(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 140 377 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.03.2023 Bulletin 2023/09

(21) Application number: **22190896.5**

(22) Date of filing: **18.08.2022**

(51) International Patent Classification (IPC):
A47K 13/30 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A47K 13/302

(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
Designated Validation States:
KH MA MD TN

(30) Priority: **31.08.2021 CN 202122084850 U**
10.08.2022 US 202217885192

(71) Applicant: **Kohler (China) Investment Co. Ltd.**
Shibei Industrial Park, Jing'an District
Shanghai
Shanghai 200436 (CN)

(72) Inventors:
- **CHEN, Feixiang**
  Shanghai, 200436 (CN)
- **CHENG, Shiping**
  Shanghai, 200436 (CN)
- **ZHU, Xuedan**
  Shanghai, 200436 (CN)

(74) Representative: **Barker Brettell LLP**
100 Hagley Road
Edgbaston
Birmingham B16 8QQ (GB)

(54) TOILET SEAT, TOILET COVER PLATE AND INTELLIGENT TOILET

(57) The present disclosure discloses a bidet, comprising: a seat ring comprising a rear portion; an accommodating tank disposed at the rear portion of the seat ring and comprising a front side tank wall, wherein at least one tank wall through hole is disposed on the front side tank wall of the accommodating tank; a liquid reservoir configured to store disinfectant and disposed in the accommodating tank; and at least one atomizing nozzle disposed in the accommodating tank and comprising a liquid inlet end communicated with the liquid reservoir and a liquid outlet end communicated with the at least one tank wall through hole. The present disclosure also discloses a toilet cover plate comprising a seat cover and the bidet and discloses an intelligent toilet comprising a controller; a toilet body; and the toilet cover plate.

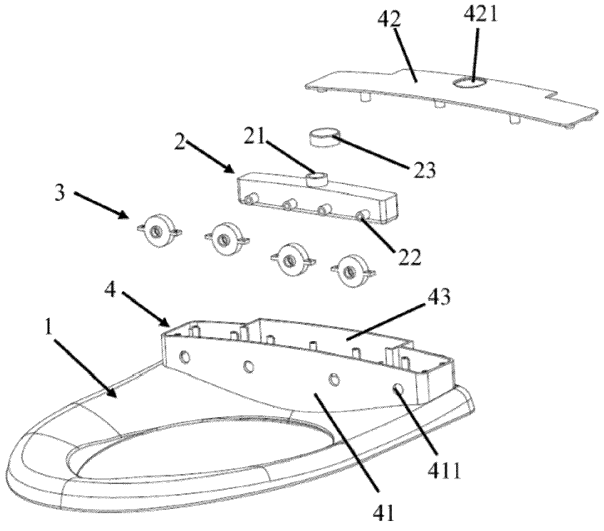

FIG. 2

EP 4 140 377 A1

Description

TECHNICAL FIELD

[0001] The utility model relates to the technical field of bathroom devices, and more particularly, to a seat ring assembly, a toilet cover plate and an intelligent toilet.

BACKGROUND

[0002] A toilet is commonly known as a closestool, which includes a toilet body and a toilet cover plate installed on the toilet body, and the toilet cover plate includes a seat ring and a seat cover.

[0003] In the prior art, when sterilizing and disinfecting the toilet, a disinfectant is generally sprayed onto the toilet cover plate and sprayed into the toilet body, and then the toilet is scrubbed with a rag.

[0004] The existing toilet requires manual operation for sterilization and disinfection, which is time-consuming and labor-consuming. It is impossible to disinfect dead corners by manually spraying the disinfectant, such as a back of the seat cover, a gap between the seat ring and the seat cover, an inner wall of the toilet body, and other positions. After spraying the disinfectant, wiping the toilet with a rag is easy to cause secondary pollution.

[0005] In light of this, it is necessary to provide a seat ring assembly, a toilet cover plate and an intelligent toilet that can automatically sterilize and disinfect.

SUMMARY

[0006] The utility model aims at providing a seat ring assembly, a toilet cover plate and an intelligent toilet that can automatically sterilize and disinfect.

[0007] The technical solutions of the utility model provide a seat ring assembly, including a seat ring, a liquid reservoir for storing disinfectant and at least one atomizing nozzle;

a rear portion of the seat ring being provided with an accommodating tank, and the liquid reservoir being located in the accommodating tank;
a front side tank wall of the accommodating tank being provided with a tank wall through hole; and
the atomizing nozzle being located in the accommodating tank, and a liquid inlet end of the atomizing nozzle being communicated with the liquid reservoir, and a liquid outlet end of the atomizing nozzle being communicated with the tank wall through hole.

[0008] In one optional technical solution, the accommodating tank is provided with more than two atomizing nozzles arranged at intervals, and accordingly, the front side tank wall is provided with more than two tank wall through holes arranged at intervals; and
the liquid inlet end of each atomizing nozzle is communicated with the liquid reservoir, and the liquid outlet end of each atomizing nozzle is communicated with one tank wall through hole.

[0009] In one optional technical solution, the liquid outlet end of the atomizing nozzle is inserted in the tank wall through hole.

[0010] In one optional technical solution, the liquid inlet end of the atomizing nozzle is connected with a liquid outlet of the liquid reservoir through a liquid supply hose.

[0011] In one optional technical solution, a spring is installed in the liquid supply hose.

[0012] In one optional technical solution, the liquid reservoir is internally provided with a liquid pump.

[0013] In one optional technical solution, the atomizing nozzle includes a nozzle shell with an installation cavity, an atomizing sheet with a spray hole and a piezoelectric sheet connected to one side of the atomizing sheet;

the liquid inlet end and the liquid outlet end are respectively arranged on the nozzle shell, and are respectively communicated with the installation cavity; and
the atomizing sheet and the piezoelectric sheet are located in the installation cavity, and the spray hole faces the liquid outlet end.

[0014] In one optional technical solution, the spray hole and the liquid outlet end are coaxially arranged.

[0015] In one optional technical solution, the piezoelectric sheet is a piezoelectric ring surrounding the spray hole.

[0016] In one optional technical solution, a liquid inlet of the liquid reservoir extends above a top cover plate of the accommodating tank; and
a plug cover is detachably installed on the liquid inlet of the liquid reservoir.

[0017] In one optional technical solution, the accommodating tank is provided with a clamping groove, and the liquid reservoir is clamped in the clamping groove.

