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[Continued on next page]

(54) Title: MINIATURISED CENTRIFUGATION APPARATUS

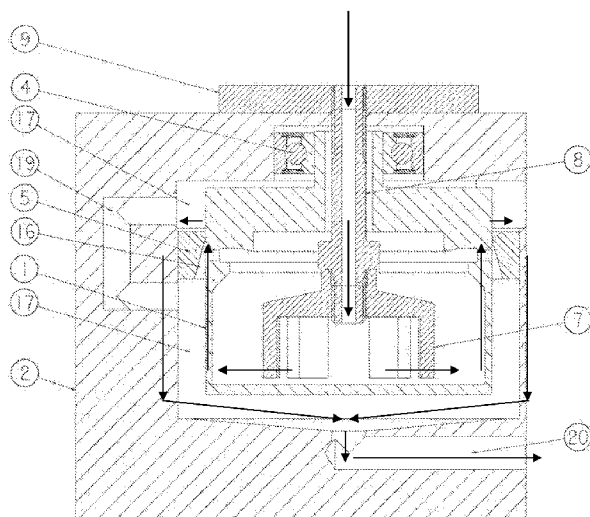


Fig. 3

(57) Abstract: A centrifuge comprises a casing (2) and a rotor (1) mounted on a bearing (4) for rotation inside the casing. Inside a circumferential wall (12) of a bowl of the rotor (1) there are arranged in an axial sequence: a settle-ment zone where fluid can collect, an annular weir (13) projecting radially inwards, and an escape zone (14) where fluid can flow out of the bowl. The escape zone may comprise a set of holes (15) through the wall (12) in the base of an annular gully (14). The bowl of the rotor (1) rotates in a chamber of the casing (2) and an annular seal (5) between the rotor (1) and the casing (2) divides the chamber into two parts (17, 18) to prevent fluid from reaching the bearing (4). Air ducts (19) may connect the two parts of the chamber to equalize the pressure between them. The centrifuge can be manufactured as a small, disposable unit designed to work with an external drive.



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INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2013/051027

A. CLASSIFICATION OF SUBJECT MATTER

INV. B04B1/00 B04B7/00 B04B7/02 B04B7/08 B04B9/12
B04B11/06

ADD.

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)

B04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 387 174 A (ROCHAT JEAN-DENIS [CH]) 7 February 1995 (1995-02-07) column 2, line 15 - column 3, line 31; figures 1,2	1-3,10, 11,18-20
X	DE 31 43 348 A1 (KRAUSS MAFFEI AG [DE]; WIEDERAUFARBEITUNG VON KERNBRE [DE]) 11 May 1983 (1983-05-11) page 10, paragraph 2 - page 11, paragraph 1; figures	1-5, 18-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

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Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2013/051027

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-5, 10, 11, 18-20

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5, 10, 11, 18-20

A centrifuge comprising:

- a) a casing;
 - b) a rotor mounted on a bearing for rotation inside the casing, the rotor comprising:
 - c) a bowl defined by an end wall and a circumferential wall;
 - d) a settlement zone where fluid in the bowl can collect on an inner surface of the circumferential wall when the rotor is rotating;
 - e) an escape zone where fluid can flow from the interior to the exterior of the bowl when the rotor is rotating; and
 - f) an annular weir projecting radially inwards from the circumferential wall to divide the settlement zone from the escape zone,
- with specific features of the weir.

2. claims: 6-9

A centrifuge comprising:

- a) a casing;
 - b) a rotor mounted on a bearing for rotation inside the casing, the rotor comprising:
 - c) a bowl defined by an end wall and a circumferential wall;
 - d) a settlement zone where fluid in the bowl can collect on an inner surface of the circumferential wall when the rotor is rotating;
 - e) an escape zone where fluid can flow from the interior to the exterior of the bowl when the rotor is rotating; and
 - f) an annular weir projecting radially inwards from the circumferential wall to divide the settlement zone from the escape zone, and
- an annular seal between the casing and the rotor, the seal dividing the chamber into a first part adjacent to the bearing and a second part into which fluid flowing from the escape zone of the bowl is discharged.

3. claims: 12-15

A centrifuge comprising:

- a) a casing;
- b) a rotor mounted on a bearing for rotation inside the casing, the rotor comprising:
- c) a bowl defined by an end wall and a circumferential wall;
- d) a settlement zone where fluid in the bowl can collect on an inner surface of the circumferential wall when the rotor is rotating;
- e) an escape zone where fluid can flow from the interior to the exterior of the bowl when the rotor is rotating; and
- f) an annular weir projecting radially inwards from the

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

circumferential wall to divide the settlement zone from the escape zone, and
where the rotor is provided with blades, ridges, vanes or paddles for agitating fluid in the bowl and/or a stator that is fixed to the casing and is suspended inside the bowl of the rotor, eventually provided with blades, ridges, vanes or paddles for agitating fluid in the bowl.

4. claims: 16, 17

A centrifuge comprising:

- a) a casing;
 - b) a rotor mounted on a bearing for rotation inside the casing, the rotor comprising:
 - c) a bowl defined by an end wall and a circumferential wall;
 - d) a settlement zone where fluid in the bowl can collect on an inner surface of the circumferential wall when the rotor is rotating;
 - e) an escape zone where fluid can flow from the interior to the exterior of the bowl when the rotor is rotating; and
 - f) an annular weir projecting radially inwards from the circumferential wall to divide the settlement zone from the escape zone,
- and drive means for mechanically coupling the rotor to an external drive, wherein the rotor eventually further comprises a set of permanent magnets or electrical coils to induce rotation.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2013/051027

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US 5387174	A	07-02-1995	AT 172893 T 15-11-1998
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