-like contour conforming to the contour of said deformable portion and being spaced slightly therefrom.

**Classifications:**

**International (IPC 8-9):** F04D29/04 F04D29/044 F04D29/08

F16J15/52 (Advanced/Invention);

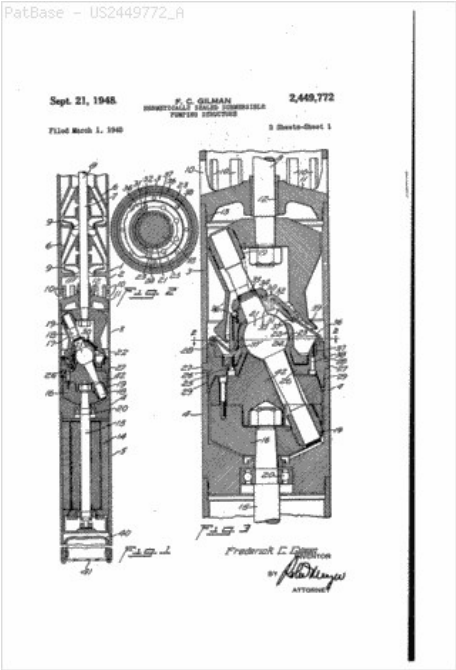
F04D29/04 F04D29/08 F16J15/50 (Core/Invention)

**International (IPC 1-7):** F02M37/04 F04C15/00 F04D13/02 H02K5/12

**CPC:** Y10S415/901 F04D29/044 F04D29/086 F16J15/525 Y10T74/18384

**European:** F04D29/044 F04D29/04B F04D29/08P F16J15/52B

**US:** 415/901 417/414 417/423.3 74/18.1 74/66



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| US2449772 A        | 19480921         | US19450580469      | 19450301         |

**Priority:**

US19450580469 19450301

**Assignee(s):** (std): WORTHINGTON PUMP AND MACH CORP

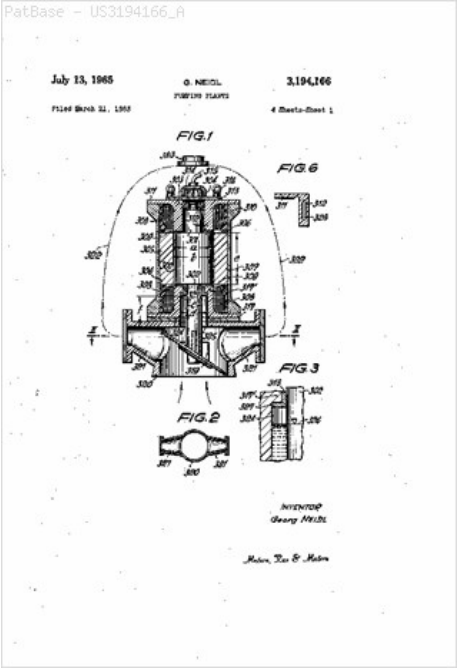
**Assignee(s):** WORTHINGTON PUMP AND MACHINERY CORP

**Inventor(s):** (std): GILMAN FREDERICK C

Title: **Pumping** plants

**Abstract:** Source: GB1031346A 1,031,346. Centrifugal **pumps**. G. NEIDL. Feb. 6, 1963 [March 23, 1962], No. 4880/63. Heading F1C. [Also in Division H2] A **submersible** centrifugal **pump** 351 is con nected to its driving motor 350 by an intermediate member 352. The presence of air in the space between the motor and the intermediate member above an annular cavity 359 is small compared with the volume of the cavity so that, when the **pump** is submerged, equilibrium between the static pressure of the liquid and the pressure of the air is reached when the liquid has risen in the cavity to a level 372 which is below the lower bearing 371. The motor 350 may be controlled automatically in accordance with the liquid level, being switched on when a maximum level is reached. The motor is automatically slowed down when the level has fallen to the upper edge 361 of the **pump** and is stopped when the level has fallen to the lower edge 360. At this instant, frothing occurs between the liquid and the air so that air enters the **pump** to replenish the air cavity 359. The **pump** is of the type having an oblique-disc rotor 363 which may have circumferential teeth engaging circumferential grooves 364. Two discharge branches 367 are provided.

