



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
21.05.2014 Bulletin 2014/21

(51) Int Cl.:
E03D 9/052 (2006.01)

(21) Application number: **12814877.2**

(86) International application number:
PCT/BR2012/000266

(22) Date of filing: **16.07.2012**

(87) International publication number:
WO 2013/010239 (24.01.2013 Gazette 2013/04)

(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

(72) Inventor: **Rodrigues, Amadeu Tonussi**
Belo Horizonte - MG (BR)

(30) Priority: **15.07.2011 BR PI1103686**

(74) Representative: **Lucas, Brian Ronald**
Lucas & Co.
135 Westhall Road
Warlingham,
Surrey CR6 9HJ (GB)

(71) Applicant: **Rodrigues, Amadeu Tonussi**
Belo Horizonte - MG (BR)

(54) **DEVICE FOR EVACUATING ODOURS FROM TOILETS**

(57) The present application relates to a device designed for evacuating unpleasant odours during the use of a toilet. The present device is specifically designed for toilet models comprising a flush water tank. The proposed solution differs from prior solutions in that it can

both be adapted to already existing sanitary fixtures and be integrated into new units. Another fundamental feature of the present device is that the odours are directly collected through the water discharge holes already provided in the toilet.

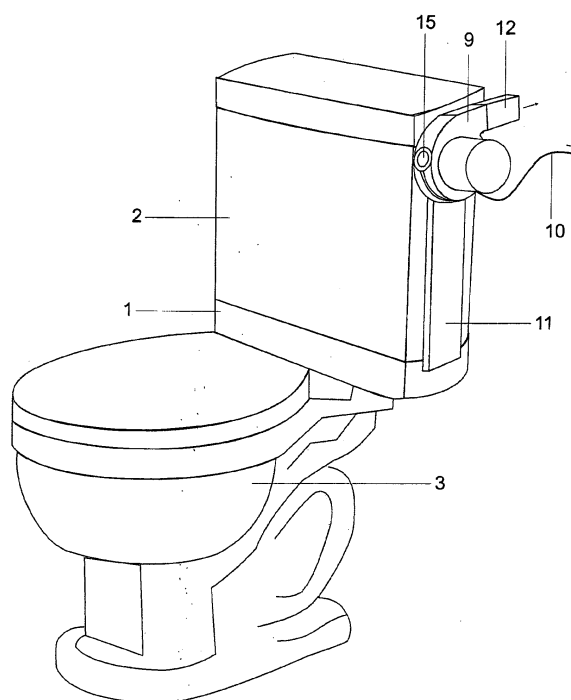


Fig. 1

Description

[0001] The present invention relates to an odor extractor apparatus to be installed in a toilet, particularly to the type of toilet assembly that has both a bowl (3) and a water tank (2). Although this invention uses a mechanical fan (9) to force the gases through an exhaust pipe (12), as other inventions do, it does it by an innovative basic architecture. In essence it comprises an exhaust system activated by the user presence, plus a water-air duct segment (1) inserted between the water tank (2) and the bowl (3). This duct segment (1) also presents an output (7) that allows the unpleasant gases but not the water, to flow into the aforementioned exhaust system.

[0002] This apparatus may well be retrofit to used toilets in the field or acquired pre-installed to factory new units.

Description of the prior art:

[0003] Most relevant documents found during patent research for definition of the prior related art are US6588025B1 (referred herein as D1) and US20030019019A1 (referred herein as D2).

[0004] Although this invention targets the same end result as D1 and D2, it does it by a completely different basic architecture.

[0005] The sole common elements being the fan (9) and the exhaust air pipe (12). Nevertheless, these two basic elements are common not just to the aforementioned inventions but to all existing or proposed odor exhaust systems, obviously out of the scope of claims in this patent.

[0006] Both, D1 and D2 have an odor collecting device assembly (item 20 in D1, item 12 in D2) in their basic architectures, aimed to suck polluted air. D2 also has a skirting (component 28) to allow for a more elevated toilet seat. These components are essentials in those apparatus, in other words D1 and D12 do not work without these assemblies.

