



(11)

EP 2 626 146 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
14.08.2013 Bulletin 2013/33

(51) Int Cl.:
B07B 1/00 (2006.01)
D21D 5/16 (2006.01) **D21D 5/04** (2006.01)

(21) Application number: **12154666.7**

(22) Date of filing: **09.02.2012**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

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(54) **Screen**

(57) The invention relates to a screen for screening mixtures comprising a chamber of the screen (10), which chamber is created into a space by walls (25), which space is divided by a screen mesh element (20) into at least two chambers (18,19) comprising a screening chamber (18) and a discharge chamber (19) and which screen (10) further comprises at least one inlet opening (11), at least one outlet opening (12), at least one reject discharge (13), at least one rotor element (17) and at least one actuator (15) for rotating the rotor element (17). The screen mesh element (20) of the screen (10) is a sintered element comprising at least two sintered mesh layers (21) and in the screen (10) the distance between the rotor element (17) and the screen mesh element (20) is 1 mm - 70 mm.

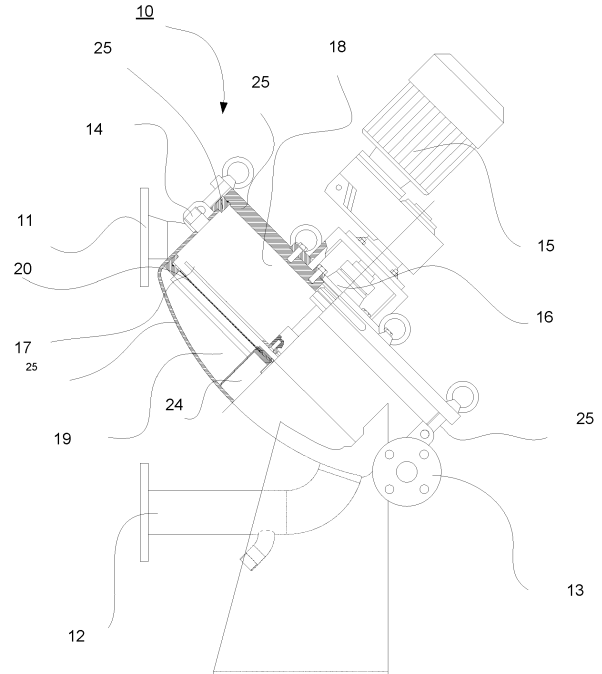


Fig. 1

Description

[0001] The present invention relates to screens for screening mixtures to be used in connection with for example dispersing devices fiber web machines or mineral industry machines. More especially the invention relates to a screen according to the preamble part of claim 1 for screening mixtures.

[0002] In connection with dispersing devices screens are used for screening for example mixtures of pigment slurries, starch etc.

[0003] In connection with the fiber web production, for example in connection with paper or board web production, different kinds of mixtures for example pigment slurries and coating pastes are used to coat the web. The mixtures are of different compositions and have different kinds of dry substances i.e. solids and liquid, for example water and they are typically prepared for each specific use. To achieve high quality of the coated web these mixtures are to be screened. Generally the primary screening is done to the mixture as part of the mixture preparing but additionally screens are arranged to coating stations in connection with the mixture feed circulation. The purpose of screening is to separate from the coating mixture dry substance accumulations, fibers detached from the web and other foreign matter that would cause coating defects.

[0004] In connection with mineral industry machines screens are used for screening for example mixtures of pigment slurry. Usually there are for example sand, flocculated pigment particles and other foreign substances which have to be removed from the slurry.

[0005] Two basic types of screens are known from prior art, namely pressure screens and open vibrating screens i.e. vibrating flat screens. Vibrating flat screens are conventionally used for screening slurries through a flat wire cloth with the help of the hydrostatic pressure imposed by a slurry layer. The vibration keeps the cloth unclogged and improves the screening capacity by decreasing the viscosity of the slurry. Vibrating screens have good selectivity but not so good capacity. Pressure screens are used for screening slurries and pastes in connection with feed circulation. The pressure screen comprises a drum of spiral wires attached apart from each other to create a spiraled slot. Pressure screens have high capacity but not so good selectivity.