**Classifications:**  
**International (IPC 8-9):** F04D11/00 F04D13/08 F04D29/10 G01R27/02 H02K5/132 H03H2/00 H03H7/38 (Advanced/Invention); F04D11/00 F04D13/06 F04D29/08 H02K5/12 (Core/Invention)  
**International (IPC 1-7):** F04D13/06 F04D13/08 F04D29/70 F05G H02K5/12  
**CPC:** F04D11/005 F04D13/083 F04D29/10 H02K5/132 G01R27/02 H03H2/006 H03H7/38  
**European:** F04D11/00B F04D13/08B F04D29/10 G01R27/02 H02K5/132 H03H2/00T1 H03H7/38  
**US:** 310/90 416/202 417/421



Family:

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| BE628177 A1        | 19630529         | BE19630628177      | 19630208         |
| CH423494 A         | 19661031         | CH19630001333      | 19630204         |
| GB1031346 A        | 19660602         | GB19630004880      | 19630206         |
| GB633975 A         | 19491230         | GB19470027996      | 19471020         |
| NL142841 B         | 00000000         |                    | 00000000         |
| NL82617 C          | 00000000         |                    | 00000000         |
| SE316375 B         | 19691020         | SE19630001258      | 19630205         |
| US3194166 A        | 19650713         | US19630267390      | 19630321         |

**Priority:** GB19470027996 19471020 DE1962N021366 19620323

**Assignee(s):** (std): GEN ELECTRIC CO LTD ; GEORG NEIDL ; GEORG NEIDL DIPL ING ; NEIDL G ; NEIDL GEORG ; NEIDL GEORG DIPL ING ; DIPL ING GEORG NEIDL MATSCHILS TRIESEN LIECHTENST ; HOWARD HARRY ROSENBRÖCK

**Assignee(s):** DIPL ING GEORG NEIDL MATSCHILS TRIESEN LIECHTENSTE ; DIPL ING GEORG NEIDL MATSCHILS TRIESEN LIECHTENSTEIN ; THE GENERAL ELECTRIC COMPANY LIMITED

**Inventor(s):** (std): GEORG NEIDL ; NEIDL G ; NEIDL GEORG ; NEIDL GEORG DIPL ING

Title: **SUBMERSIBLE** SEAL

**Abstract:** Source: GB983642A 983,642. Stuffing-box substitutes. BORG-WARNER CORPORATION. Feb. 2, 1962 [Feb. 9, 1961], No. 4139/62. Heading F2B. A device 10 for sealing a **submersible** electric motor M against the ambient liquid in which both the motor and the device are immersed comprises sealing means 26, 27, 28 and a chamber 19 containing lubricant and communicating with the ambient liquid. The motor M drives a **pump** P by a shaft 18 rotatably mounted in the device 10 which comprises a number of tubular casings 12, 13, 14, 15, 16 screw-threaded and welded together. The uppermost seal section 12 comprises four chambers 40-43 separated by the seals 26, 27, 28, each of which comprises a rotary ring 33 sealed to the shaft by packing 58 and urged by a coil spring 35 into contact with a non- rotary ring 54. The chamber 40 communicates with the chamber 19 via bore 90 and tube 91. The chambers 41, 42 and 43 also communicate with the chamber 19 via bore 80 and tube 84, bore 93 and tube 94, and port 98 respectively. The space 51 within a tube 49, which extends from top to bottom of the device 10 and provides a bearing for the shaft 18, communicates through a transverse bore 77 and a central bore 62 in the shaft 18 with the motor lubricating oil system. Prior to **submersion** in a well, chambers 19 and 51 are filled with oil. When the **pump**-seal motor unit is **submersed**, leakage of water along the shaft 18 is prevented by seals 26, 27 and 28 and water enters the chamber through tube 91 and forms an oilwater interface 99 therein, the tube 91 providing for expansion and contraction of the lubricating oil in the motor and the chamber 19. Specification 983,643 is referred to.

