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F1C CFAC CFB CFC C104 C404 C422

(56) Documents cited

GB 1485815 A

GB 1325131 A

US 4684329 A

US 4648808 A

US 4645433 A

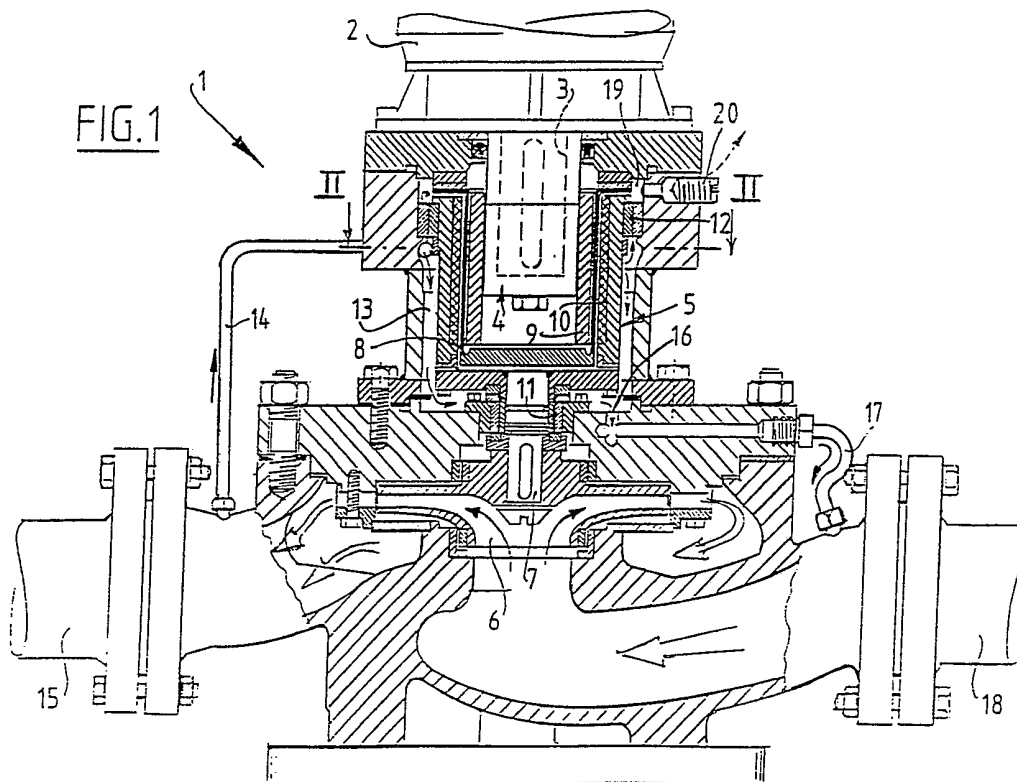
(58) Field of search

UK CL (Edition L) F1C CFAC CFB CFC CFKA

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(54) Vertical pump with magnetic coupling

(57) The inner rotor 4 of the magnetic coupling is coupled to the drive shaft 3 and the outer rotor 5, separated therefrom by a separating pot 8, is coupled to the shaft 7 supporting the pump member. The construction of the pump is hereby greatly simplified. Any danger of the bearings being left dry during starting of the pump is avoided. By connecting the delivery side of the pump (line 14) to the space 13 enclosing the outer rotor 5, sufficient liquid is always supplied to this space and therefore to the bearings which may be ceramic. Air bubble formation can be avoided by connecting this space to the atmosphere via a venting valve 20.



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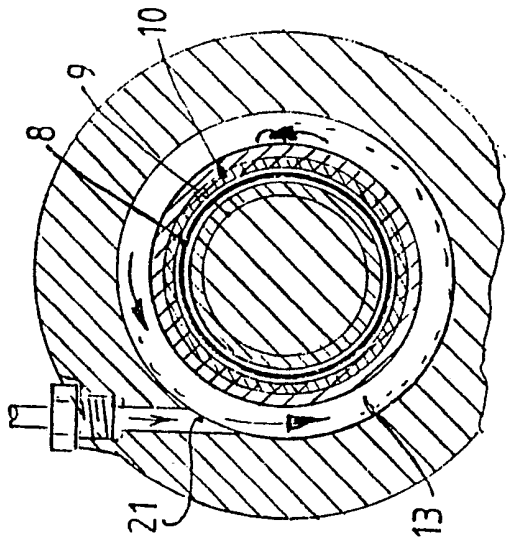