[0007] The present invention, on the other hand, has a completely different approach, an architecture that does not require such assemblies to achieve its exhaust goal. It is innovative compared to D1 and D12 or to any other solution to date. It relies on the flushing orifices already present on the bowl ring to grab the air and also relies on the duct segment (1) added between the water tank (2) and the bowl (3) to extract the air (air-water separation by force of gravity).

[0008] By comparison, it becomes evident the differences between the present invention against mentioned patents D1 and D2:

D1: odor collecting assembly - air duct - fan - exhaust duct.

D2: skirting - odor collecting assembly - air duct - fan - exhaust duct.

[0009] Present invention: water flush orifices (added new function of air passing) - duct segment (function of water and air separation) - air duct - fan - exhaust duct.

[0010] It's important to mention that the duct segment (1) in the present patent is not an air sucking assembly as those existing in the aforementioned prior art, instead it is a split device for the air already sucked. Air collection is performed by the orifices already existing in the bowl for flushing purposes that then become dual function orifices.

[0011] The present invention uses a completely different inventive principle, based in a configuration that uses the hydraulic flushing structure of the bowl to perform air suction as well, instead of creating a whole new separate structure for this function. Advantages over the prior art are obvious, both from the functional as from the aesthetic standpoints. There are four classes of functional advantages: exhausting performance, easy making and installation, sanitization and components endurance.

[0012] Aesthetic advantages refer to the environmental visual impact and to the standardization/harmonization with the other toilet components.

Discussing each class of advantages:

[0013] EXHAUSTING PERFORMANCE - From this standpoint, the advantages of the present invention against D1 are evident. Concerning the location of the air collecting assembly in D1, positioned outside the bowl, D1 it is not a toilet odor extracting apparatus, but indeed a room odor extraction apparatus. In other words, at the time the apparatus starts performing its job, a significant amount of unpleasant gases has already spread through the room and has already bothered or will bother the users. The apparatus thus miss its goal that is to prevent bothering the users.

[0014] Against D2 (and also against D1), the present invention has a meaningful advantage concerning the cross section of the air ducts. Exhausting airflow performance is a function of the cross section of the ducts and the fan power. The smaller the cross section, the larger the fan power required to achieve the same airflow. In the present invention, where the gases are captured through the flushing holes, the dimensions of the water flush system are large enough to provide a good air flow for a midsized fan. It results in lower noise level thus increased user comfort. Concerning D2, it was required to move up the toilet seat and use a skirting to enlarge air collecting assembly cross section. Performance is thus dependent on the toilet seat height and skirting to achieve acceptable venting, meaning it needs at least this extra assembly to reach performance.

[0015] EASY OF MAKING AND INSTALLATION - The present invention has a lower component count compared to D1 and D2, the components are grouped in a more compact form factor and are more organically integrated, seamless, with fewer joints, concavities and corners. This structural simplicity leads naturally to easier

making and installation.

[0016] Opposite to the air collection assemblies of D1 and D2, the duct segment (1) of the present invention is made out of the same material of the water tank, being suitable to be manufactured by the same manufacturer using the same technology. Besides, both D1 and D2 require toilet seat modifications, not required by the present invention. The toilet seat is usually a user's personal choice item, among many options available. This choice is limited to the integrated toilet seat type offered, when D1 or D2 solutions are employed. **SANITIZATION** - The present invention exhibits clear advantages against D1 and D2 both concerning inner and outer sanitization. Concerning internal components, since air and water flow through the same ducts, they become self-cleaning, particles of nasty substances being removed at each water flush.

[0017] Exhibiting less corners and concavities than D1 and D2 it has better internal cleaning.

[0018] Its external components due to positioning, form and material are less prone to urine splashes as well as other contaminants, on duty. They are also easier to clean up, because its outer surfaces are smooth and washable.

[0019] COMPONENT PRESERVATION/ENDURANCE - Due to the aforementioned component toughness, form, position and better cleaning, the apparatus of the present invention is expected to last long, well beyond those of D1 and D2, and are less prone to damages from daily use.

[0020] AESTHETICS ADVANTAGES - Concerning aesthetics, the present invention, when added to toilets in the field, presents much less visual impact than D1 and D2. Although both D1 and D2 might be added to toilets in the field, one can clearly note they do seem like parts strange to the set. Only the present invention integrates seamlessly to the toilet set.