[0006] An object of the present invention is to create a screen in which the problems of the prior art screens are eliminated or at least minimized.

[0007] In EP patent application publication 0733734 a screen to improve selectivity as compared to conventional pressure screens and to combine the advantages of a vibrating screen and a conventional pressure screen is disclosed. The screen for screening filler and pigment slurries and coating mixtures in papermaking has been disclosed, which screen comprises an in-feed chamber having at least a portion of its walls formed by a straining element perforated with holes, elements for feeding the

material to be strained into the in-feed chamber, elements for routing the fraction of the material passed through said straining element to further use and elements for discharging the non-passed fraction out from the screen as rejects, and elements for feeding the material to be strained into said in-feed chamber so that the pressure in said in-feed chamber is higher than the pressure in the discharge chamber after said straining element and the straining element employed is a perforated member with a hole size smaller than 300 μm and in conjunction with the in-feed chamber are adapted means for agitating the material to be strained and for forming a flow pattern in the vicinity of said straining element. This prior art screen fulfills the needs of screening well and provides for good selectivity in combination to high capacity but in some cases its durability is not sufficient and another object of the present invention is to further improve the prior art screen as disclosed in EP patent application publication 0733734 especially in relation to creating better turbulence for the flow.

[0008] To achieve the mentioned objects the screen according to the invention is mainly characterized by the features of the characterizing clause of claim 1.

[0009] According to the invention the screen is sintered and comprises at least two mesh layers and in the screen mesh element the distance between the rotor element and the screen mesh element is 1 mm - 70 mm. By the screen according to the invention thus high mechanical strength in combination with very high turbulence at the surface of the screen mesh element is achieved and so a screen with long service life with good selectivity in combination with high capacity is achieved.

[0010] According to an advantageous aspect the sintered screen mesh element comprises several sintered mesh layers. The screen mesh element with at least two layers according to the invention has good pressure responsiveness, for example to pressures of about 1 bar pressure difference over screen element and more layers are advantageous if further responsiveness to pressure is needed.

[0011] Layers are advantageously formed of mesh structure that creates an open surface of 30 - 80 %, advantageously of 40 - 70 %, for the screen mesh element. The material of the screen mesh element is steel advantageously acid-resistant steel is used. By these advantageous features the life time of the mesh is even longer, mechanical strength higher and thus not so many service breaks are needed.

[0012] According to a further advantageous feature in the screen the distance between the rotor element that provides for a mixing wing and the screen mesh element is 1 mm - 15 mm. By this high turbulence is created on the surface of the screen mesh element and efficient mixing and good flow properties are achieved.

[0013] According to an advantageous feature the screen is located substantially vertically such that the screen element extends in substantially vertical direction or in inclination angle greater than 0 but less than 45

degrees and thus the reject is in the lower part. By this arrangement good selectivity and good flow properties are achieved.

[0014] According to an advantageous feature the rotor element is a rotor blade that has been designed such that it generates turbulence on the surface of the screen mesh element.

[0015] Further according to an advantageous feature the screen comprises a venting channel by which air is removed from the screening chamber.

[0016] According to a further advantageous feature the screen mesh element comprises at least one support layer for further mechanical strength.

[0017] In the screen according to the invention the pressure in the screen is higher in inlet side than in outlet side.

[0018] In the following the invention is described in more detail referring to the appended drawing in which

Figure 1 shows schematically one example of the screen according to one advantageous embodiment of the invention and

Figures 2A - 2C show schematically one example of the screen mesh element according to an advantageous feature of the invention.

[0019] In the following figures to which the invention is not to be narrowly limited same reference signs are used for respective parts and components if not otherwise mentioned.