FIG. 2

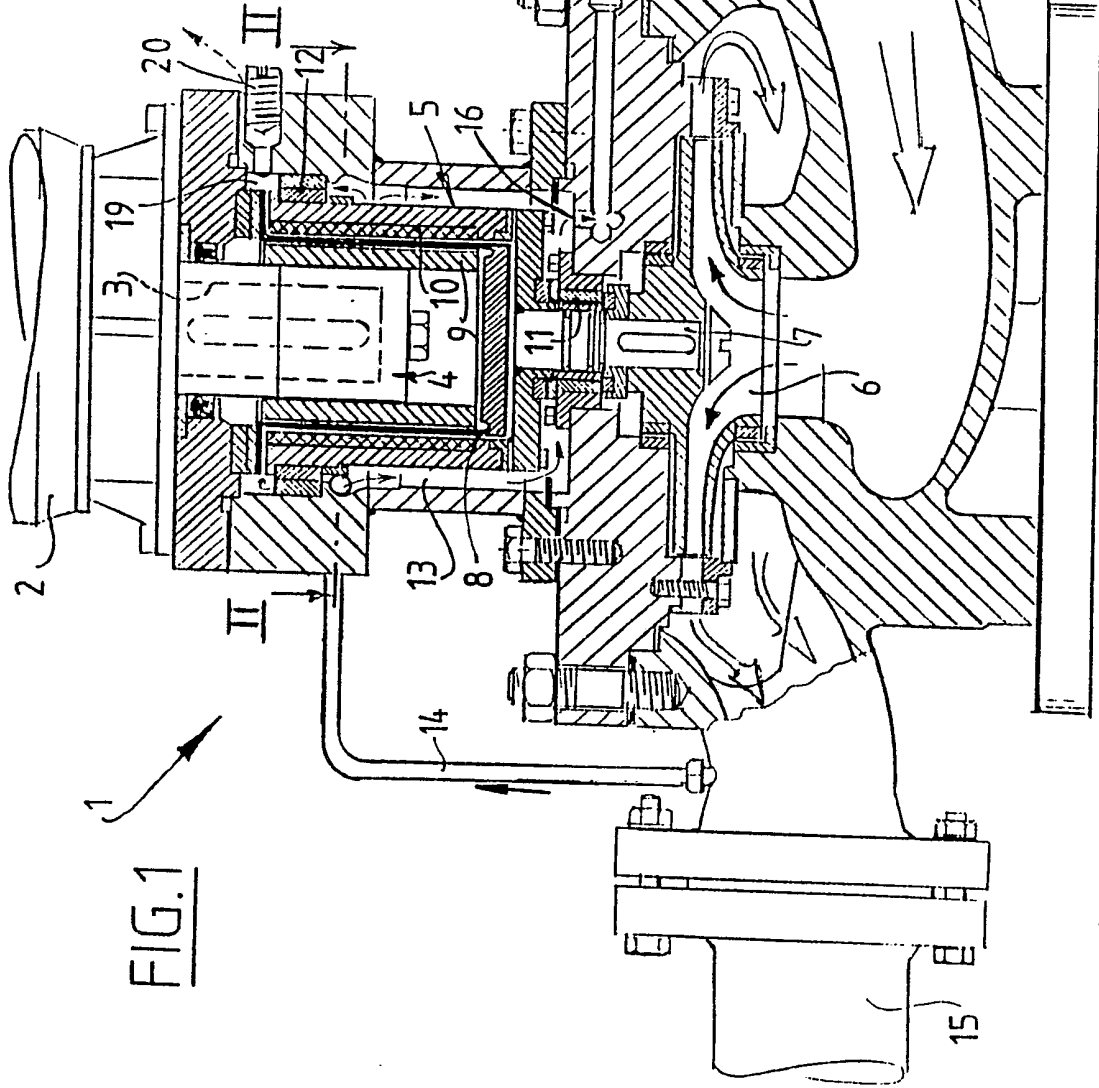
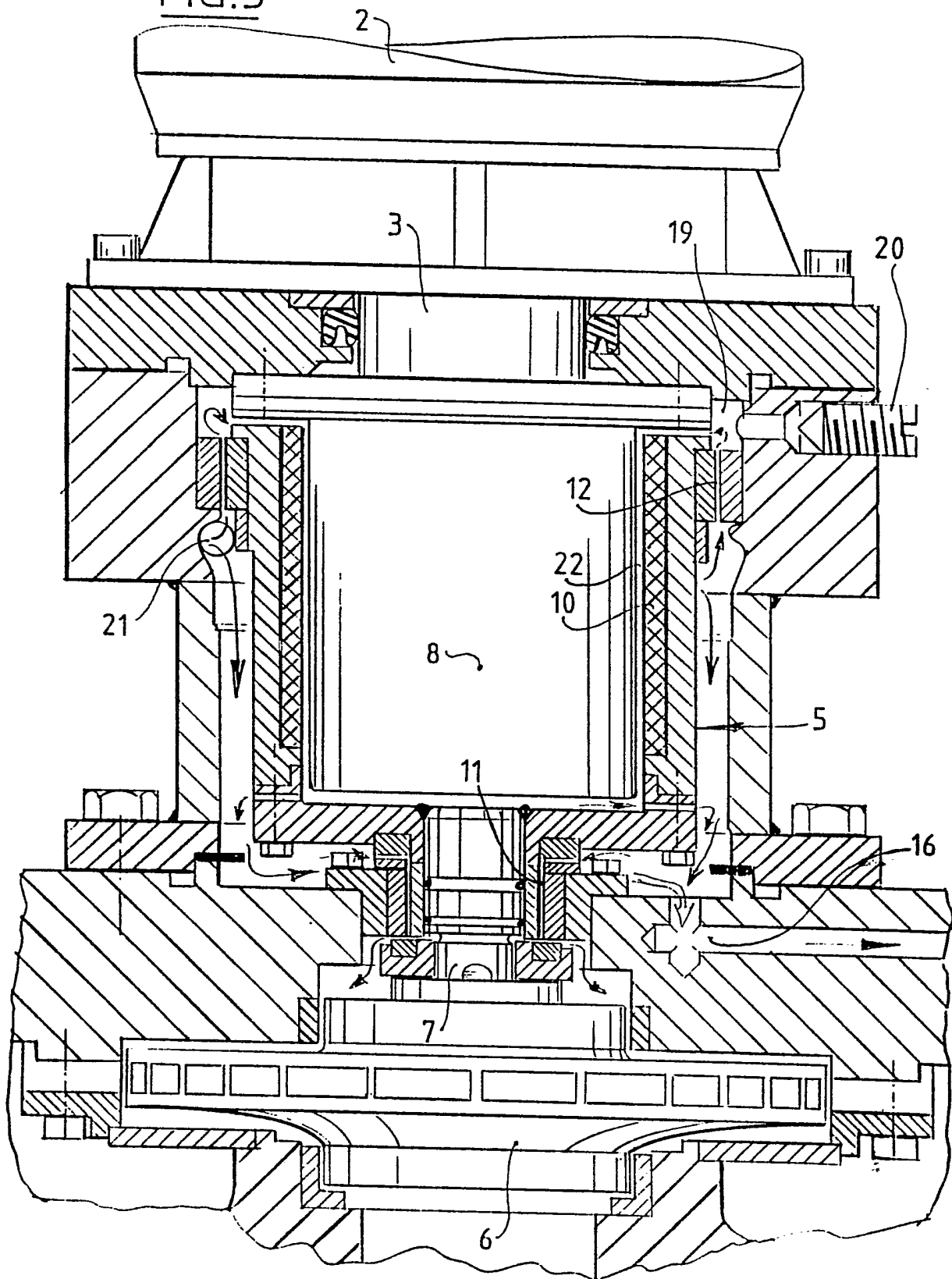


