Nov. 4, 1969 J. GANGLOFF 3,476,054

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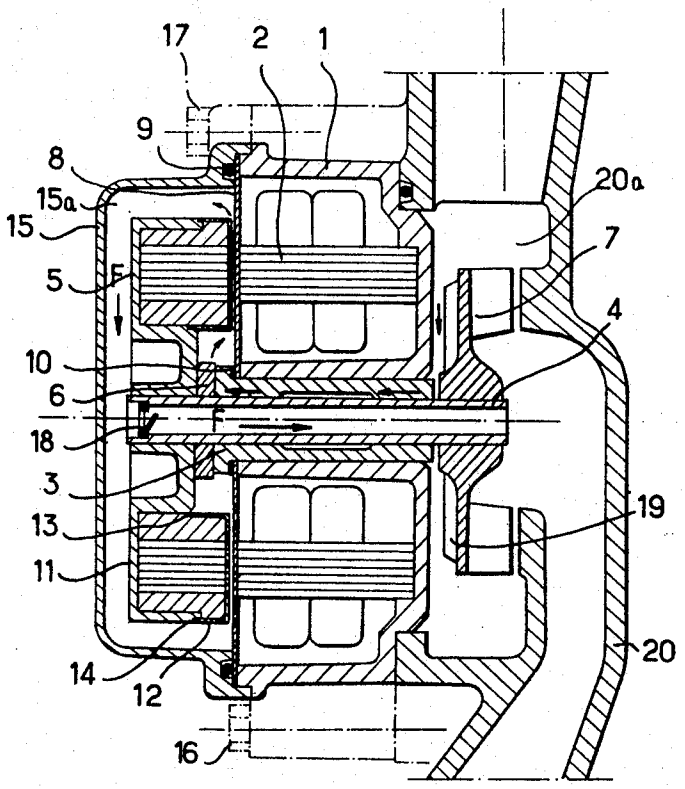

FIG. 1

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FIG. 2

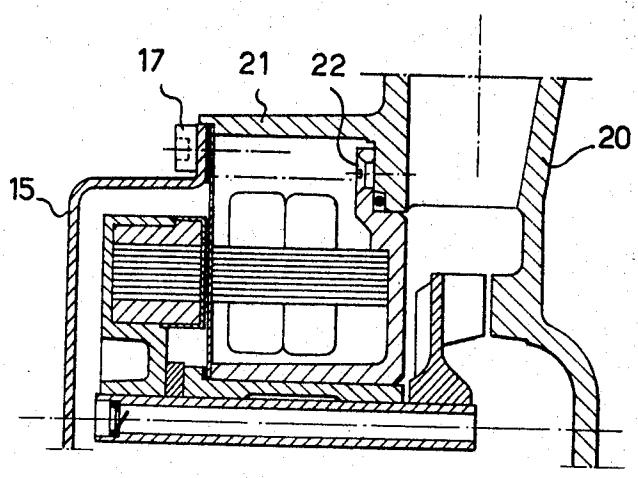
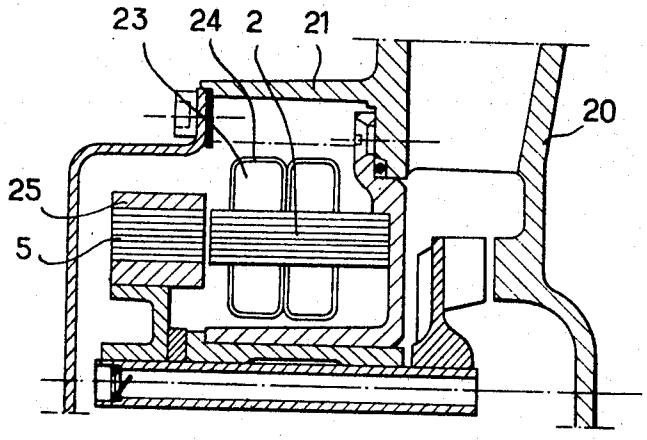


FIG. 3



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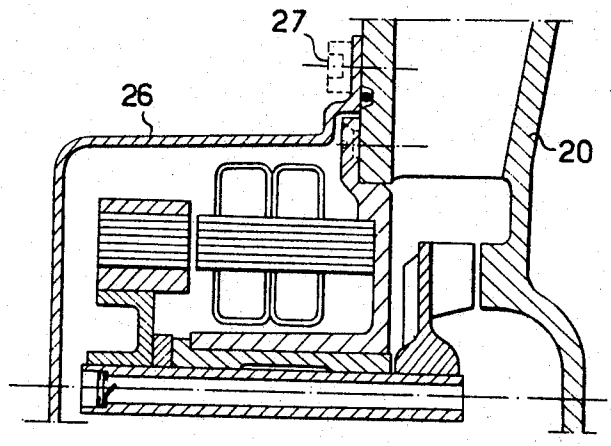