[0018] The technical solutions of the utility model further provide a toilet cover plate, including a seat cover and the seat ring assembly described in any of the above technical solutions;
a cover plate rotating shaft being installed in the accommodating tank, and the seat ring and the seat cover being connected with the cover plate rotating shaft respectively.

[0019] The technical solutions of the utility model further provide an intelligent toilet, including a controller, a toilet body and the toilet cover plate described in the above technical solutions;

the toilet cover plate being installed on the toilet body;
wherein, the atomizing nozzle is in signal connection with the controller.

[0020] Employing the foregoing technical solutions can implement the following beneficial effects:

[0021] According to the seat ring assembly, the toilet cover plate and the intelligent toilet provided by the utility

model, the disinfectant is stored in the liquid reservoir, when sterilization and disinfection are needed, the atomizing nozzle operates to atomize the disinfectant into sterilization mist, which can sterilize a whole area enclosed by the seat cover, and can also sterilize and disinfect a gap between the seat ring and the seat cover, an inner wall of the toilet body and other positions, thus avoiding secondary pollution and improving performances of the product.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

FIG. 1 is a perspective view of a seat ring assembly provided by an embodiment of the utility model;
FIG. 2 is an exploded view of the seat ring assembly provided by an embodiment of the utility model;
FIG. 3 is a sectional view of the seat ring assembly provided by an embodiment of the utility model;
FIG. 4 is a perspective view of an atomizing nozzle;
FIG. 5 is an exploded view of a shell of the atomizing nozzle;
FIG. 6 is a schematic diagram showing connections of an atomizing sheet, a piezoelectric sheet and an oscillating circuit;
FIG. 7 is a side view of the piezoelectric sheet and the atomizing sheet;
FIG. 8 is a schematic diagram of a liquid supply hose with a spring installed therein;
FIG. 9 is a schematic diagram of a liquid reservoir internally provided with a liquid pump;
FIG. 10 is a perspective view of a toilet cover plate provided by an embodiment of the utility model;
FIG. 11 is an exploded view of the toilet cover plate provided by an embodiment of the utility model; and
FIG. 12 is a schematic structural diagram of an intelligent toilet provided by an embodiment of the utility model.

DETAILED DESCRIPTION

[0023] The specific embodiments of the utility model will be further described with reference to the drawings hereinafter. Same parts are denoted by same reference numerals. It is to be noted that the terms "front", "back", "left", "right", "up", and "down" used in the following description refer to the directions in the accompanying drawings, and the terms "inner" and "outer" refer to the directions toward or far away from geometric centers of a specific parts respectively.

[0024] As shown in FIG. 1 to FIG. 5, an embodiment of the utility model provides a seat ring assembly 100, including a seat ring, a liquid reservoir 2 for storing disinfectant and at least one atomizing nozzle 3.

[0025] A rear portion of the seat ring 1 is provided with an accommodating tank 4, and the liquid reservoir 2 is located in the accommodating tank 4.

[0026] A front side tank wall 41 of the accommodating tank 4 is provided with a tank wall through hole 411.

[0027] The atomizing nozzle 3 is located in the accommodating tank 4, and a liquid inlet end 313 of the atomizing nozzle 3 is communicated with the liquid reservoir 2, and a liquid outlet end 314 of the atomizing nozzle 3 is communicated with the tank wall through hole 411.

[0028] The seat ring assembly 100 provided by the utility model is a part of the toilet, including the seat ring 1, the liquid reservoir 2, the at least one atomizing nozzle 3 and the accommodating tank 4.

[0029] The accommodating tank 4 is installed at a rear end of the seat ring 2, the accommodating tank 4 is used for installing a connecting piece 9 shown in FIG. 11, and the connecting piece 9 includes a cover plate rotating shaft 91 and a bolt connector 92. The cover plate rotating shaft 91 is used for assembling the seat ring 1 and a seat cover 201 shown in FIG. 10 to FIG. 11 together, so that both the seat ring 1 and the seat cover 201 can rotate around the cover plate rotating shaft 91. The bolt connector 92 is used for fixing the seat ring 1 to a toilet body 301 shown in FIG. 12.

[0030] The liquid reservoir 2 is used for storing disinfectant, and the liquid reservoir 2 is installed in the accommodating tank 4. The front side tank wall 41 of the accommodating tank 4 is provided with the tank wall through hole 411, and the number of the tank wall through hole 411 corresponds to the number of the atomizing nozzle 3.

[0031] The atomizing nozzle 3 is a nozzle capable of atomizing disinfectant, and an ultrasonic atomizing nozzle may be selected. The atomizing nozzle 3 is installed in the accommodating tank 4, and the liquid inlet end 313 of the atomizing nozzle is communicated with the liquid reservoir 2. The liquid outlet end 314 of the atomizing nozzle 3 is communicated with the tank wall through hole 411.

[0032] According to the need, a liquid outlet 22 may be arranged at a bottom portion or a lower portion of the accommodating tank 4, and the liquid inlet end 313 of the atomizing nozzle 3 may be connected with the liquid outlet 22 through a pipeline. As long as a liquid level of the disinfectant is higher than the liquid outlet 22, the disinfectant can flow to the atomizing nozzle 3.

[0033] The atomizing nozzle 3 may be connected with a controller in the intelligent toilet, and the operation of the atomizing nozzle 3 is controlled by the controller, to realize automatic sterilization and disinfection.

[0034] When sterilization and disinfection are required, the atomizing nozzle 3 operates to atomize the disinfectant into sterilization mist, which can sterilize a whole area enclosed by the seat cover 201, and also sterilize a gap between the seat ring 1 and the seat cover 201, an inner wall of the toilet body 301 and other positions, thus avoiding secondary pollution and improving the performances of the product.

[0035] In one embodiment, as shown in FIG. 1 to FIG. 3, the accommodating tank 4 is provided with more than

two atomizing nozzles 3 arranged at intervals, and accordingly, the front side tank wall 41 is provided with more than two tank wall through holes 411 arranged at intervals.

[0036] The liquid inlet end 313 of each atomizing nozzle 3 is communicated with the liquid reservoir 2, and the liquid outlet end 314 of each atomizing nozzle 3 is communicated with one tank wall through hole 411.

[0037] In this embodiment, the plurality of atomizing nozzles 3 and tank wall through holes 411 are arranged at intervals along a width direction of the seat ring 1, which can improve the sterilization and disinfection efficiency.

