



(43) International Publication Date
4 September 2014 (04.09.2014)

- (51) International Patent Classification:
B01D 33/067 (2006.01) *B04B 3/08* (2006.01)
B01D 17/038 (2006.01)
- (21) International Application Number:
PCT/IB2014/059336
- (22) International Filing Date:
28 February 2014 (28.02.2014)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
201300745 28 February 2013 (28.02.2013) AU
- (71) Applicant: FLSMIDTH A/S [DK/DK]; Global IPR Management, Vigerslev Allé 77, DK-2500 Valby (DK).
- (72) Inventor; and
- (71) Applicant (for AU only): STARR, David [AU/AU]; 19 Manet Crescent, Forest Lake, Queensland 4077 (AU).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,

HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))

(54) Title: A BASKET

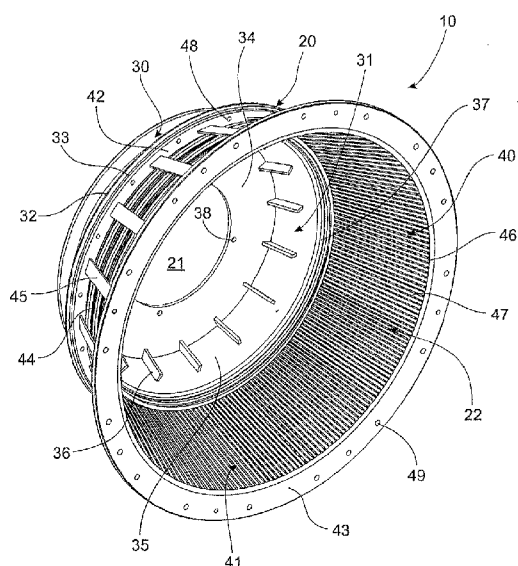


FIG. 1

(57) Abstract: Described is a basket for use in a centrifuge for dewatering material, such as crude ore for use in the mineral industry, where the basket is comprised of a first portion and a second portion. The first portion is characterized in that it includes a wear member, a back member, a connection flange and a feed end flange. The first portion is detachably connected to the second portion, which is formed from a screen member, a connecting flange and a delivery end flange.

TITLE

"A BASKET"

FIELD OF THE INVENTION

This invention relates to a basket. In particular the invention relates to a
5 basket for use in a mineral processing centrifuge that has improved wear
properties.

BACKGROUND OF THE INVENTION

Centrifuges have been used in mineral processing industry for some time.
Centrifuges are primarily used to dewater minerals and ores. A component of
10 most centrifuges is a basket which is rotated in order to dry the minerals. In use,
mineral slurry is fed into a feed end of the basket whilst the basket is rapidly
spinning to cause the slurry to be forced against an inner periphery of the basket.
The centrifugal force imparted to the mineral slurry causes water to be forced from
the ore through slots located within the basket.

15 A major issue with the use of the centrifuges is the amount of basket wear.
Most basket wear is caused adjacent the feed end of the basket, where the slurry
is fed. Wear to the basket generally occurs when the slurry that is being
processed moves tangentially (i.e. the material rotates) around the basket. When
a basket wears prematurely, the basket must be replaced. This is costly due to
20 cost of the basket and the substantial downtime cost.

US Patent number 6,109,452 discloses a basket for use in a
centrifuge that has improved wear properties. The basket is formed from a
plurality of spaced-apart circumferential ribs and axial stringers that joined
together to form a series of apertures. Bridging each aperture at one end of the
25 basket is a series bars made from a wear resistant material, such as tungsten

carbide, silicon carbide or ceramic. The bars are configured so that, when arranged side-by-side and end-to-end, they form apertures between adjacent bars.

The wear that is caused on the bars is less than the steel that is traditionally used. Unfortunately, tangential movement of the slurry still causes wear on the metal circumferential ribs causing premature failure of the basket. Further the labor costs of manufacturing the basket are high as each individual bar is required to be individually attached to the metal frame. This makes the manufacture of the basket cost prohibitive.