[0020] In figure 1 an example of a screen according to an advantageous feature of the invention is shown. The screen 10 comprises a screening chamber 18 and a discharge chamber 19 that are located on opposite sides of a screen mesh element 20 that thus divides the chamber into two main chambers 18, 19. Mixture to be screened by the screen 10 is fed to the screening chamber 18 via inlet opening 11. In the screening chamber 18 the mixture is subject to turbulence provided by the rotor blade 17 with design that crates turbulence on the surface of the screen mesh element 20. The rotor blade 17 is rotated by motor 15 or corresponding actuator via a shaft 16 on which the rotor blade 17 is attached. The chamber of the screen 10 comprising screening chamber 18 and discharge chamber 19 is located vertically or in inclination as shown in the figure 1 so that inlet opening 11 and venting channel 14 are in the upper part of the screening chamber 18 and the outlet opening 12 the reject discharge 13 are in the lower part of the screening chamber 18. Thus the screen mesh element extends in substantially vertical direction or in inclination angle in respect to the vertical direction which angle is greater than 0 but less than 45 degrees. Thus the reject separated by the screen mesh 21 of the screen mesh element 20 accumulates with the help of gravity in the vicinity of the reject discharge 13 located at the substantially lowest section of the screening chamber 18. The screened mixture

passed through the screen mesh 21 of the screen mesh element 20 is removed from the discharge chamber 17 via the outlet opening 12. The chamber of the screen 10 has wall structures that limit the chamber space and support the rotor blade 17 and its shaft 16. The screen mesh element 20 is attached inside the chamber walls along its outer circumference thus creating the divider of the chamber. The center of the screen mesh element 20 is attached by a support piece 24 to the chamber wall. In the screen 10 the distance between the rotor blade 17 that provides for a mixing wing and the screen mesh element 20 is 1 mm - 70 mm, advantageously 1 mm - 15 mm.

[0021] In figures 2A - 2C an example of the screen mesh element 20 is shown. the screen mesh element 20 has an outer support structure 22 that circumvents is outer circumference and to inner side of which at least two sintered screen mesh layers 21 are attached and which is attached to the walls of the chamber of the screen 10 at its outer side. In the center of the screen mesh element 20 a center support structure is attached to which the support piece 24 is attached for supporting the center area of the mesh to the wall of the discharge chamber 18 (fig. 1). The screen mesh 21 is sintered and its material is steel, advantageously acid-resistant steel. The mesh like structure comprises at least two mesh layers and its open surface is 30 - 80 %, advantageously 40 -70 %. The screen mesh element may also comprise support layers for adding mechanical strength.

[0022] In the above the invention has been explained in reference to an advantageous example only into which the invention is not to be narrowly limited and many variations and modifications are possible within the inventive idea.

Reference sings used in the drawing

[0023]

- 10 screen
- 11 inlet opening
- 12 outlet opening
- 13 reject discharge
- 14 venting channel
- 15 motor
- 16 shaft
- 17 rotor blade
- 18 screening chamber
- 19 discharge chamber
- 20 screen mesh element
- 21 screen mesh layer
- 22 outer support structure
- 23 center support structure
- 24 support piece
- 25 walls

Claims

1. Screen for screening mixtures comprising a chamber of the screen (10), which chamber is created to a space by walls (25) which space is divided by a screen mesh element (20) into at least two chambers (18, 19) comprising a screening chamber (18) and a discharge chamber (19) and which screen (10) further comprises at least one inlet opening (11), at least one outlet opening (12), at least one reject discharge (13), at least one rotor element (17) and at least one actuator (15) for rotating the rotor element (17), **characterized in that** the screen mesh element (20) of the screen (10) is a sintered element comprising at least two sintered mesh layers (21) and that in the screen (10) the distance between the rotor element (17) and in the screen mesh element (20) the distance between the rotor element (17) and the screen mesh element (20) is 1 mm - 70 mm.