[0038] In one embodiment, as shown in FIG. 3 to FIG. 4, the liquid outlet end 314 of the atomizing nozzle 3 is inserted into the tank wall through hole 411.

[0039] A liquid outlet pipe may be selected for the liquid outlet end 314, which is sealed and inserted into the tank wall through hole 411, such that the atomized sterilization mist is directly sprayed out, which is beneficial to improving the sterilization and disinfection effect.

[0040] In one embodiment, as shown in FIG. 3, the liquid inlet end 313 of the atomizing nozzle 3 is connected with a liquid outlet 22 of the liquid reservoir 2 through a liquid supply hose 5. The liquid supply hose 5 may be bent in the accommodating tank 4, so as to conveniently connect the liquid inlet end 313 with the liquid outlet 22 of the liquid reservoir 2.

[0041] In one embodiment, as shown in FIG. 8, a spring 6 is installed in the liquid supply hose 5, which can prevent unsmooth flow of the disinfectant caused by wrinkling of the liquid supply hose 5.

[0042] In one embodiment, as shown in FIG. 9, the liquid reservoir 2 is internally provided with a liquid pump 7.

[0043] The liquid pump 7 is a micro water pump. The liquid pump 7 is connected with the controller in the intelligent toilet, and the controller controls on/off of the liquid pump 7. The liquid pump 7 is used for delivering the disinfectant in the liquid reservoir 2 to the atomizing nozzle 3. The liquid pump 7 may be directly connected with the liquid inlet end 313 of the atomizing nozzle 3 through a pipeline 8. The liquid pump 7 may also be connected with the liquid outlet 22 of the liquid reservoir 2 through the pipeline 8.

[0044] In one embodiment, as shown in FIG. 4 to FIG. 7, the atomizing nozzle 3 includes a nozzle shell 31 with an installation cavity 315, an atomizing sheet 32 with a spray hole 321 and a piezoelectric sheet 33 connected to one side of the atomizing sheet 32.

[0045] The liquid inlet end 313 and the liquid outlet end 314 are respectively arranged on the nozzle shell 31, and are respectively communicated with the installation cavity 315.

[0046] The atomizing sheet 32 and the piezoelectric sheet 33 are located in the installation cavity 315, and the spray hole 321 faces the liquid outlet end 314.

[0047] In this embodiment, the atomizing nozzle 3 includes the nozzle shell 31, the atomizing sheet 32 and the piezoelectric sheet 33. The nozzle shell 31 is formed by clamping a front shell 311 and a rear shell 312. The nozzle shell 31 is provided with the installation cavity 315, and the installation cavity 315 is formed between the front shell 311 and the rear shell 312. The liquid inlet end 313 is arranged on the rear shell 312, and the liquid outlet end 314 is arranged on the front shell 311. The liquid inlet end 313 may be a liquid inlet or a liquid inlet pipe arranged on the rear shell 312, and the liquid outlet end 314 may be a liquid outlet or a liquid outlet pipe arranged on the front shell 311. The front shell 311 is provided with an ear plate 316, and the ear plate 316 may be connected with a base plate of the accommodating tank 4 by a screw.

[0048] A middle portion of the atomizing sheet 32 is provided with a spray hole 321, and the spray hole 321 includes a plurality of micropores distributed in an array. The atomization sheet 32 may be a ceramic atomizing sheet or a metal atomizing sheet, which may be driven to vibrate by the piezoelectric sheet 33.

[0049] The piezoelectric sheet 33 is installed on one side of the atomizing sheet 32. The piezoelectric sheet 33 may be a piezoelectric ceramic sheet.

[0050] The atomizing sheet 32 and the piezoelectric sheet 33 constitute an ultrasonic vibrator.

[0051] The atomizing sheet 32 and the piezoelectric sheet 33 are respectively connected with an oscillating circuit board 34 through one electrode 35. The oscillating circuit board 34 may be hermetically installed in the installation cavity 315, or alternatively installed outside the atomizing nozzle 3.

[0052] The oscillating circuit board 34 is connected with the controller 303 of the intelligent toilet. When the oscillating circuit board 34 is energized, a high-frequency vibration current is provided, and an oscillating frequency is 1.7 MHz or 2.4 MHz. The piezoelectric sheet 33 and the atomizing sheet 32 may generate high-frequency resonance, which disperses water molecules containing disinfectant to produce natural and elegant disinfectant water mist, and the disinfectant water mist is ejected out through the spray hole 321 to achieve the spray and disinfection effect.

[0053] In one embodiment, the spray hole 321 and the liquid outlet end 314 are coaxially arranged, which is beneficial to directly spray the disinfectant water mist to the liquid outlet end 314.

[0054] In one embodiment, as shown in FIG. 6 to FIG. 7, the piezoelectric sheet 33 is a piezoelectric ring surrounding the spray hole 321, so that the resonance surrounding the spray hole 321 is uniform to improve the spray effect.

[0055] In one embodiment, as shown in FIG. 1 to FIG. 2, a liquid inlet 21 of the liquid reservoir 2 extends above a top cover plate 42 of the accommodating tank 4. A plug cover 23 is detachably installed on the liquid inlet 21 of the liquid reservoir 2.

[0056] When the disinfectant needs to be replenished, the plug cover 23 is opened, and the disinfectant is

poured into the liquid reservoir 2 through the liquid inlet 21, so as to facilitate the replenishment operation of the disinfectant.

[0057] In one embodiment, as shown in FIG. 2 to FIG. 3, the accommodating tank 4 is provided with a clamping groove 43, and the liquid reservoir 2 is clamped in the clamping groove 43, which facilitates the disassembly and installation of the liquid reservoir 2.

[0058] As shown in FIG. 10 to FIG. 11, a toilet cover plate 200 provided by an embodiment of the utility model includes a seat cover 201 and the seat ring assembly 100 described in any of the foregoing embodiments.

[0059] A cover plate rotating shaft 91 is installed in the accommodating tank 4, and the seat ring 1 and the seat cover 201 are connected with the cover plate rotating shaft 91 respectively.

[0060] The toilet cover plate 200 provided by the utility model includes a seat cover 201 and a seat ring assembly 100.

[0061] For the structure, construction and working principle of the seat ring assembly 100, please refer to the previous description of the seat ring assembly 100, which will not be repeated here.