FIG. 1

FIG.3



SUBSTANTIALLY VERTICAL PUMP WITH A MAGNETIC COUPLING

The invention relates to a substantially vertical pump comprising a bearing mounted shaft supporting the pump members, a drive shaft, a suction side and a delivery side, wherein the pump members and the drive shaft are coupled by
5 a magnetic coupling consisting of an inner rotor carrying magnets and, separated therefrom by a separating pot, an outer rotor carrying magnets.

Such a pump is of a complicated construction. In addition there is the danger with such a pump that, due for
10 instance to air bubble formation, the upper bearing in particular will be left dry when the pump is started, which can result in serious bearing damage. There is the further danger of the separating pot being damaged by contaminants in the liquid.

15 The invention has for its object to obviate these drawbacks.

This is achieved according to the invention in that the shaft of the inner rotor is the drive shaft and the shaft of the outer rotor is the shaft supporting the pump
20 member.

Because the separating pot is reversed compared to the known pump, a simple construction results and it becomes possible to take steps to vent the space connecting onto the bearings.

25 To this end, the space connecting onto the bearings of the rotor is connectable via a venting valve to the atmosphere. Air bubble formation is therefore avoided.

In preference the said space is further connected to the delivery side of the pump, thus ensuring that the
30 bearings are continually flushed with liquid.