**Classifications:**

**International (IPC 8-9):** F04D29/12 F16J15/36 F16J15/40 H02K5/132 (Advanced/Invention);

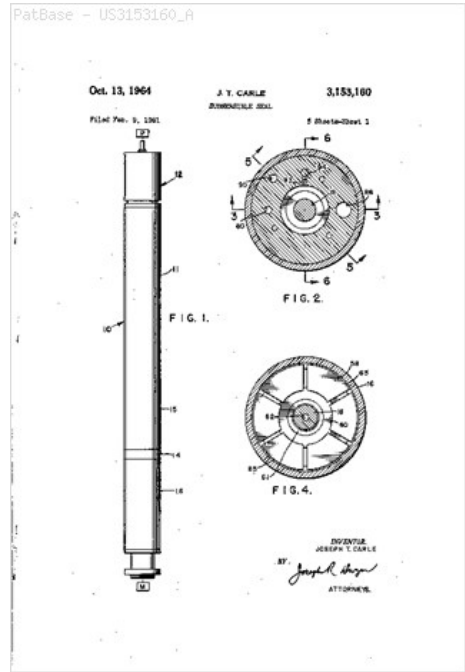
F04D29/08 F16J15/40 H02K5/12 (Core/Invention)

**International (IPC 1-7):** F04D29/12 F16J15/54 H02K5/12

**CPC:** F16J15/36 Y10S277/929 F04D29/128 F16J15/40 H02K5/132

**European:** F04D29/12P2 F16J15/40 H02K5/132

**US:** 277/365 277/366 277/408 277/929 310/87 310/90



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| AT246850 B         | 19660510         | AT19620001037      | 19620208         |
| GB983642 A         | 19650217         | GB19620004139      | 19620202         |
| US3153160 A        | 19641013         | US19610088096      | 19610209         |

**Priority:**

US19610088096 19610209

**Assignee(s):** (std): BORG WARNER

**Assignee(s):** BORG WARNER CORP ; CENTRILIFT HUGHES INC

**Inventor(s):** (std): CARLE JOSEPH T

Title: **Submersible** motor seal section

**Abstract:** Source: GB1037747A 1,037,747. Seals. BORG-WARNER CORPORATION. Oct. 15, 1963 [Dec. 26, 1962], No. 40621/63. Heading F2B. A seal for sealing a **submersible** electric motor against the ambient liquid in which both the motor and the seal are immersed comprises a **housing** having a chamber 32 which communicates with the motor and the ambient liquid and contains lubricating liquid and an intermediate liquid which has a specific gravity greater than that of the lubricating liquid and separates the latter from the ambient liquid. The motor 10, Fig. 1 (not shown), drives a **pump** 12 through a shaft 18. The lubricating intermediate and ambient liquids may be oil, water and well liquid respectively. The seal **housing** comprises four chambers 44, 45, 46 and 32 separated by three mechanical seals 35, 36 and 37 each comprising a rotary seal member urged by a spring into contact with a stationary seat. The chamber 44 is open at its upper end to the ambient liquid and communicates via bore 54 and tube 55 with the chamber 32. The chambers 45 and 46 also communicate with the chamber 32 via bore 48 and tube 50 and bore 51 and tube 52 respectively. Ports 31 connect the chamber 32 with a space 30 which communicates through bores 28 and 24 in the shaft 18 with the motor lubricating and cooling oil system. Prior to **submersion** in a well, the motor and seal **housing** are first filled with lubricating oil, and water is then introduced into the bottom of chamber 32 through plug 59. The water displaces oil from the chamber 32 through the tube 55, bore 54 and chamber 44 until the oil-water interface 61 reaches the open end of tube 55, the supply of water being continued until it fills the tube 55, bore 54 and chamber 44. The plug 59 is then replaced. When the motor and seal are **submersed** leakage along the shaft 18 is prevented by seals 35 to 37 and an interface between the water and the well liquid is formed within the tube 55, which interface rises or falls within the tube when expansion or contraction of the oil in the motor and chamber 32 occurs.