[0062] A connecting piece 9 is installed in the accommodating tank 4, and the connecting piece 9 includes a cover plate rotating shaft 91 and a bolt connector 92. The seat ring 1 and the seat cover 201 are respectively connected with the cover plate rotating shaft 91, and both the seat ring 1 and the seat cover 201 can rotate around the cover plate rotating shaft 91. The bolt connector 92 is used for fixing the seat ring 1 to a toilet body 301 shown in FIG. 12.

[0063] When the seat cover 201 is closed, a closed space is formed between the toilet body 301 and the seat cover 201. When the atomizing nozzle 3 is turned on, the sterilization mist spreads in the closed space, and the seat cover 201, the seat ring 1 and the toilet body 301 are immersed in the sterilization mist and completely disinfected and sterilized, so that complete sterilization and disinfection without dead space can be achieved. After atomization disinfection for a period of time, the disinfection is completed, and the atomization function can be turned off for normal use.

[0064] As shown in FIG. 12, an intelligent toilet 300 provided by an embodiment of the utility model includes a controller 303, a toilet body 301 and the toilet cover plate 200 described in the forgoing embodiment.

[0065] The toilet cover plate 200 is installed on the toilet body 301. The atomizing nozzle 3 is in signal connection with the controller 303.

[0066] The intelligent toilet 300 provided by the embodiment of the utility model includes the toilet body 301, a water tank 302 arranged at a rear end of the toilet body 301, a control panel arranged at one side of the toilet body 301, and the toilet cover plate 200.

[0067] The control panel includes the controller 303. The accommodating tank 4 is located in the water tank 302.

[0068] Sterilization and disinfection operations may be used with the control panel to realize automatic operation, and users can directly use the intelligent toilet without waiting.

[0069] Specifically, after monitoring that the toilet cover plate 200 is closed (which may also be delayed for a preset time, for example, 5 seconds, 8 seconds, or the like according to the need), the controller 303 sends a signal to turn on the atomizing nozzle 3, and after the atomization disinfection are carried out for a preset time, for example, 10 seconds, 20 seconds, or the like, the disinfection and disinfection operations are completed, and the controller 303 sends a signal to turn off the atomizing nozzle 3. The atomization work time and the delay time may be set according to the actual test disinfection effect system.

[0070] According to needs, the above technical solutions may be combined to achieve the best technical effect.

[0071] The above only describes the principles and the preferable embodiments of the utility model. It is to be pointed out that for those of ordinary skills in the art, several other modifications can be made on the basis of the principle of the utility model, which should also be regarded as the scope of protection of the utility model.

Claims

1. A bidet, comprising:

a seat ring comprising a rear portion;
an accommodating tank disposed at the rear portion of the seat ring and comprising a front side tank wall, wherein at least one tank wall through hole is disposed on the front side tank wall of the accommodating tank;
a liquid reservoir configured to store disinfectant and disposed in the accommodating tank; and
at least one atomizing nozzle disposed in the accommodating tank and comprising a liquid inlet end communicated with the liquid reservoir and a liquid outlet end communicated with the at least one tank wall through hole.

2. The bidet according to claim 1,

wherein the at least one atomizing nozzle comprises a plurality of atomizing nozzles spaced apart from each other,
wherein the at least one tank wall through hole comprises a plurality of tank wall through holes spaced apart from each other,
wherein the liquid inlet end of each of the plurality of atomizing nozzles is communicated with the liquid reservoir, and
wherein the liquid outlet end of each of the plurality of atomizing nozzles is communicated with

one tank wall through hole of the plurality of tank wall through holes.

3. The bidet according to claim 1 or claim 2, wherein the liquid outlet end of the at least one atomizing nozzle is inserted into the at least one tank wall through hole and/or wherein a liquid pump is disposed in the liquid reservoir.

4. The bidet according to claim 1, claim 2 or claim 3, wherein the liquid inlet end of the at least one atomizing nozzle is connected to a liquid outlet of the liquid reservoir through a liquid supply hose, optionally wherein a spring is installed in the liquid supply hose.

5. The bidet according to any one of the preceding claims,

wherein the at least one atomizing nozzle comprises:

a nozzle shell comprising an installation cavity;
an atomizing sheet comprising at least one spray hole; and
a piezoelectric sheet connected to one side of the atomizing sheet,

wherein the liquid inlet end of the at least one atomizing nozzle and the liquid outlet end of the at least one atomizing nozzle are respectively disposed on the nozzle shell and are respectively communicated with the installation cavity,
wherein the atomizing sheet and the piezoelectric sheet are disposed in the installation cavity, and
wherein the at least one spray hole faces the liquid outlet end of the at least one atomizing nozzle.

6. The bidet according to any one of the preceding claims,

wherein a liquid inlet of the liquid reservoir extends out of a top cover plate of the accommodating tank; and
wherein a plug cover is detachably installed on the liquid inlet of the liquid reservoir.

7. The bidet according to any one of the preceding claims,

wherein the accommodating tank comprises a clamping groove, and
wherein the liquid reservoir is clamped in the clamping groove.

8. A toilet cover plate, comprising:

a seat cover; and
a bidet, comprising:

a seat ring comprising a rear portion;
an accommodating tank disposed at the rear portion of the seat ring and comprising a front side tank wall, wherein at least one tank wall through hole is disposed on the front side tank wall of the accommodating tank;
a liquid reservoir configured to store disinfectant and disposed in the accommodating tank; and
at least one atomizing nozzle disposed in the accommodating tank and comprising a liquid inlet end communicated with the liquid reservoir and a liquid outlet end communicated with the at least one tank wall through hole,

wherein a cover plate rotating shaft is installed in the accommodating tank, and
wherein the seat ring and the seat cover are connected with the cover plate rotating shaft respectively.

9. The toilet cover plate according to claim 8,

wherein the at least one atomizing nozzle comprises a plurality of atomizing nozzles spaced apart from each other,
wherein the at least one tank wall through hole comprises a plurality of tank wall through holes spaced apart from each other,
wherein the liquid inlet end of each of the plurality of atomizing nozzles is communicated with the liquid reservoir, and
wherein the liquid outlet end of each of the plurality of atomizing nozzles is communicated with one tank wall through hole of the plurality of tank wall through holes.

10. The toilet cover plate according to claim 8 or claim 9, wherein the liquid outlet end of the at least one atomizing nozzle is inserted into the at least one tank wall through hole.