The connection between the delivery side and the space connecting onto the bearings is preferably joined to this space in tangential direction. A cyclone action is hereby obtained so that as a consequence of the centrifugal

action the contaminated parts in the liquid are moved to the outer wall and damage to the bearings and a separating pot are avoided.

The annular space is preferably further connected to
5 the suction side of the pump for the discharge of the contaminated parts.

It is also possible to accommodate a cyclone or a filter in the connection line between the delivery side and the annular space.

10 Fig. 1 is a partly sectional view of the pump according to the invention,

fig. 2 is a sectional view along the line II-II in fig. 1, and

fig. 3 shows a part of fig. 1 on a larger scale.

15 The pump 1 is driven from a drive motor 2 over a magnetic coupling via the drive shaft 3. The magnetic coupling consists of an inner rotor 4 connected to drive shaft 3 and an outer rotor 5 coupled to the shaft 7 supporting the impeller 6. Rotors 4 and 5 are spatially separated by the
20 separating pot 8. Both rotors carry magnets such that when the drive shaft 3 turns the shaft 7 of the pump follows without slipping. The said magnets are designated respectively with the reference numerals 9 and 10.

The pump is bearing mounted using ceramic bearings
25 wherein a distinction is made between lower bearings 11 and upper bearings 12. Formed according to the invention round the outer rotor is an annular space 13 which is connected via the line 14 to the delivery side 15 of the pump. The line 14 carries to the annular space water which, as
30 indicated by the arrows, follows a path from the feed opening upward and downward and finally comes out via the outlet opening 16 and line 17 into the suction side 18 of the pump. The bearings are therefore flushed by water. Arranged on the top side of the annular space 13 is a
35 venting opening 19 which is closable with a venting valve 20. The line 14 is connected via a feed opening 21 (see fig. 2) onto the annular space. As shown in fig. 2, this feed opening is oriented tangentially of the annular space 13

such that a cyclone action is created. Contaminants are therefore carried away downward along the outer wall so that a scouring effect is avoided in respect of the bearings and the separating pot. The clean liquid, that is, the liquid
5 freed of contaminants, is also drained to the suction side 18 via the narrow gap 22 (fig. 3) between the outer rotor and the separating pot 8. As a result of the invention the magnetic coupling is cooled by the water flowing therearound while the bearing is lubricated. The invention is
10 particularly applicable in a pump with ceramic bearings, since these are particularly sensitive to being left dry.

CLAIMS

1. Substantially vertical pump comprising a bearing mounted shaft supporting the pump members, a drive shaft, a suction side and a delivery side, wherein the pump members and the drive shaft are coupled by a magnetic coupling
5 consisting of an inner rotor carrying magnets and, separated therefrom by a separating pot, an outer rotor carrying magnets, characterized in that the shaft of the inner rotor is the drive shaft and the shaft of the outer rotor is the shaft supporting the pump members.
- 10 2. Pump as claimed in claim 1, characterized in that an annular space connecting onto the bearings of the rotor is connectable via a venting valve to the atmosphere.
3. Pump as claimed in claim 2, characterized in that this space is connected to the delivery side.
- 15 4. Pump as claimed in claim 1, characterized in that the connection between the delivery side and the annular space is connected to the annular space in tangential direction.
5. Pump as claimed in claims 1-4, characterized in
20 that the annular space is further connected to the suction side of the pump.
6. Pump as claimed in claims 1-5, characterized in that the connection of the annular space to the delivery side is located close to the top end and the connection to
25 the suction side close to the bottom end.
7. Pump as claimed in claims 1-6, characterized in that a cyclone is accomodated in the connection between the delivery side and the annular space.
8. Pump as claimed in claims 1-6, characterized in
30 that a filter is accomodated in the connection between the delivery side and the annular space.

**Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)**

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Relevant Technical fields

(i) UK CI (Edition L) F1C (CFAC, CFB, CFC) (CFKA)

(ii) Int CI (Edition 5) F04D 13/02, 13/06, ; 29/04,
29/06

Search Examiner

M D WALKER

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

8 MARCH 1993

Documents considered relevant following a search in respect of claims

ALL

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
Y	GB 1485815 (RULE) - page 2 lines 110-117	2,3
Y	GB 1325131 (SETHCO) - page 3 lines 3-23	5,8
Y	US 4684329 (HASHIMOTO) - column 3 lines 19-40	3,5
X	US 4648808 (HAVENSTEIN) - column 4 lines 25-39	1
Y	US 4648808 (HAVENSTEIN)	2,3,5,8
X	US 4645433 (HAVENSTEIN) - column 3 lines 60-68	1
Y	US 4645433 (HAVENSTEIN)	2,3,5,8



Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

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