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10
15
20
2. Screen according to claim 1, **characterized in that** the sintered screen mesh comprises several sintered mesh layers.
3. Screen according to claim 1, **characterized in that** open surface of the screen mesh element (20) is 30 - 80 %, advantageously 40 - 70 %.

25
4. Screen according to claim 1, **characterized in that** the screen mesh element is made of steel, advantageously of acid-resistant steel.

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5. Screen according to claim 1, **characterized in that** in the screen (10) the distance between the rotor element (17) and the screen mesh element (20) is 1 mm - 15 mm.

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6. Screen according to claim 1, **characterized in that** the screen mesh element (20) extends in substantially vertical direction or in inclination angle in respect to the vertical direction which angle is greater than 0 but less than 45 degrees.

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7. Screen according to claim 1, **characterized in that** the rotor element (17) of screen (10) is a rotor blade and the rotor element (17) has been designed such that turbulence on the surface of the screen mesh element (20) is generated.

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8. Screen according to claim 1, **characterized in that** the screen (10) comprises at least one venting channel (14) by which air is removed from the screening chamber (18).

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9. Screen according to claim 1, **characterized in that** the screen (10) comprises at least one support layer supporting the screen mesh element (20).

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10. Use of screen according to any of claims 1 - 9 in connection with a dispersing device.
11. Use of screen according to any of claims 1 - 9 in connection with a fiber web machine.
12. Use of screen according to any of claims 1 - 9 in connection with a mineral industry machine.