**Classifications:**

**International (IPC 8-9):** F04D13/10 F04D29/12 F16J15/40

H02K5/132 (Advanced/Invention);

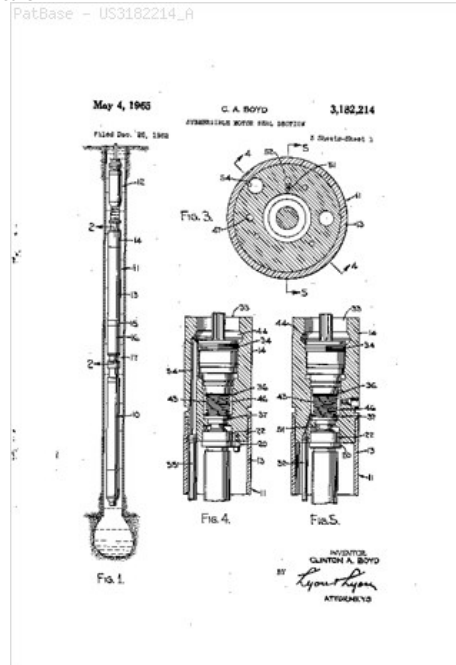
F04D13/06 F04D29/08 F16J15/40 H02K5/12 (Core/Invention)

**International (IPC 1-7):** E21B43/12 F04D29/12 F16J15/34 H02K5/12

**CPC:** F04D13/10 F04D29/128 F16J15/40 H02K5/132

**European:** F04D13/10 F04D29/12P2 F16J15/40 H02K5/132

**US:** 277/366 277/408 277/409 310/87



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| DE1453725 A1       | 19690327         | DE19631453725      | 19631223         |
| DE1453725 B2       | 19720817         | DE19631453725      | 19631223         |
| DE1453725 C3       | 19730308         | DE1963B074790      | 19631223         |
| GB1037747 A        | 19660803         | GB19630040621      | 19631015         |
| US3182214 A        | 19650504         | US19620247188      | 19621226         |

**Priority:**

US19620247188 19621226

**Assignee(s):** (std): BORG WARNER ; BORG WARNER CORP CHICAGO ILL V ST A

**Assignee(s):** BORG WARNER CORP

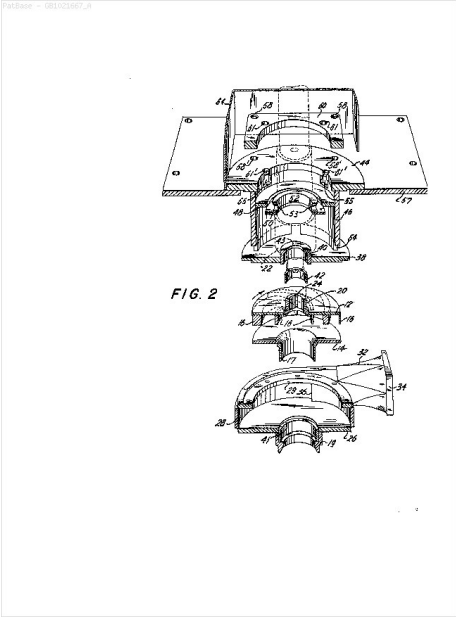
**Inventor(s):** (std): A BOYD CLINTON ; BOYD CLINTON A

**Title:** Improvements in or relating to centrifugal **pumps**

**Abstract:** Source: GB1021667A 1,021,667. Centrifugal **pumps**. AJEM LABORATORIES Inc. Oct. 5, 1962 [Oct. 6, 1961], No. 37769/62. Heading F1C. The **submersible pump** shown comprises sealing bushes 41 and 42 which surround the impeller eye 17 and the impeller hub 20, respectively, with clearances of at least 0A003 inch to allow suspended particles in the liquid to pass freely through without abrasion or jamming. A similar clearance is provided between an annular flange 43 and the **pump** shaft 22. Leakage through the bush 42 is minimized by the action of the impeller 10 in throwing liquid in the space above the impeller outward by centrifugal force. In addition, the leakage is opposed by centrifugal action when flowing inwardly over the end of the impeller hub 20 towards the clearance between the flange 43 and the shaft 22. Liquid climbing up the shaft 22 is thrown off below an annular partition 48 by a slinger disc 50. Drain ports 54, 55 are provided in the counn 46.