The reference to any prior art in this specification is not, and should not be taken as, an acknowledgement or any form of suggestion that the prior art forms part of the common general knowledge.

OBJECT OF THE INVENTION

It is an object of the invention to overcome and/or eliminate one or more of the above disadvantages or to provide the consumer with a useful or commercial choice.

SUMMARY OF THE INVENTION

In one form, although not necessarily the only or broadest form, the invention resides in a basket for use in a centrifuge, the basket having an first portion which is more resistant to tangential wear than a second portion.

In another form the invention resides in a basket for a centrifuge, the basket comprising:

a frusto-conical body having a first portion and a second portion;
the first portion further comprising at least one wear member.

The wear member may located on the interior of the first portion of the

body.

The wear member may be made from an integrally formed wear material.

Preferably the first portion and the second portion are detachably connected to each other.

5 The body includes a feed end and a delivery end. The feed end is located adjacent a small diameter end of the body whilst the delivery end is located adjacent a large diameter end of the body.

The first portion of the body is located adjacent the feed end of the body.

10 The wear member may be formed by applying a wear material to a backing plate.

The wear member may be formed from a mouldable or castable wear material.

The wear material is preferably Siliconized Silicon Carbide. However other suitable wear materials may be used such as alumina ceramic or Ni-hard.

15 Normally there is only a single wear member. The wear member may also be substantially frusto-conical in shape. The wear member may be a solid annular ring with no slots. Alternatively, the wear member includes slots.

The wear member may include one or more vanes on an inner face of the wear member. The vanes may be integrally formed with the wear member.

20 Alternatively, the vanes may be otherwise attached to the wear member. The vanes may extend axially along the wear member. The vanes may extend approximately one half to two-thirds the length of the wear member. The vanes may extend from adjacent a feed end of the wear member.

25 A circumferential wall may be located adjacent to the inner face of the wear member. The circumferential wall may be located adjacent a delivery end edge of

the wear member. The circumferential wall may be located adjacent an end of the vanes. The circumferential wall may be integrally formed with the wear member or the vanes. Alternatively, the circumferential wall may be otherwise attached to the wear member or vanes.

5 The second portion of the body may be located adjacent the delivery end of the body. Preferably, the second portion of the body is made from less wear resistant materials than the wear member. The second portion normally includes steel or stainless steel wedge or profiled wires. Normally, the adjacent surfaces of the first and second portions are smoothly joined together so as to form a single
10 continuous basket. The wear member may be tapered adjacent a joint between the first portion and the second portion.

 The first portion of the body may be detachably connected to the second portion. A first attachment member forms part of the first portion to attach the first portion to the second portion. A second attachment member forms part of the
15 second portion to attach the second portion to the first portion. The attachment members of the first and second portions may be in the form of a flange.

 Preferably, the first portion extends approximately one-third of the length of the basket and the second portion comprises the remaining two-thirds.

 In another form, the invention resides in a basket for a centrifuge, the
20 basket comprising:

 a frusto-conical body having a first portion and a second portion,
the first portion further comprising at least one wear member wherein the wear member includes at least one arcuate segment.

 The arcuate segment may be integrally made from wear material.

25 The body includes a feed end and a delivery end. The feed end is located

adjacent a small diameter end of the body whilst the delivery end is located adjacent a large diameter end of the body.

The first portion of the body is located adjacent the feed end of the body.

The wear material may be formed from a mouldable or castable material.

5 The wear material is preferably Siliconized Silicon Carbide. However other suitable wear materials may be used such as alumina ceramic or Ni-hard.

Preferably, there is a plurality of arcuate segments. The arcuate segments can form of an annular ring.

Each arcuate segment may be solid with no slots. Alternatively, each
10 arcuate segment may include slots.

Each arcuate segment typically includes at least one vane, but may have a plurality of vanes. The vanes may extend axially along the arcuate segment. The vanes may extend approximately one-half to two-thirds the length of the arcuate segment. The vanes may extend from adjacent a feed end of the arcuate
15 segment.