11. The toilet cover plate according to claim 8, claim 9 or claim 10,

wherein the at least one atomizing nozzle comprises:

a nozzle shell comprising an installation cavity;
an atomizing sheet comprising at least one spray hole; and
a piezoelectric sheet connected to one side

of the atomizing sheet,

wherein the liquid inlet end of the at least one atomizing nozzle and the liquid outlet end of the at least one atomizing nozzle are respectively disposed on the nozzle shell and are respectively communicated with the installation cavity,
wherein the atomizing sheet and the piezoelectric sheet are disposed in the installation cavity, and
wherein the at least one spray hole faces the liquid outlet end of the at least one atomizing nozzle.

12. The bidet according to claim 5 or the toilet cover plate according to claim 11, wherein the at least one spray hole and the liquid outlet end of the at least one atomizing nozzle are coaxially arranged and/or wherein the piezoelectric sheet is a piezoelectric ring surrounding the at least one spray hole.

13. An intelligent toilet, comprising:

a controller;
a toilet body; and
a toilet cover plate disposed on the toilet body, the toilet cover plate comprising:

a seat cover; and
a bidet, comprising:

a seat ring comprising a rear portion;
an accommodating tank disposed at the rear portion of the seat ring and comprising a front side tank wall, wherein at least one tank wall through hole is disposed on the front side tank wall of the accommodating tank;
a liquid reservoir configured to store disinfectant and disposed in the accommodating tank; and
at least one atomizing nozzle disposed in the accommodating tank and comprising a liquid inlet end communicated with the liquid reservoir and a liquid outlet end communicated with the at least one tank wall through hole,

wherein a cover plate rotating shaft is installed in the accommodating tank,
wherein the seat ring and the seat cover are connected with the cover plate rotating shaft respectively, and
wherein the at least one atomizing nozzle is communicably connected to the controller.

14. The intelligent toilet according to claim 13,

wherein the at least one atomizing nozzle comprises:

a nozzle shell comprising an installation cavity;
an atomizing sheet comprising at least one spray hole; and
a piezoelectric sheet connected to one side of the atomizing sheet,

wherein the liquid inlet end of the at least one atomizing nozzle and the liquid outlet end of the at least one atomizing nozzle are respectively disposed on the nozzle shell and are respectively communicated with the installation cavity,
wherein the atomizing sheet and the piezoelectric sheet are disposed in the installation cavity, and
wherein the at least one spray hole faces the liquid outlet end of the at least one atomizing nozzle.

15. The intelligent toilet according to claim 14, further comprising an oscillating circuit board communicably connected to the controller,

wherein the atomizing sheet and the piezoelectric sheet are respectively connected to the oscillating circuit board 34 through an electrode, and
wherein when the oscillating circuit board is energized to generate a high-frequency vibration current, and the atomizing sheet and the piezoelectric sheet generate a high-frequency resonance configured to produce disinfectant water mist.