**Classifications:**

**International (IPC 8-9):** F04D29/16 F04D29/22 F04D29/44 F04D7/02 F04D7/04 (Advanced/Invention);  
F04D29/08 F04D29/18 F04D29/44 F04D7/00 (Core/Invention)  
**International (IPC 1-7):** F04D1/00 F04D13/08 F04D29/42 F04D7/04  
**CPC:** F04D7/02 F04D7/04 F04D29/167 F04D29/2216 F04D29/445  
**European:** F04D29/16P2 F04D29/22B3 F04D29/44P F04D7/02 F04D7/04



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| CH442023 A         | 19670815         | CH19620011728      | 19621005         |
| DE1453712 A1       | 19681219         | DE19621453712      | 19621005         |
| GB1021667 A        | 19660309         | GB19620037769      | 19621005         |
| GB1021668 A        | 19660309         | GB19650029928      | 19621005         |

**Priority:**

US19610143355 19611006

**Assignee(s):** (std): AJEM LAB INC

**Assignee(s):** AJEM LABORATORIES INC

**Inventor(s):** (std): EMIL UMBRICHT ; UMBRICHT EMIL

Title: VISCOSITY PUMP FOR COOLING FACE SEALS

**Abstract:** Source: GB1111047A 1,111,047. Mechanical seals. FLYGTS PUMPAR A.G. 12 May, 1965 [15 May, 1964], No. 20113/65. Heading F2B. [Also in Division F1] In a motor driven centrifugal pump comprising an impeller 4 driven by a vertical shaft 1, leakage of pumped liquid into the motor unit is prevented by means comprising an oil chamber 17 located between the motor housing and the pump housing and a pair of face seals including sealing rings 31, 34 sealingly engaging opposite faces of a slip ring 15 which is provided with at least one channel 19, 20 extending between the chamber 17 and the shaft whereby in use the ring 15 co-operates with the shaft, or bushings 38, 39 thereon, to act as a viscosity pump circulating the oil to cool the face seals. The slip-ring 15 has two tangential channels 19 and 20 therein and is located in a holder 13 being sealed thereto and to the bottom 14 of the motor housing by sealing-rings 16 and 28 respectively. The rings 31 and 34 are carried by rubber sleeves 30 and 35 and urged against the slip-ring 15 by springs 29 and 36 respectively. The bottom of the oil chamber 17 is formed by a rubber diaphragm 25 and the oil is pressurized by pumped liquid supplied through an opening 24 in the pump housing.

**Classifications:**

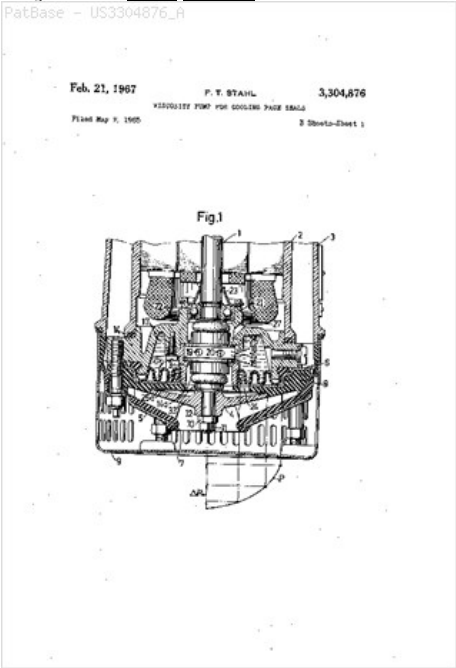
**International (IPC 8-9):** F04D13/08 F04D29/12 F16J15/36 (Advanced/Invention); F04D13/06 F04D29/08 F16J15/36 (Core/Invention)

**International (IPC 1-7):** F04D29/12 F16J15/34

**CPC:** Y10S277/93 F16J15/36 F04D13/08 F04D29/128

**European:** F04D13/08 F04D29/12P2 F16J15/36

**US:** 277/367 277/391 277/408 277/930 415/180 415/197



**Family:**

| Publication number | Publication date | Application number | Application date |
|--------------------|------------------|--------------------|------------------|
| DE1296907 B        | 19690604         | DE1965A049144      | 19650507         |
| GB1111047 A        | 19680424         | GB19650020113      | 19650512         |
| US3304876 A        | 19670221         | US19650454030      | 19650507         |

**Priority:**

SE19640006002 19640515

**Assignee(s):** (std): FLYGTS PUMPAR AB

**Assignee(s):** AKTIEBOLAGET FLYGTS PUMPAR

**Inventor(s):** (std): TORVALD STAHL FILIP

**Inventor(s):** STAHL FILIP TORVALD