[0021] The end result can easily be seen at the main drawing in each of the patents: even at a glimpse, D1 and D2 show up as a toilet set to which an apparatus was added; while the present invention integrates itself seamlessly to the set. This is a very important factor affecting consumer's buying decision making, because even a very effective apparatus may not be bought for aesthetic reasons.

[0022] The duct segment (1) in the present invention is made out of the same material as the toilet bowl (3) and tank (2), (usually ceramics) and can be offered in the same color and finishing. For its position and form, this duct segment (1) presents itself as a natural extension of the tank (2), undistinguishable of the tank at a first glimpse.

[0023] It comes out that the duct segment (1) can be manufactured by the same manufacturer of the toilet set, granting seamless form fit free from corners and steps that might degrade its performance and aesthetics. Also, a perfect color match for the duct segment (1) to the toilet set can be expected from the manufacturer of both items.

[0024] The remaining components of the present invention (ducts 11 and 12 and the fan housing); due to their form and position have less visual impact. Besides, they can be made in the same color and finishing of the junction segment (1), same as the bowl (3) and tank (2), allowing them to be made by the same manufacturer, achieving the aforementioned seamless fit and pattern.

[0025] The overall end result has low negative visual impact, accounting for big business expectations.

[0026] In the prior art, patent US 5, 839,127 also sucks gases from the flushing holes, but as the gases flow downstream through relatively narrow passages, since originally made as water overflow drain, the efficacy of gas removal is comparably small. Another shortcoming is the relative difficulty to retrofit units in the field, since parts changes inside the tank are required.

[0027] The patent search also showed solutions that remove the gases from the room after they have escaped from the bowl (3), thus out of the scope of the present invention since inherently not effective. There are other solutions already tried, again out of the scope of the present invention because instead of getting rid of the odor, they mask it by means of chemical products.

Objectives:

[0028]

- Be capable of incorporation to new units as well as being sold as a kit (accessory) to retrofit units in the field.
- Do not alter the tank, the bowl, the components of one neither the other. Instead, be a separate device to be installed between the water tank and the bowl. The advantage of this configuration is an easier comprehension of the product by the installer and by the consumer, getting around qualified workmanship, leading to a popular and well accepted product.
- To lower the production and installation costs.
- To make use of gravity as the air-water separator force, avoiding valves. This is an advantage because valves require sealings, costs and may fail.

Drawings:

[0029] The object of the present invention is depicted by the attached drawings that represent one of the possible forms of implementation. Other configurations may be implemented, the basic architecture kept, replacing one or more parts by others that technically perform likewise.

[0030] The attached figures are:

Figure 1- Perspective view of the whole set, as installed.

Figure 2 - Front and cut view of the duct segment (1) and the water tank (2).

Figure 3 - Top view of the duct segment (1).

Figure 4 - Schematic view of the siphon (16).

[0031] Item numbering on the drawings refers to the parts listed below:

- 1- duct segment
- 2 - flush water tank
- 3 - toilet bowl
- 4 - inner chamber
- 5 - chamber water input
- 6 - chamber water output air input
- 7 - chamber vent output
- 8 - cap
- 9-fan
- 10 - power cord
- 11 - air duct from chamber to fan
- 12 - fan air output duct
- 13 - chamber lower surface
- 14 - sealing ring
- 15 - user presence sensor
- 16 - siphon

Description:

[0032] The invention comprises an exhaust system activated by the user presence, plus a water-air duct segment (1) inserted between the water tank (2) and the bowl (3). This duct segment (1) also presents an output (7) that allows the unpleasant gases but not the water, to flow into the aforementioned exhaust system.

[0033] Said duct segment (1) is a hollow chamber (4) that besides the water input (5) and the water output that is also the air input (6), has an air vent output (7) (to outside the room). Two vent outputs (7), one at each side of said junction segment (1), can be fitted so that the more convenient vent side can be selected to install the ventilation parts. In this case, the unused output is blocked by a cap (8).

[0034] Ventilation is mechanically forced by means of a fan (9) installed anywhere downstream in the exhaust duct, also connected to the power outlet by a power cord (10). One side of the fan (9) is connected to the chamber (4) by the duct (11) and, the other side is connected to a duct (12) that guides the air out of the room. The fan (9) must be located above the maximum possible flood water level in the chamber (4), ideally above the tank water surface level, thus assuring that the flush water does not reach it.