FIG. 4

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U.S. Cl. 103—87 11 Claims

ABSTRACT OF THE DISCLOSURE

An acceleration pump, with a plane-gap motor, for central-heating installations utilizing the circulation of hot water, wherein the rotor of the pump is mounted alongside the stator at one extremity of a hollow shaft, a turbine wheel mounted on the other end of the shaft such that a journal bearing of the shaft is located inside of the stator and is protected against the impurities carried by the circulating water. A portion of the water, after having lubricated the journal bearing, returns through the hollow shaft to the spiral housing of the turbine.

Brief summary of the invention

The present invention relates to a glandless pump driven by a motor known as the "plane-gap" type and an object of the invention is to provide such a pump in which the circulation of hot fluids loaded with impurities can be effected without adverse effect on the pump.

It is known in current glandless pumps driven by a motor of the plane-gap type to locate the rotor and its journal bearing in a convoluted chamber placed alongside the turbine, and hence in the circuit of the fluid to be carried.

The advantages of this arrangement are that dust and waste, i.e., sand, impurities, etc., which are ordinarily suspended in the fluid and carried by it are deposited on the journal bearing or in the gap in the motor, thus clogging the gap and jamming the shaft and thereby causing the motor to stop. Moreover, the foreign particles are often abrasive and scratch the journal bearing.

An effort has been made to avoid these disadvantages by fastening to the rotor one or more baffle plates, but this solution is costly and is not entirely effective.

Furthermore, since the thrust caused by the magnetic attraction does not act in the same direction as the thrust from the hydraulic pressure, the rotor, upon each starting and stopping of the motor, is driven from one side to the other in the space in which it turns, thus producing an undesirable knocking noise.

An object of the present invention is to provide a novel acceleration pump which is primarily designed as a hot-water central-heating pump in which the above-mentioned disadvantages are substantially eliminated.

This pump is characterized essentially by the arrangement wherein its rotor is mounted alongside the stator, at that end of a hollow shaft oposite the one on which the turbine is mounted. A journal bearing is located inside of the stator and is protected against the impurities carried by the circulating fluid. A portion of the fluid lubricates the journal bearing and the fluid is purified by centrifugation by the action of small counter-blades carried by the turbine before reaching the journal bearing, the fluid returning through the hollow shaft into the spiral chamber of the turbine.

The magnetic attraction acts in the same direction as the hydraulic thrust. Both while stopped and in operation, the rotor always abuts against a single thrust bearing.

Other characteristics of the invention will become

evident from the description which follows, with reference to the annexed drawing.

Brief description of the drawing

FIGURE 1 is a sectional view of a first embodiment of a pump according to the invention; and

FIGURES 2, 3 and 4 are sectional views of respective modifications of the pump of FIG. 1.

Detailed description

FIG. 1 shows a pump which comprises a bearing frame **1** in which are housed a stator **2** and a single journal bearing **3** constructed of a material that can be lubricated by the conveyed fluid, for example, graphite, bronze, plastic, or ceramic material. The journal bearing **3** can be either forcibly fitted or mounted elastically in the bearing frame **1** by means of elastic rings made, for example, of rubber.

The journal bearing **3** is traversed by a hollow shaft **4** which has only one bearing surface, which is easily adjustable. The hollow shaft **4** is equipped with a clack valve **18** at one of its extremities. At this extremity is fixed a rotor **5** equipped with a friction lug **6** which has been forcibly fitted on the shaft **4** and a sealed joint **10**. At the other extremity of the shaft **4** there is fixed a turbine wheel **7**, turning in a chamber **20a** of a spiral housing **20**, to which is fastened the bearing frame **1** by means of a screw **16**.

The rotor turns in the chamber **15α** of a rear cowling **15**, which is fastened to the bearing frame **1** by means of screws **17**. A seal is formed between cowling **15** and frame **1** by a joint **9**.

The center section of the hollow shaft **4** turns in the journal bearing **3**, which can, if so desired, be hollowed out in its center section so as to reduce the losses through friction.

The stator is isolated from the circulating fluid by means of a washer **8** of stainless steel and is sealed by joints **9** and **10**.

In order to prevent oxidation of the rotor **5**, in the case of installations containing copper piping, the rotor **5** is enclosed in jackets **11** and **12**, made of copper or stainless steel, and welded together at **13** and **14** or set in place.

In practice, the packet **12** will be thin, in order to form a minimum electric gap.