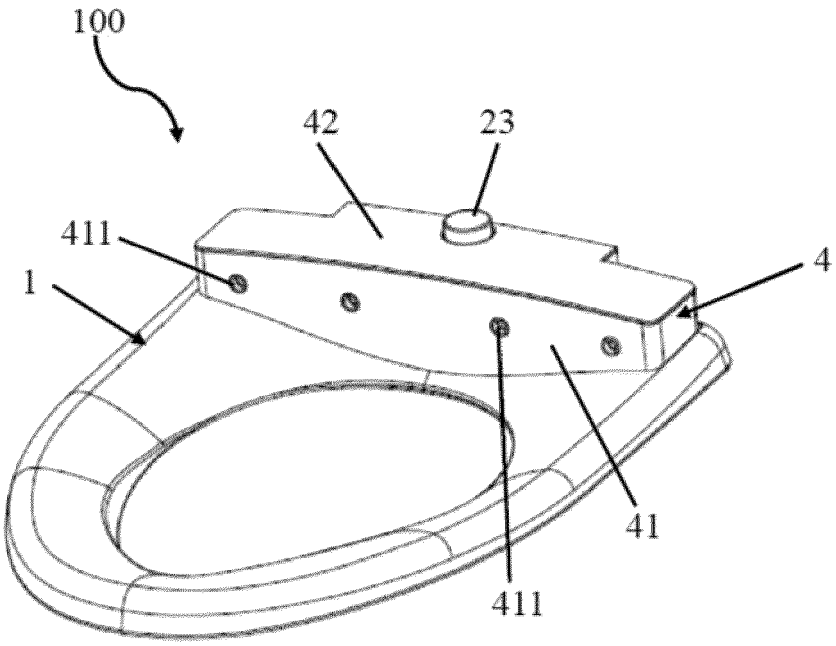

FIG. 1

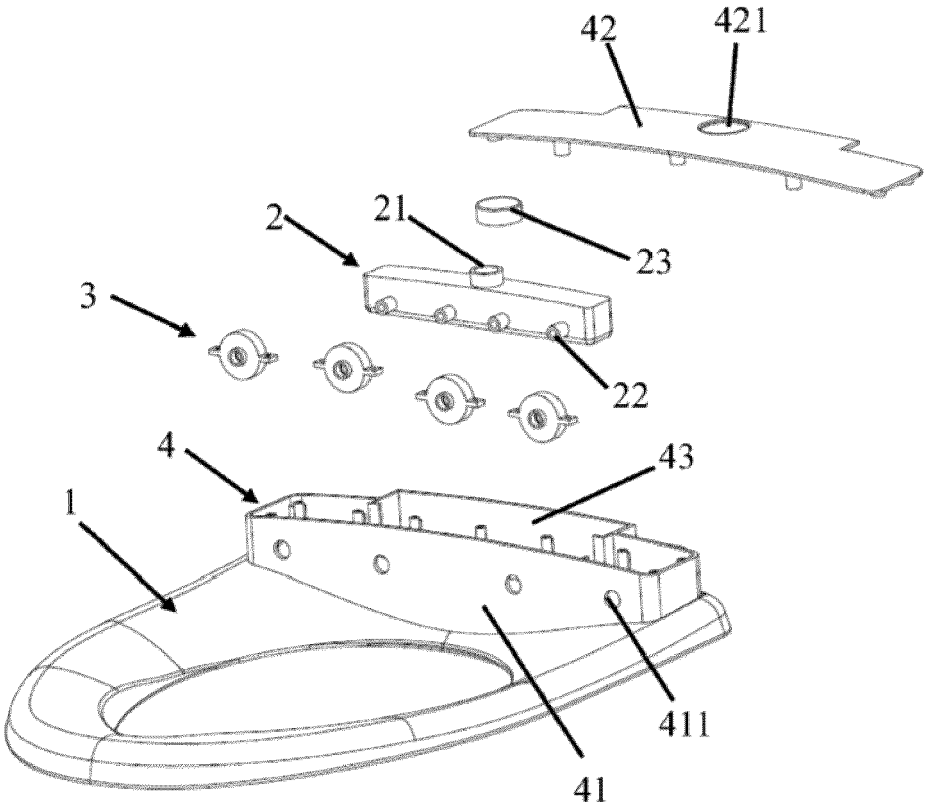

FIG. 2

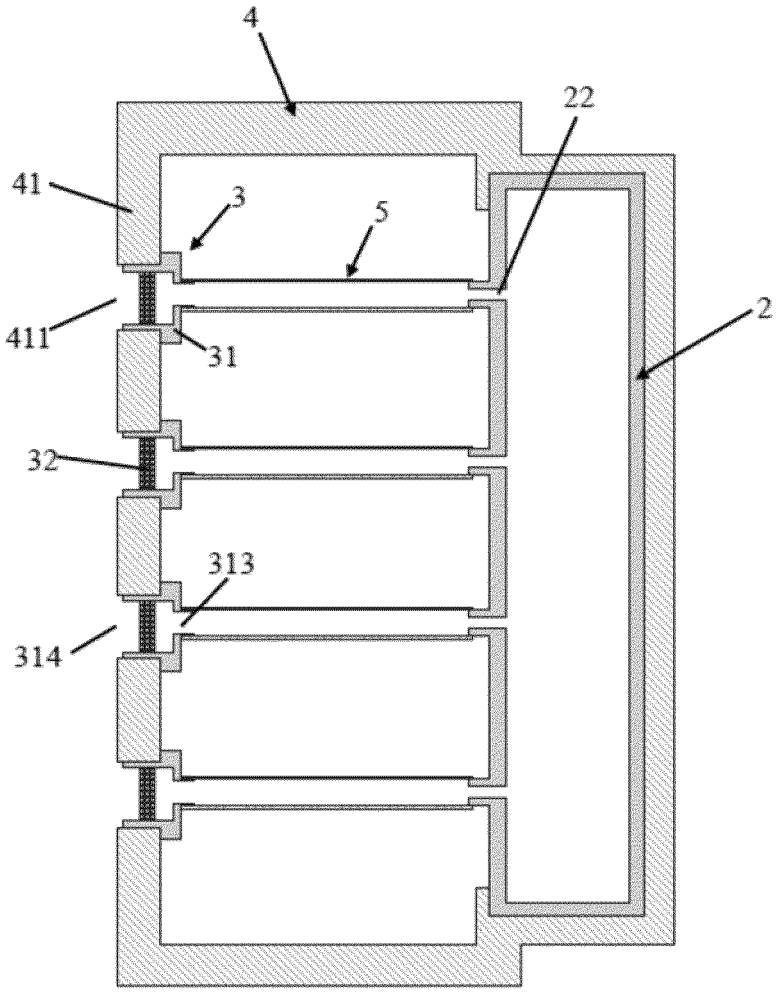

FIG. 3

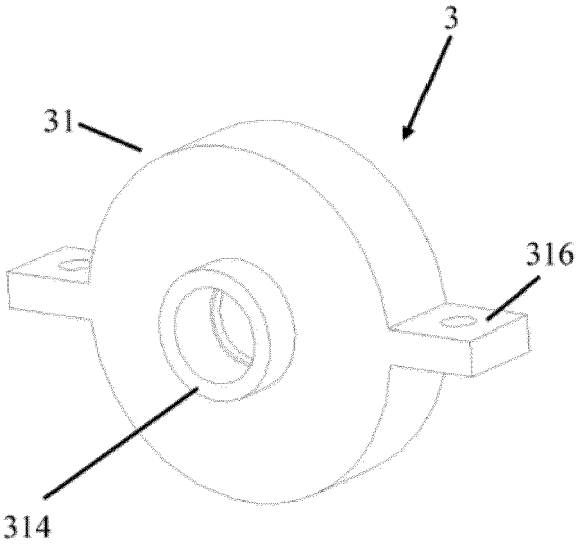

FIG. 4

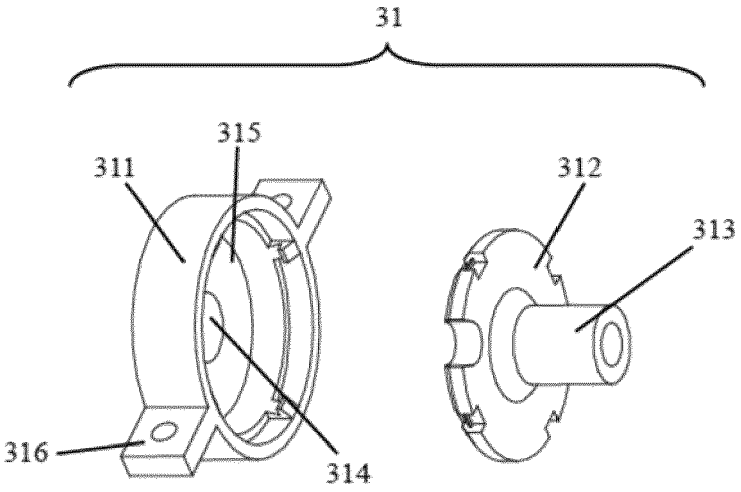

FIG. 5

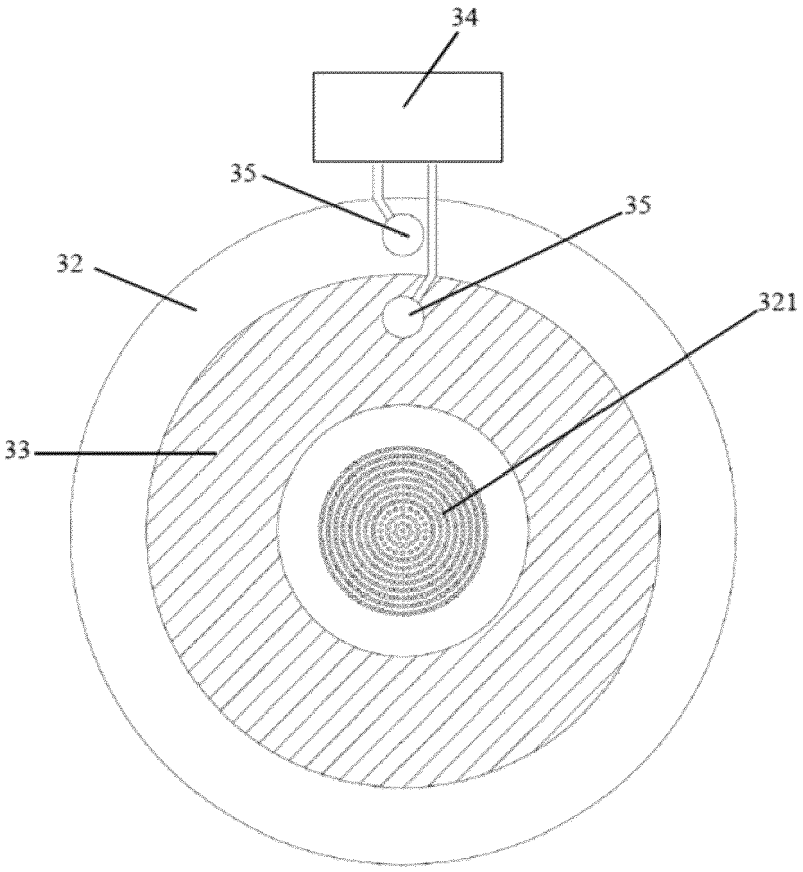

FIG. 6

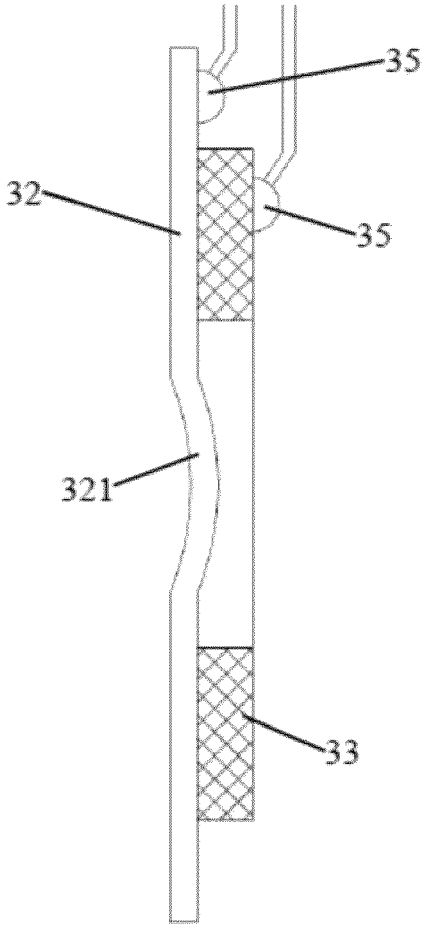

FIG. 7

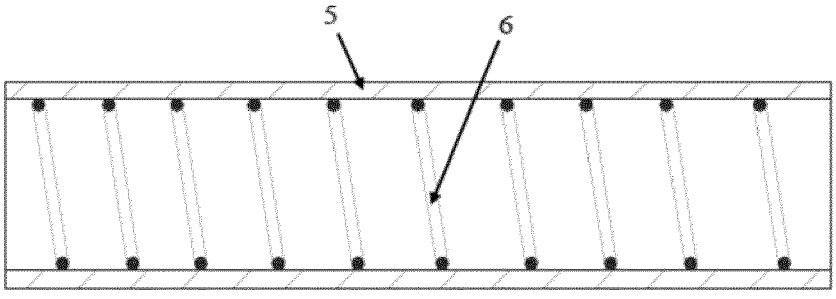

FIG. 8

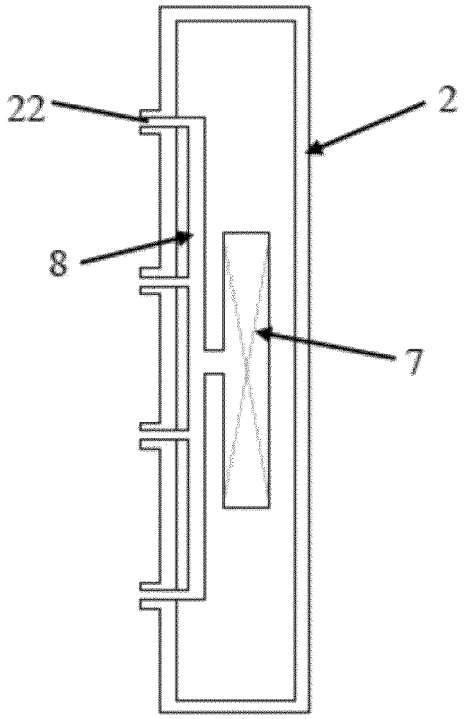

FIG. 9

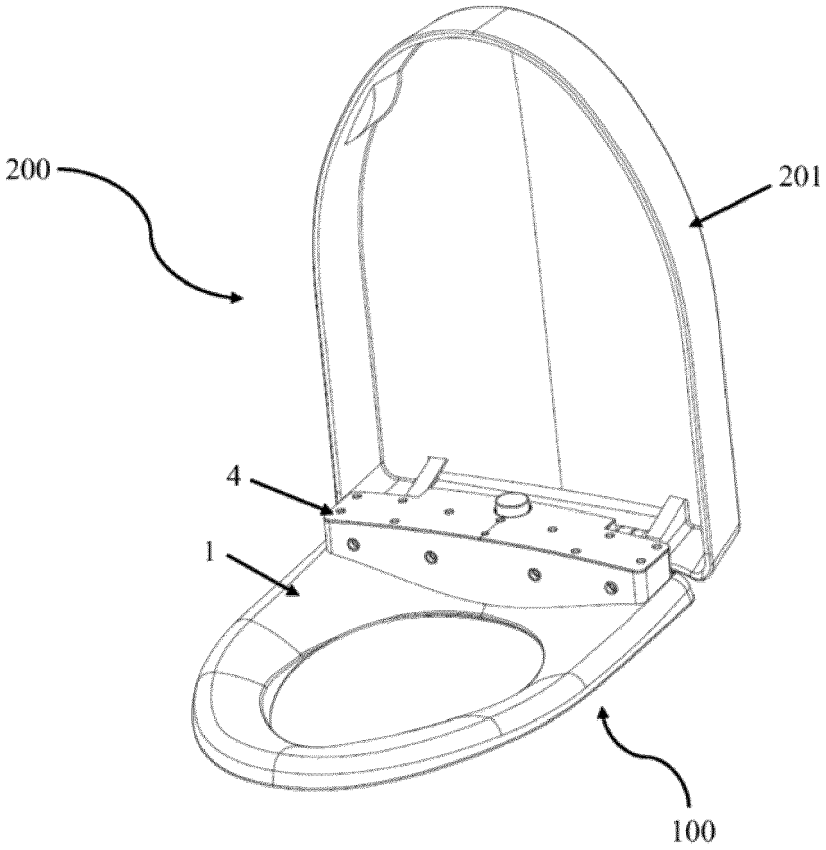

FIG. 10

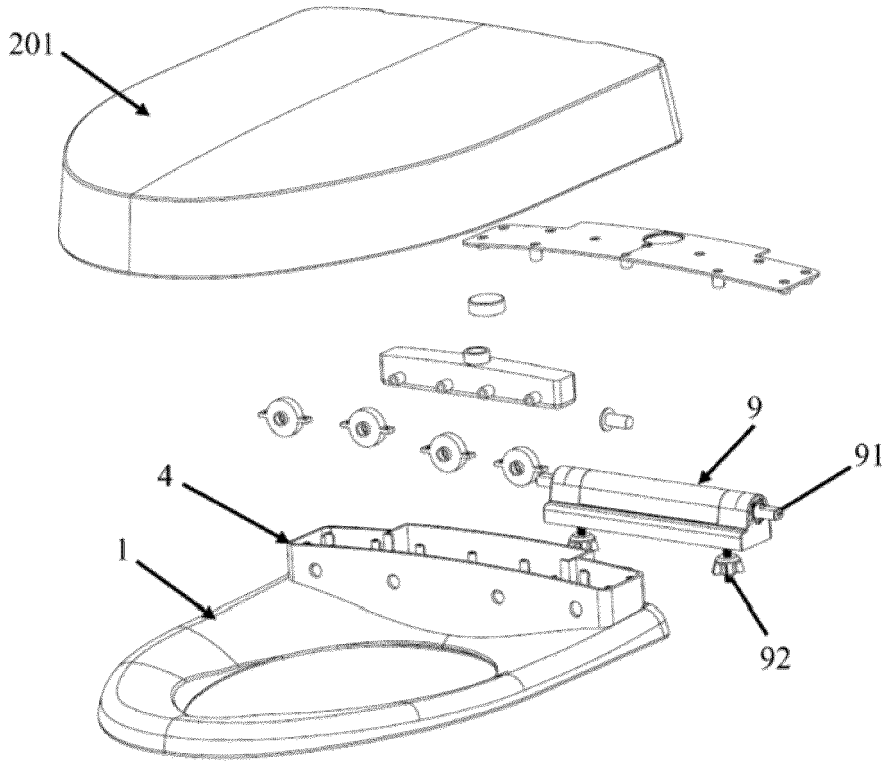

FIG.11

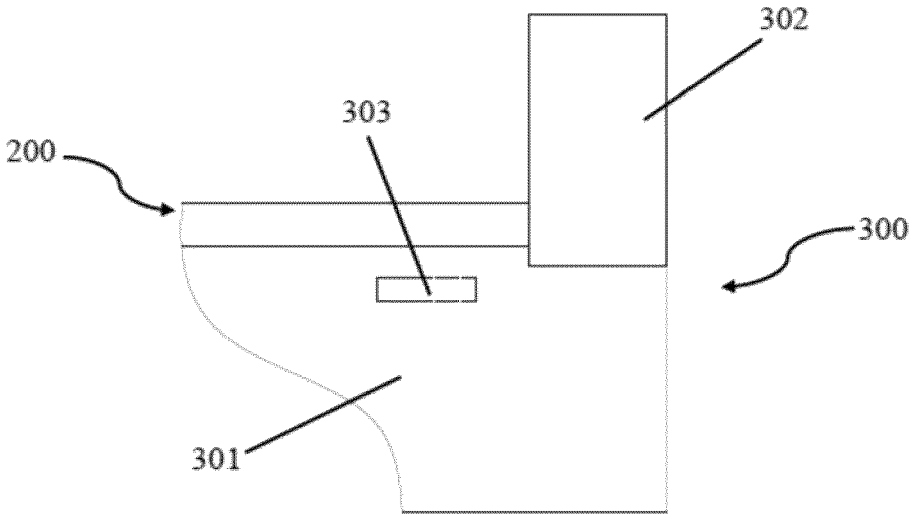

FIG. 12

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 19 0896