[0035] Just in case aesthetic or room space or any other reason forces fan (9) placement at or below the flood level, the present invention comprises a siphon (inverted "U ") (16) upstream the fan (9) to force the gases flow above the flood level thus preventing water from reaching the fan (9). When the fan (9) is integrated to the duct, its output duct (12) moves to the desired direction to ease the installation.

[0036] Despite chamber (4) and adjacent junction duct (11) flood during the water flush, thus suspending gas

extraction, the lower surface (13) of the chamber (4) is inclined towards its center to allow the water to be drained into the bowl soon after flushing, resuming gas extraction.

[0037] Said duct segment (1) is hydraulically connected to the water tank (2) above and to the toilet bowl (3) below, by means of sealing rings (14) same as those that seal the tank (2) to the bowl (3). Said duct segment (1) has dimensions that match those of the tank (2) and bowl (3), making it possible to transfer the weight of the tank to the toilet bowl, as well as aesthetic harmonization.

[0038] The fan (9) may be turned on either by a manual switch or by a presence sensor (15) as soon as a user is detected. The presence sensor (15) can also have a timing function to keep the fan (9) turned on for a period of time after use, granting complete exhaustion.

[0039] To install the apparatus to an existing toilet in the field it is enough to separate the water tank (2) from the toilet bowl (3) and place the duct segment (1) between them. Factory new toilet sets can come with the duct segment (1) embedded in the water tank (2) resulting in a single part to be mounted over the bowl (3) as a regular tank.

Claims

1. **Toilet odor extracting apparatus** having mechanical ventilation forced by a fan through an exhaust duct **comprising** a junction segment (1), to be installed between the existing water tank (2) and the existing bowl (3), hydraulically connected to both, said junction segment (1) being a hollow chamber (4) with its lower inner surface (13) inclined, having a water input (5), a water output air input (6) and a vent output (7);
2. **Toilet odor extracting apparatus** in accordance with claim 1 wherein a low profile duct (11) is attached to the side of the said existing tank (2) connecting the chamber (4) to the fan(9).
3. **A toilet exhaust device** in accordance with claim 1 wherein the junction segment (1) is built embedded in the water tank (2), resulting in a single part hydraulically connectable to the bowl (3).
4. **Toilet odor extracting apparatus** in accordance with claim 1 wherein a siphon (16) is placed between the chamber (4) and the fan (9), for the cases in which the installation requires the fan (9) to be positioned at or below the chamber (4) flood level.