The main portion of the liquid flows through the turbine, while a small portion follows the path indicated by the arrows F in FIG. 1 to lubricate the journal bearing.

It should be noted that the in the apparatus of the invention, the eventual unblocking operation of the rotatable elements does not required the use of a separate device apart from the apparatus. Without having to empty the installation, it is sufficient to remove the rear cowling **15** by unscrewing the screws **17**. At this moment, the water pressure applies the turbine wheel **7** against the journal bearing **3**, and the clack valve **18** closes. Since the rotor **5** is then open to the air, it is sufficient to turn the rotor alternately in each direction in order to unblock the rotatable elements.

It should also be noted that, in accordance with another characteristic of the invention, the thrust due to the magnetic attraction acts in the same direction as the hydraulic thrust. In order to reduce the force exerted on the thrust block **6**, the turbine wheel **7** is equipped with small counter-blades **19**; these counter-blades also provide the advantage that they centrifuge the impurities suspended in the fluid and prevent them from penetrating into the journal bearing **3**.

In the embodiment shown in FIG. 2, the elements identical to those shown in FIG. 1 are designated by the same reference numbers. The pump shown in FIG. 2

differs from the preceding one by the fact that the spiral housing **20** has a skirt **21** to which the cowling **15** is fastened by the screws **17**. The bearing frame **1** is fastened to the spiral housing by means of the screws **22**.

The pump shown in FIG. 3 differs from that in FIG. 1 by the fact that the stator and rotor are no longer isolated from the circulating fluid. The washer **8**, the joint **10**, the jacket **11** and **12**, and the welds **13** and **14** are eliminated. The stator **2** and the rotor **5** are made of magnetic stainless steel. The coils **23** of the stator, before being set in place, are enveloped in a plastic resin **24** for example, a silicon elastomer which is waterproof and impervious to hot water. The outlet wires are insulated in silicone rubber so as to insure perfect adherence to the covering. These wires pass to the exterior through a seal, such as a stuffing box or similar means. The cage of the motor **25** can be made of aluminum or cast copper.

In the embodiment shown in FIG. 4, the skirt **21** of the spiral housing **20** of FIG. 3 is eliminated, and instead a deep cowling **26** is mounted on the spiral housing **20** by means of the screws **27**.

It is understood, of course, that the embodiments hereinabove described are given by way of example and not limitation and can be modified in any desirable way without going beyond the scope of the invention as defined in the attached claims.

What is claimed is:

1. A pump comprising a hollow rotatable shaft having opposite ends; a turbine at one end of the shaft including a turbine wheel mounted on said shaft at said one end thereof; a journal bearing rotatably supporting said shaft; a motor stator mounted on said journal bearing and externally covering the same; and a rotor mounted on the other end of the shaft and positioned adjacent said stator in axially spaced relation therefrom, said shaft having a clearance in said journal bearing such that while a major portion of the circulating fluid passes through the turbine a minor portion passes between the shaft and the bearing and then between the rotor and stator after which it returns to the turbine through the hollow shaft.

2. A pump as claimed in claim **1** comprising valve means in said hollow shaft.

3. A pump as claimed in claim **1** comprising a frame in which the stator is housed, said frame including a central core portion encircling the journal bearing.

4. A pump claimed in claim **3**, wherein said turbine includes a spiral housing which is secured to said frame.

5. A pump as claimed in claim **4** comprising a cowling removably connected to said frame in sealed relation, said cowling surrounding the rotor.

6. A pump as claimed in claim **5** comprising a partition means between said cowling and the frame for isolating said stator from the fluid.

7. A pump as claimed in claim **1** comprising jacket means covering the rotor to protect the same against the circulating fluid.

8. A pump as claimed in claim **1**, wherein said turbine wheel includes counter-blades thereon in the path of said minor portion for producing an axial force on the wheel tending to move the shaft in a direction to increase the spacing between the rotor and stator, while also producing a centrifugal force tending to eliminate solid particles from the minor portion of the liquid before it passes between the shaft and the bearing.

9. A pump as claimed in claim **3** comprising a cowling encircling the rotor, said turbine including a spiral housing with a skirt, said cowling being detachably connected to said skirt.

10. A pump as claimed in claim **3** comprising a cowling encircling the rotor, said turbine including a spiral housing surrounding the turbine wheel, said cowling including an elongated flange portion in sealed relation with said spiral housing and detachably connected thereto.

11. A pump as claimed in claim **10**, wherein said stator and rotor are constituted of stainless steel material, said stator including coils and an enveloping insulating material on said coils, said insulating material being resistant to the circulating fluid.

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U.S. Cl. X.R.

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