A circumferential wall section may be located adjacent to an inner face of each arcuate segment. The circumferential wall section may be located adjacent a delivery end edge of each arcuate segment. The circumferential wall section may be located adjacent an end of the vanes. The circumferential wall section
20 may be integrally formed with the arcuate segment or the vanes. Alternatively, the circumferential wall section may be attached to the arcuate segment or the vanes.

The second portion of the body is located adjacent the delivery end of the basket. Preferably, the second portion of the body is made from less wear resistant materials than the arcuate segment. The second portion normally
25 includes steel or stainless steel wedge or profiled wires. Normally, adjacent

surfaces of the first portion and second portion are smoothly joined together so as to form a single continuous inner surface of the basket. The arcuate segments may be tapered adjacent a joint between the first portion and the second portion.

The first portion of the body may be detachably connected to the second portion. A first attachment member forms part of the first portion of the basket to attach the first portion to the second portion. A second attachment member forms part of the second portion of the body to attach the second portion to the first portion. The attachment members of the first and second portions may be in the form of a flange.

Preferably, the first portion preferably extends approximately one-third of the length of the basket and the second portion comprises the remaining two-thirds.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiment of the invention, by way of example only, will now be described with reference to the accompanying drawings in which:

FIG. 1 is a perspective view of a basket according to a first embodiment of the invention;

FIG. 2 is a perspective view of a basket according to a second embodiment of the invention; and

FIG. 3 is a perspective view of a basket according to a third embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows a basket 10 that is used within a horizontal centrifuge. In particular, the basket shown can be used in the HFC 1300 centrifuge is current manufactured by FLSmidth Ludowici Pty Ltd. However it should be appreciated

that the basket may be routinely modified to fit within other centrifuges.

The basket 10 is formed from a body 20 in the shape of a truncated cone. Accordingly, the body includes a feed end 21 (located adjacent a small diameter of the body) and a delivery end 22 (located adjacent a large diameter of the body).

5 The body is split into a first portion 30 which includes the feed end and a second portion 40 that includes the delivery end.

The first portion includes a wear member 31, a back member 32, a first attachment member 33 and a feed end flange 34. The wear member 31 is located between the first attachment member 33 and the feed end flange 34. The
10 wear member 31 is cast from Siliconized Silicon Carbide (known as "SiSiC"). The wear member 31 is a solid annular ring with a series of vanes 36 (known in the art as "accelerator bars") which are integrally formed. The wear member 31 is in the shape of a truncated cone. The vanes 36 extend axially along the wear member 31. A delivery end edge 37 of the wear member 31, located adjacent the first
15 attachment member, is tapered.

The wear member 31 is fastened to the backing member 32, first attachment member 33, and the feed end flange 34 using an adhesive such as epoxy or other fastening means. It would be appreciated by a person skilled in the art which adhesives or other fastening means are suitable depending on the use
20 of the basket 10, the material the wear member 31 is made from and the material that the first attachment member 33 and/or feed end flange 34 and/or backing member 32 is made from.

The backing member 32 is located behind the wear member 31. The backing member 32 is made from steel. The backing member 32 is connected to
25 and located between the first attachment member 33 and the feed end flange 34.

The first attachment member 33 is made from steel. The first attachment member 33 extends outwardly with respect to the wear member 31 and is fastened to the wear member 31. A series of holes 48 extend through the first attachment member 33. The holes 48 are circumferentially spaced around the
5 first attachment member 33.

The feed end flange 34 is also made from steel. The feed end flange 34 extends inwardly with respect to the wear member 31 and is fastened to the wear member 31.

The second portion 40 is formed from a screen member 41, second
10 attachment member 42 and delivery end flange 43. The screen member 41 is located between the second attachment member 42 and the delivery end flange 43. The screen member 41 is from a series of spaced-apart circumferential ribs 44 and series of axial stringers 45. The stringers 45 are welded to the ribs 44. The stringers 45 are placed radially outward from ribs 44. Secondary screen
15 elements 46 are attached to the ribs 44. The secondary screen elements 46 are normally in the form of a plurality of wire members that are arranged side-by-side. The wire members are spaced slightly apart so as to form slots 47. Normally, the slots 47 are formed by the arranging the wire members so that the wire members extend axially relative to the basket. Wire members are normally formed from steel
20 or stainless steel wedge or profiled wires.