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 416 840 A1 (FAP S R L [IT]) 12 May 2004 (2004-05-12) * paragraph [0010]; claims 1-5; figures 1-5 *	1-15	INV. A47K13/30
X	WO 2020/247380 A1 (ORIGYN LLC [US]) 10 December 2020 (2020-12-10) * paragraph [0046] - paragraph [0099]; claims 1-76; figures 1-39 * * paragraph [0094] * * paragraph [0091] * * paragraph [0090] *	1-15	
X	US 4 734 942 A (BLANCHARD CLAUDE G A [FR]) 5 April 1988 (1988-04-05) * column 4 - column 11; claims 1-15; figures 1-14 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

A47K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	21 December 2022	Oliveras, Mariana

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 19 0896

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

21-12-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1416840 A1	12-05-2004	AT 336195 T	15-09-2006
		DE 60214006 T2	29-03-2007
		EP 1416840 A1	12-05-2004
		ES 2271222 T3	16-04-2007
		IT FI20010074 U1	14-02-2003
		US 2004172742 A1	09-09-2004
		WO 03015597 A1	27-02-2003
WO 2020247380 A1	10-12-2020	US 2020375417 A1	03-12-2020
		WO 2020247380 A1	10-12-2020
US 4734942 A	05-04-1988	AT 31475 T	15-01-1988
		AU 583545 B2	04-05-1989
		BR 8505214 A	29-07-1986
		CA 1267251 A	03-04-1990
		EP 0179725 A1	30-04-1986
		ES 8700919 A1	16-11-1986
		FR 2571951 A1	25-04-1986
		IE 56971 B1	26-02-1992
		JP H0527412 B2	21-04-1993
		JP S61109837 A	28-05-1986
		US 4734942 A	05-04-1988

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82