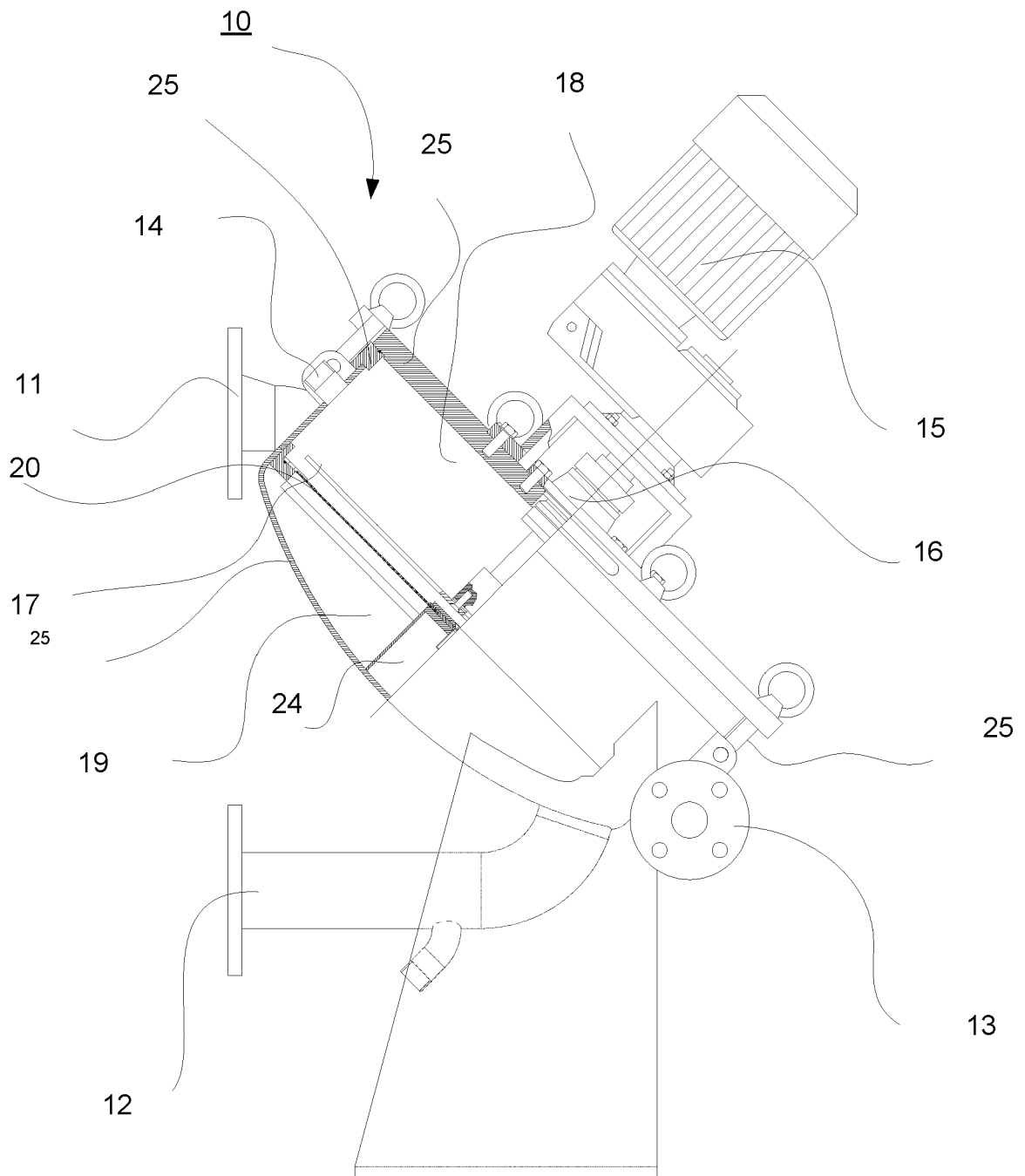
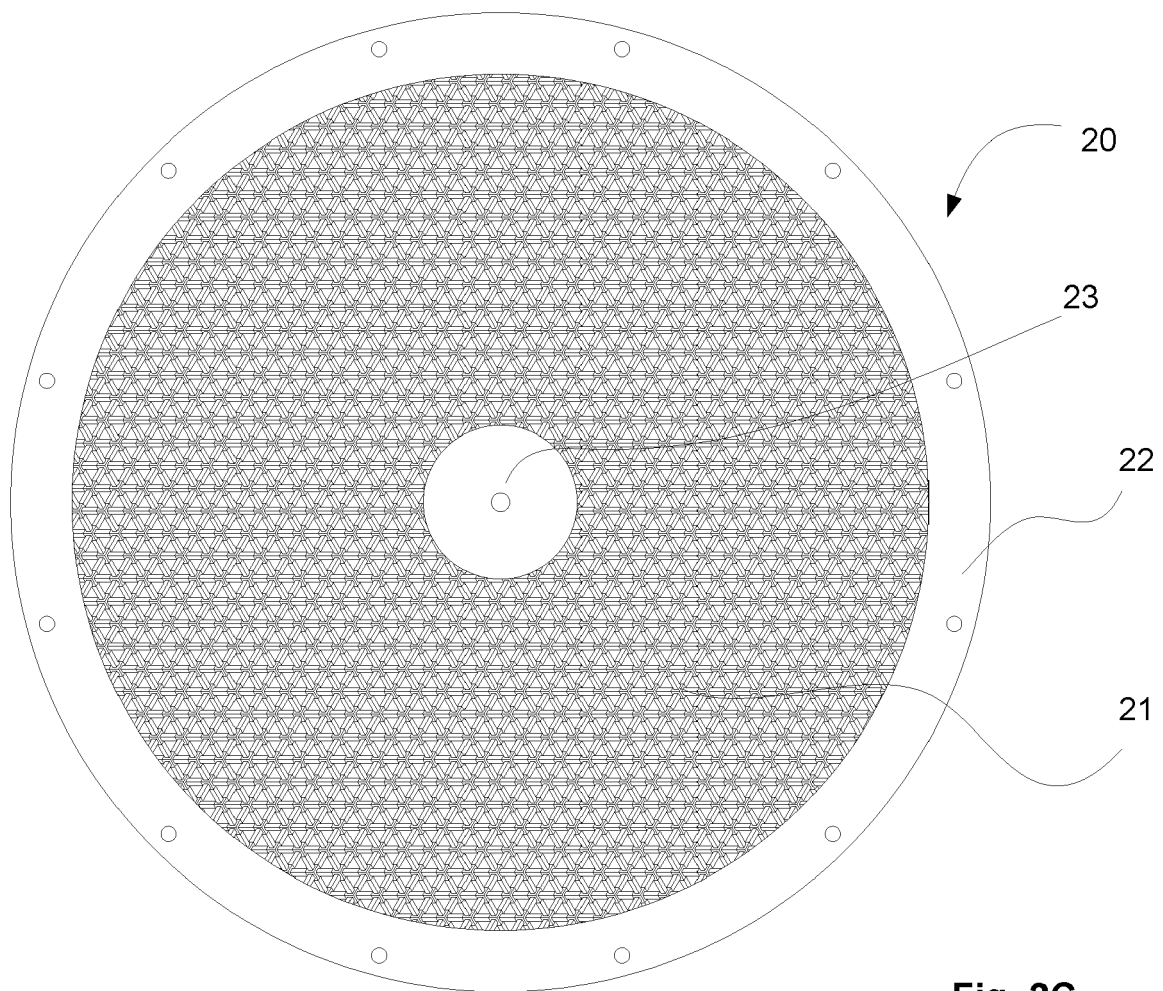
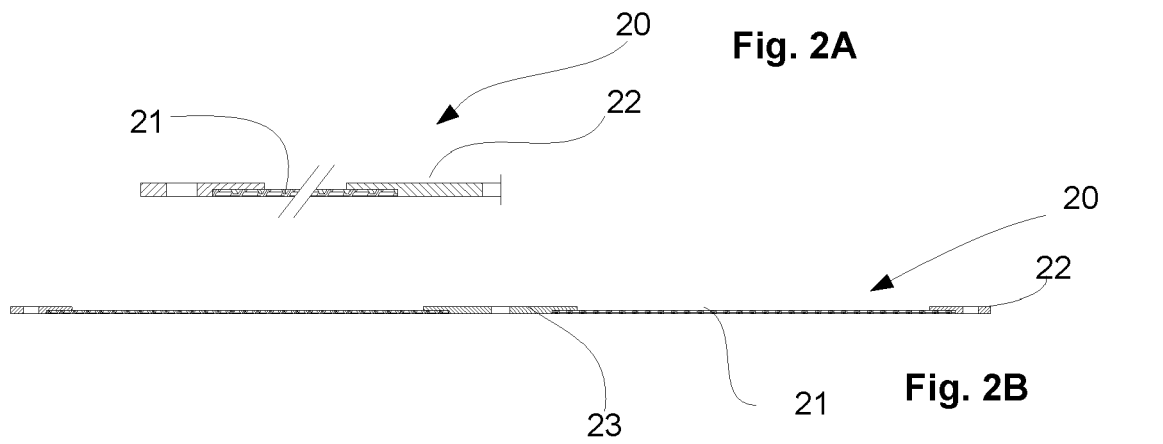


Fig. 1





EUROPEAN SEARCH REPORT

Application Number
EP 12 15 4666

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	EP 0 733 734 A2 (JYLHAERAISIO OY [FI]) 25 September 1996 (1996-09-25) * column 3, line 28 - column 6, line 55; figures 1, 2 *	1,5-9,11	INV. B07B1/00 D21D5/04 D21D5/16
A	US 6 443 310 B1 (SCHULTE JR DAVID LEE [US] ET AL) 3 September 2002 (2002-09-03) * column 5, line 12 - column 6, line 7; figure 1a *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			B07B D21D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 8 May 2012	Examiner Sabatucci, Arianna
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 15 4666

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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08-05-2012

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
EP 0733734	A2	25-09-1996	EP	0733734 A2		25-09-1996
			FI	951396 A		25-09-1996

US 6443310	B1	03-09-2002	NONE			

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 0733734 A [0007]