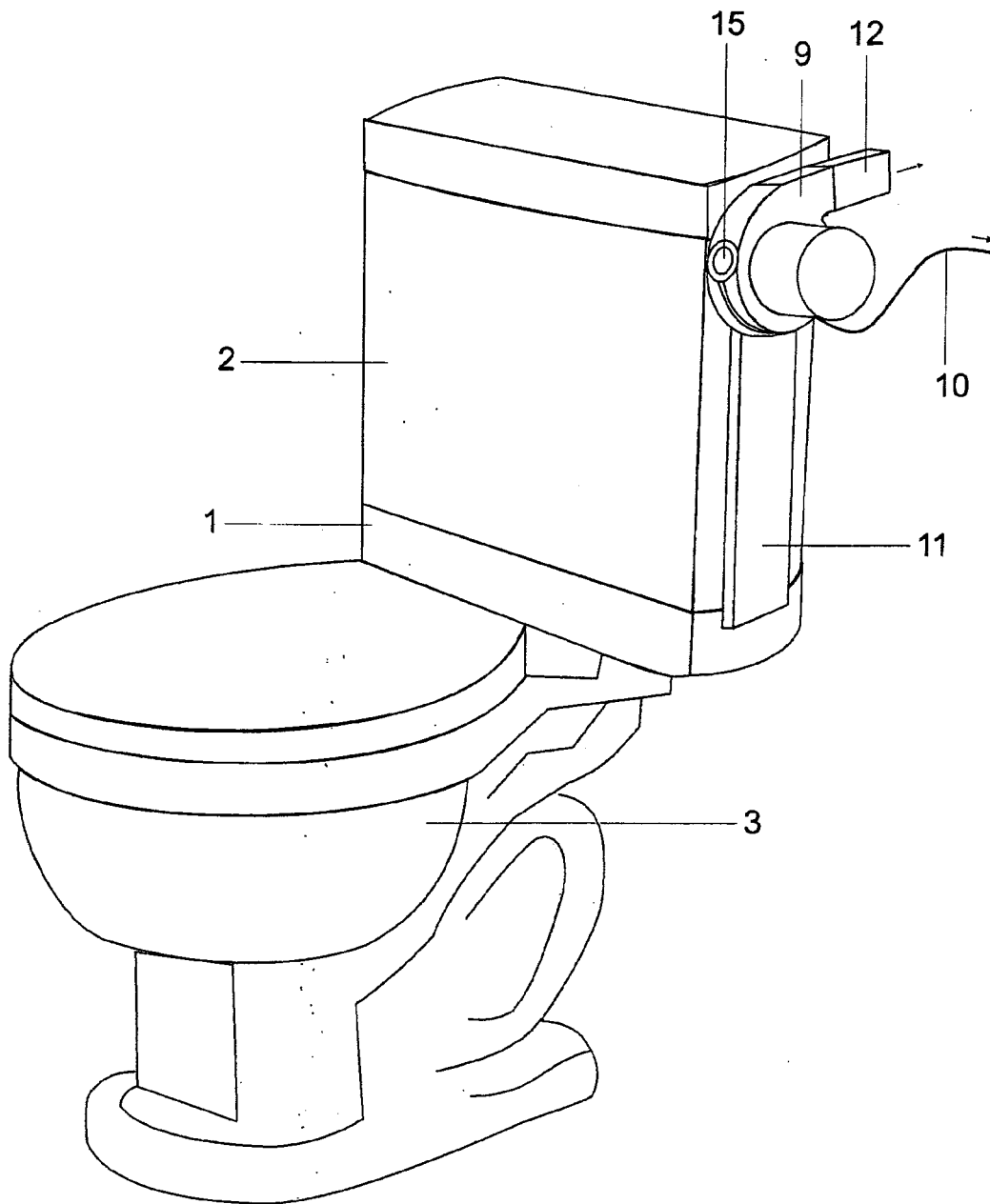


Fig. 1

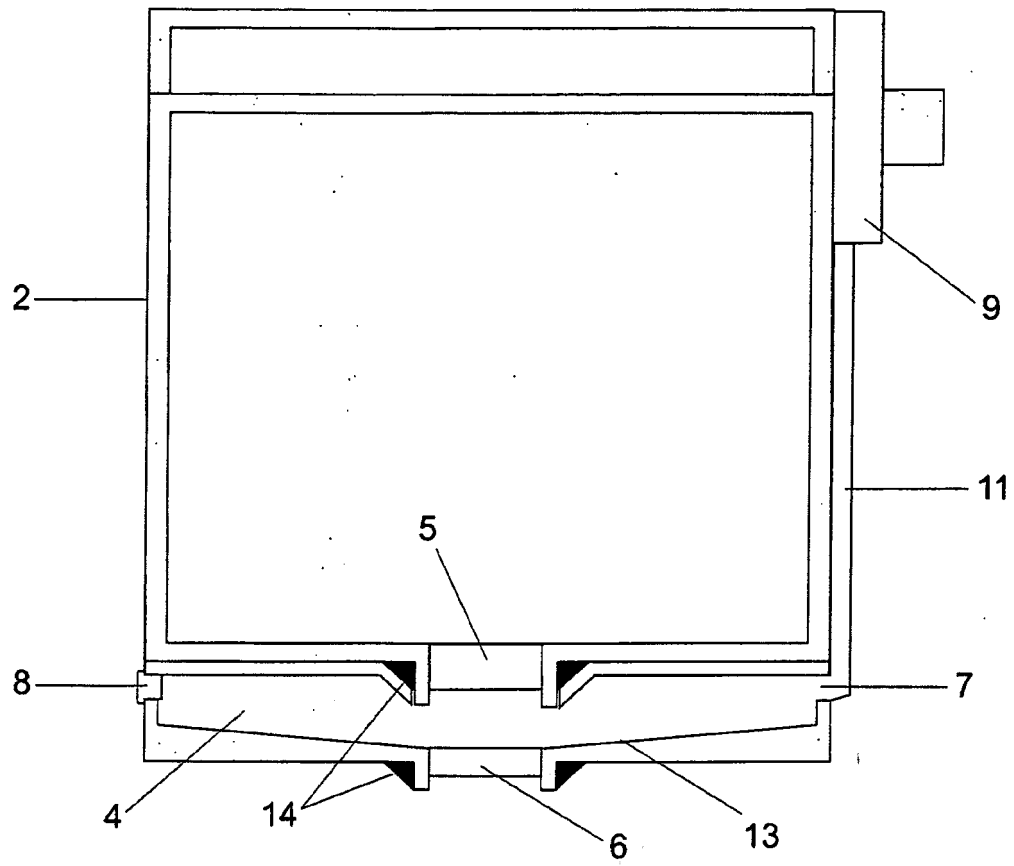


Fig. 2

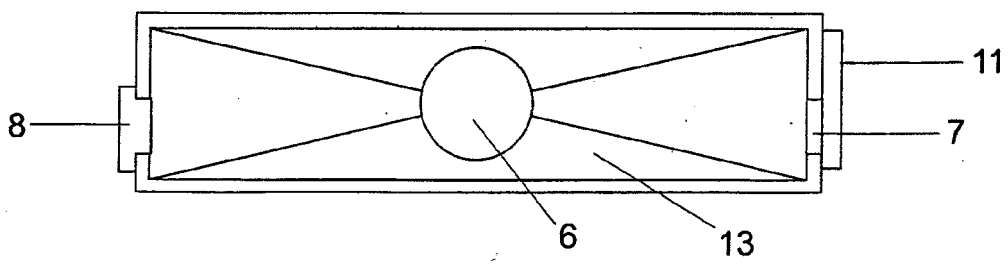


Fig.3

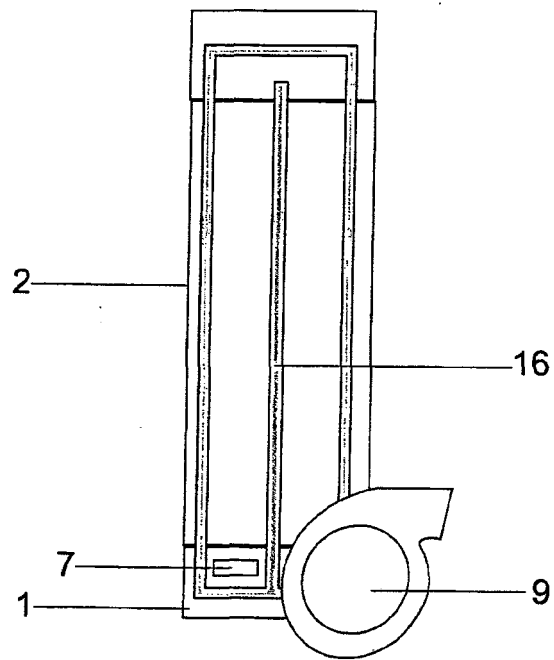


Fig.4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/BR2012/000266

A. CLASSIFICATION OF SUBJECT MATTER E03D9/052 (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) IPC E03D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched SINPI (Base de dados do INPI - BR)		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPODOC; ESPACENET		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6588025 B1 08 July 2003 (08-07-2003) Abstract, Figures -----	1, 2
X	US 2003019019 A1 30 January 2003 (30-01-2003) Abstract, Figures -----	1, 2
A	WO 2004063480 A3 (KIM HONG-MAN [KR]) 18 November 2004 (18-11-2004) the whole document -----	
☒ 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 04 september 2012		Date of mailing of the international search report 13.09.12
Name and mailing address of the ISA/ INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL +55 21 3037-3663 Rua Sao Bento nº 1, 17º andar Facsimile No. cep: 20090-010, Centro - Rio de Janeiro/RJ		Authorized officer Aline Amaral de Sousa Telephone No. +55 21 3037-3493/3742

Form PCT/ISA/210 (second sheet) (July 2009)

EP 2 733 270 A1

INTERNATIONAL SEARCH REPORT Information on patent family members

International application No.
PCT/BR2012/000266

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REFERENCES CITED IN THE DESCRIPTION

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