The second attachment member 42 is made from steel. The second attachment member 42 extends outwardly with respect to the screen member 41 and is connected to screen member 41. A series of holes 48 extend through the second attachment member 42. The holes 48 are circumferentially spaced
25 around the flange. In use, the first attachment member 33 and the second

attachment member 42 are located adjacent to each other so that bolts (not shown) can extend through respective holes 48 in each flange to attach the first portion 30 and the second portion 40 together.

The delivery end flange 43 is made from steel. The delivery end flange 43
5 extends outwardly with respect to the screen member 41 and is connected to screen member 41. A series of holes 49 extend through the delivery end flange 43 to connect the basket 10 to a basket carrier (not shown) via bolts (not shown). The holes 49 are circumferentially spaced around the flange.

In use, the basket 10 is used within a horizontal centrifuge in a normal
10 manner. In normal use, the first portion 30 will outlast the second portion 40. According, often only the second portion 40 is required to be changed after a period of use. In this instance, the first portion 30 is removed from the second portion 40 by removing the bolts through the first attachment member 33 and the second attachment member 42. A new second portion 40 is then attached to the
15 old first portion 30 by placing bolts through the old first attachment member 33 and the new second attachment member 42. It is envisaged that the first portion 30 will last at least three times longer than the second portion 40. In the instance when both the first portion and the second portion are worn, the entire basket 10 is replaced in a normal manner.

20 FIG 2 shows a second embodiment of the basket 10. Again, like numerals have been used to describe like components. In this embodiment, a circumferential wall 50 is located adjacent to an inner face 35 of the wear member 31. The circumferential wall 50 is located adjacent a delivery end of the wear member 31. The circumferential wall 50 is made of SiSiC and is integrally formed
25 with the wear member 31 and vanes 36.

FIG 3 shows a third embodiment of the invention. Again, like numerals have been used to describe like components. In this embodiment, the wear member 31 is formed by a plurality of arcuate segments 60 made from cast SiSiC. Each arcuate segment 60 includes an inner face 61, a plurality of vanes 36 and a circumferential wall section 62, which are all integrally formed. In order to produce the first portion 30, the arcuate segments 60 are fastened to the backing member 32, first attachment member 33 and feed end flange 34 once the feed end flange 34 and first attachment member 33 are connected to the backing member 32. Once all the arcuate segments 60 are installed, they form an annular ring and the circumferential wall sections 62 form a circumferential wall 50.

In this specification, the terms “comprise”, “comprises”, “comprising” or similar terms are intended to mean a non-exclusive inclusion, such that a system, method or apparatus that comprises a list of elements does not include those elements solely, but may well include other elements not listed.

It should be appreciated that various other changes and modifications may be made to the embodiments described without departing from the spirit and/or scope of the invention.

CLAIMS:

1. A basket for a centrifuge, the basket comprising:
a frusto-conical body having a first portion and a second portion, the first portion further comprising at least one wear member, wherein the first portion is
5 detachably connected to the second portion.
2. The basket of claim 1 wherein the wear member is an annular ring.
3. The basket of claim 1 wherein the wear member is made from an integrally formed wear material.
4. The basket of claim 3 wherein the wear material is a mouldable or castable
10 material.
5. The basket of claim 4 wherein the wear material is Siliconized Silicon Carbide.
6. The basket of claim 1 wherein at least one vane is connected to the wear member.
- 15 7. The basket of claim 6 wherein the vanes are integrally formed with the wear member.
8. The basket of claim 1 wherein a circumferential wall is adjacent to an inner face of the wear member.
9. The basket of claim 8 wherein the circumferential wall is integrally formed
20 with the wear member.
10. The basket of claim 1 wherein the second portion of the basket is made from less wear resistant material than the wear member.
11. The basket of claim 1 wherein the first portion extends approximately one-third of the length of the basket and the second portion comprises the remaining
25 two-thirds.

12. A basket for a centrifuge, the basket comprising:
a frusto-conical body having a first portion and a second portion, the first portion further comprising at least one wear member wherein the wear member is formed by a plurality of arcuate segments.
- 5 13. The basket of claim 12 wherein the arcuate segments form an annular ring.
14. The basket of claim 12 wherein the first portion and the second portion are detachably connected to each other.
15. The basket of claim 12 wherein the arcuate segments are constructed from an integrally formed wear material.
- 10 16. The basket of claim 15 wherein the wear material is Siliconized Silicon Carbide.
17. The basket of claim 12 wherein at least one vane is connected to at least one of the arcuate segments.
18. The basket of claim 12 wherein a circumferential wall section is located
15 adjacent to an inner face of at least one of the arcuate segments.
19. The basket of claim 19 wherein the circumferential wall section is integrally formed with at least one of the arcuate segments.
20. The basket of claim 12 wherein the second portion of the basket is made from less wear resistant material than at least one of the arcuate segments.
- 20 21. The basket of claim 12 wherein the first portion extends approximately one-third of the length of the basket and the second portion comprises the remaining two-thirds.

1 / 3

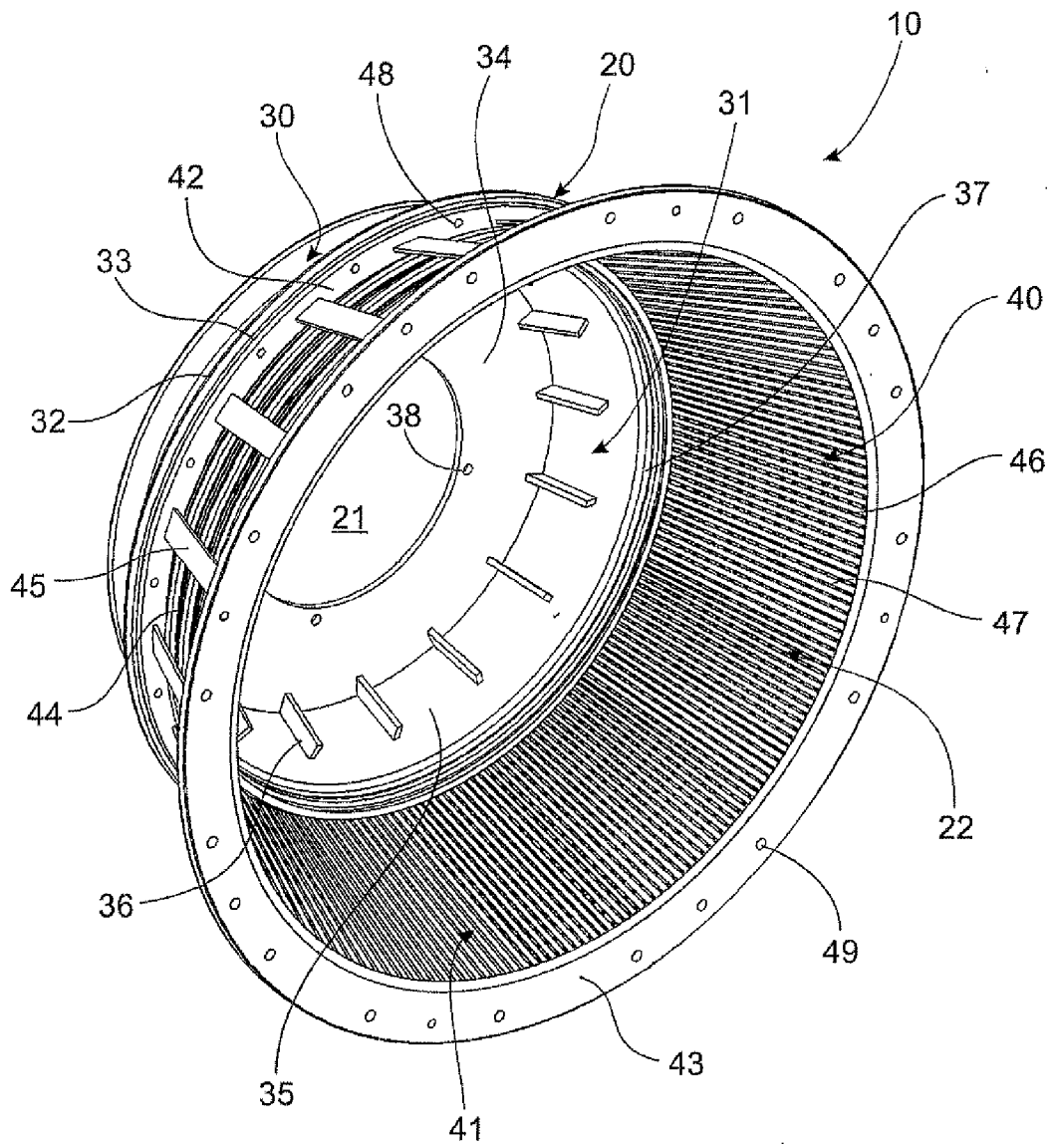


FIG. 1

2 / 3

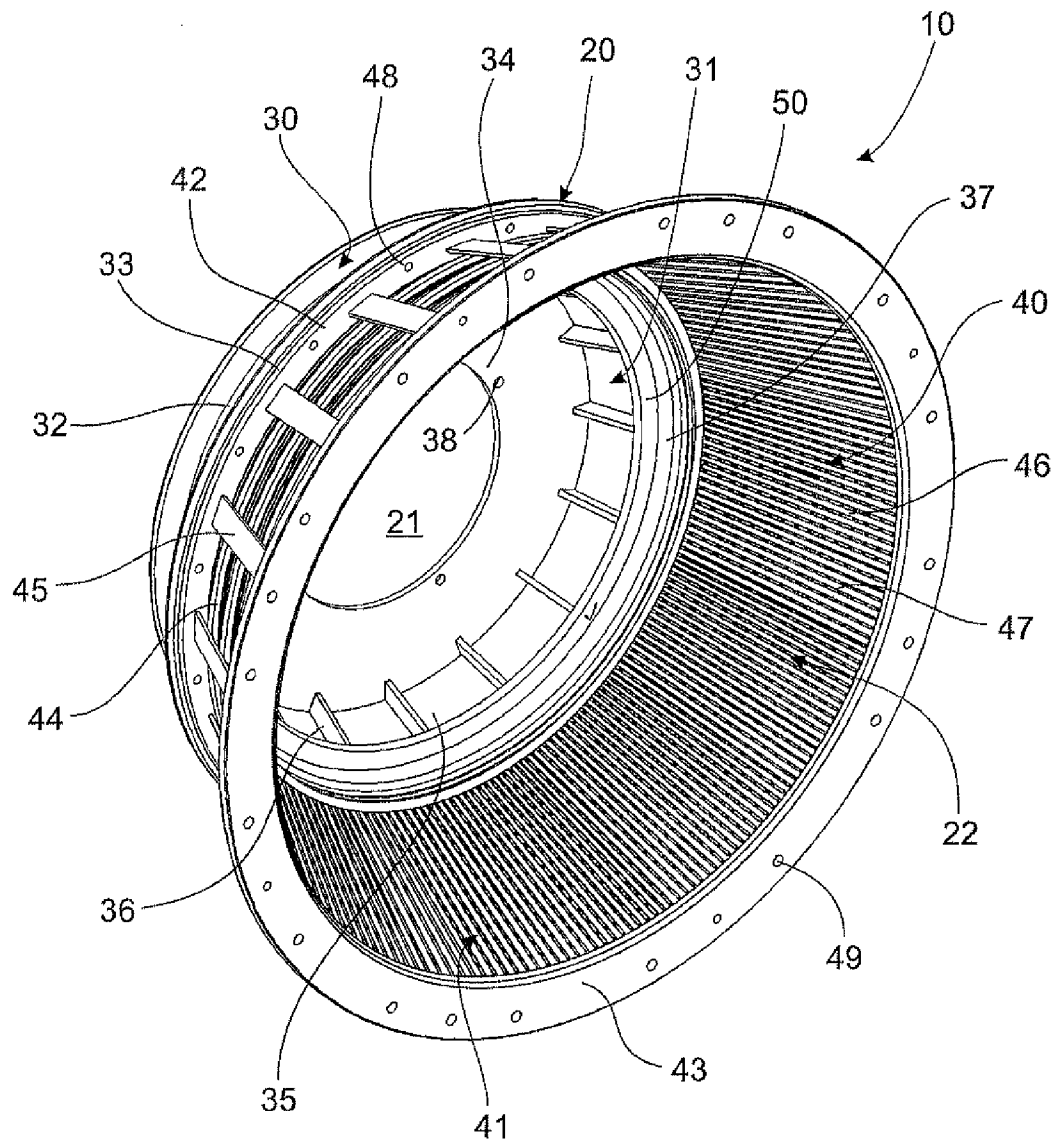


FIG. 2

3 / 3

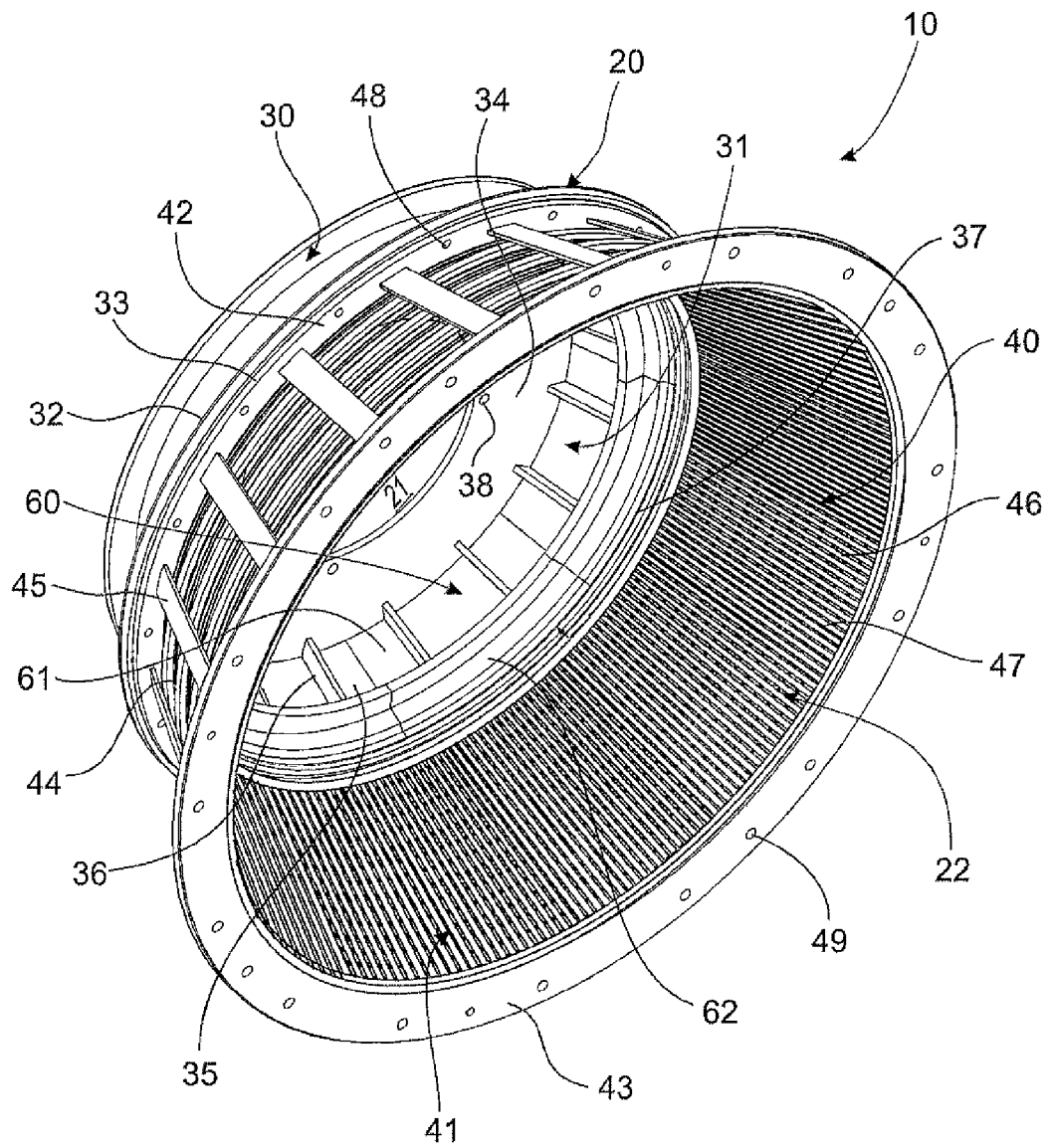


FIG. 3

INTERNATIONAL SEARCH REPORT

 International application No.
PCT/IB2014/059336

A. CLASSIFICATION OF SUBJECT MATTER

B01D 33/067 (2006.01) B01D 17/038 (2006.01) B04B 3/08 (2006.01)

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)

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)

EPODOC, WPI: IPC Marks-B01D17/038, B01D21/26, B01D33/00, B01D33/06, B01D33/067, B04B1/LOW, B04B3/LOW, B04B5/LOW, B04B7/LOW with Key Words- BASKET?, DRUM, STRAINER?, COLANDER?, BOWL?, RECEPTACL+, FRUSTO_CONICAL, CONE+, WEAR+, ABRAS+, ERO[S,D], WAST+

GOOGLE PATENTS: Word Search- Centrifugal, Separator, Basket/Drum, Wear, Detach

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	



Further documents are listed in the continuation of Box C



See patent family annex

* "A"	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance	"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
"E"	earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed		

 Date of the actual completion of the international search
 6 May 2014

 Date of mailing of the international search report
 06 May 2014

Name and mailing address of the ISA/AU

 AUSTRALIAN PATENT OFFICE
 PO BOX 200, WODEN ACT 2606, AUSTRALIA
 Email address: pct@ipaustalia.gov.au
 Facsimile No.: +61 2 6283 7999

Authorised officer

 Pathma Fernando
 AUSTRALIAN PATENT OFFICE
 (ISO 9001 Quality Certified Service)
 Telephone No. 0262837948

INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		PCT/IB2014/059336
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 4846781 A (KNELSON) 11 July 1989 column 3, lines 47-68; column 4, lines 45-56; fig 1 column 3, lines 47-68; column 4, lines 45-56; fig 1	1-5, 10 6, 7
X Y	US 4961722 A (TAYLOR et al.) 09 October 1990 column 2, line 62-column 3, line 5; column 3 lines 39-65; column 6, lines 45-50; fig 1 column 2, line 62-column 3, line 5; column 3 lines 39-65; column 6, lines 45-50; fig 1	1, 5, 10 6-9, 11-21
Y	CA 1234085 A (CONOLLY, JAMES D) 15 March 1988 page 8, lines 25-28; figs 1-4	8, 9, 11-21
Y	CN 202070409 U (CHENGDU TIANSHENG CENTRIFUGE TECHNOLOGY) 24 December 2011 see English translation retrieved from the EPODOC database, figure	6, 7
Y	US 1961226 A (C. W. KEATLEY et al.) 05 June 1934 page 2, lines 12; figs 1, 4, 6	12

INTERNATIONAL SEARCH REPORT		International application No.	
Information on patent family members		PCT/IB2014/059336	
This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.			
Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
US 4846781 A	11 Jul 1989	None	
US 4961722 A	09 Oct 1990	None	
CA 1234085 A	15 Mar 1988	None	
CN 202070409 U	24 Dec 2011	None	
US 1961226 A	05 Jun 1934	None	
End of Annex			
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001. Form PCT/ISA/210 (Family Annex)(July 2009)			