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(54) ANAL AND/OR PERINEAL WASHING AND DRYING SYSTEM FOR A TOILET AND TOILET WITH BIDET FUNCTIONS INCLUDING SAID SYSTEM

(57) Anal and/or perineal washing and drying system for a toilet with bidet functions, comprising a washing unit provided with a water outlet conduit for anal and/or perineal washing, and a drying unit provided with means to generate a jet of pressurized air, and which is characterized in that the drying unit comprises means for guiding the jet of pressurized air to a surface of the washing unit, said surface of the washing unit comprising a geometry configured to orientate by Coanda effect the direction of the jet of pressurized air from the drying unit, towards a drying position.

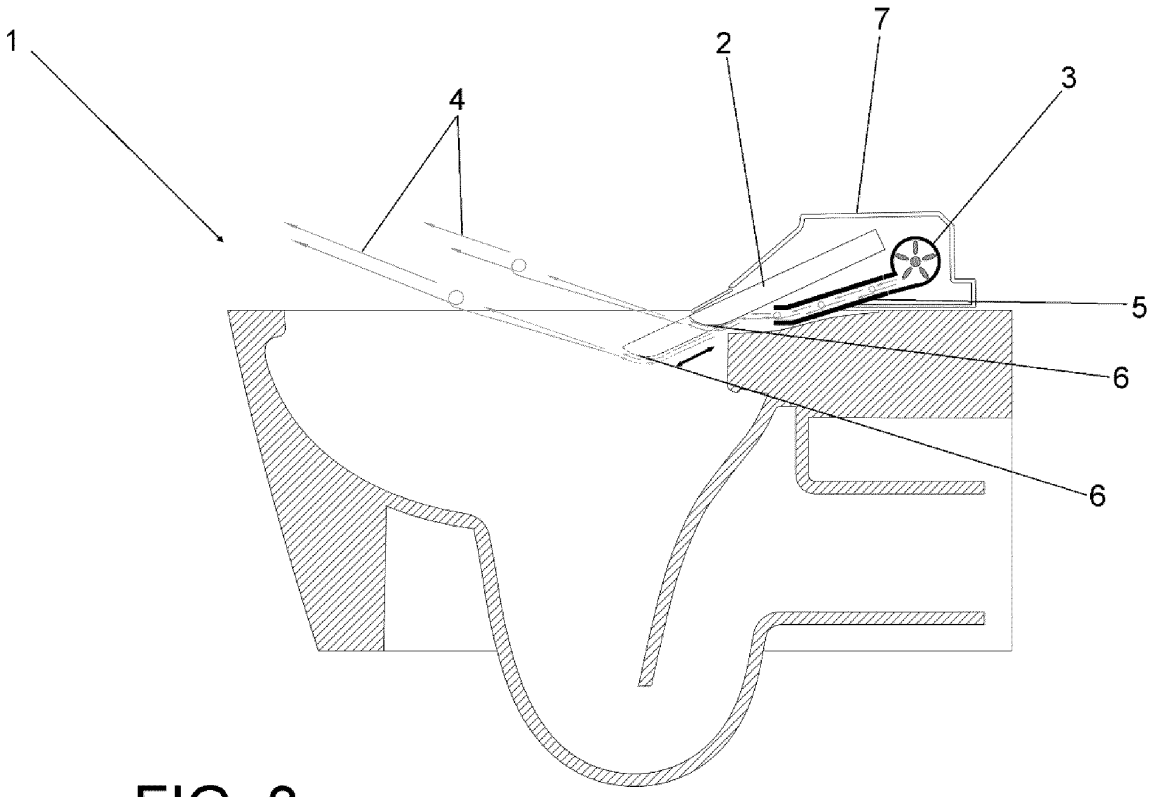

FIG. 3

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Description

[0001] The present invention relates to a washing and drying system for a toilet with bidet functions and to a water outlet conduit modified to be used in a washing and drying system of a toilet with bidet functions. The same invention also makes reference to a method of anal and/or perineal washing and drying for a toilet with bidet functions.

Background of the invention

[0002] In the European market there are a large variety of toilets with bidet functions, also known with the name of electronic bidets. These toilets or electronic bidets incorporate a device in the seat with a water outlet conduit for anal and/or perineal washing and also typically a drying unit. The water which exits the nozzle is heated by a reservoir or tank which may incorporate a heat source.

[0003] The toilets with bidet functions known to date incorporate a drying unit with air blowing nozzles that blow a jet of pressurized air from a fan which is housed in the housing of the toilet seat. Some of these air blowing nozzles are orientably mounted to be able to guarantee an optimum drying in the shortest possible time. However, in many cases, the drying efficiency is not adequate, since the orientation of the jet of air, or the drying area, are deficient, so that the user is obliged to use toilet paper to dry their private parts.

[0004] Patent EP2022901 discloses a toilet or electronic bidet which incorporates a water outlet conduit for anal and/or perineal washing, and a drying unit provided with a retractable air blowing nozzle which can be displaced in axial direction to take on an advance position, and of optionally performing a swinging movement. The same nozzle can also rotate around its axis to facilitate the orientation of the jet of pressurized air towards the user's private parts and thus widen the drying area.

[0005] The washing and drying system disclosed in patent EP20222901 has the advantage that it substantially improves the area covered by the jet of pressurized air so that the drying efficiency is much greater than those of other toilets of the state of the art. However, it is a system which requires many mechanisms for its operation and is complicated to install in the reduced space of a toilet seat housing.

[0006] In light of the above, the need is clear to provide an anal and/or perineal washing and drying system for a toilet with bidet functions, which is simple to install and enables at the same time an optimum drying efficiency.

Description of the invention

[0007] The object of the present invention is that of providing a washing and drying system for a toilet with bidet functions, and a method of anal and/or perineal washing and drying based on this system, which has the advantages that will be described below.

[0008] In accordance with this object, according to a first aspect, the present invention provides an anal and/or perineal washing and drying system for a toilet with bidet functions, comprising a washing unit provided with a water outlet conduit for anal and/or perineal washing, and a drying unit provided with means to generate a pressurized air flow for anal and/or perineal drying. The system is characterized in that the drying unit comprises means for guiding the pressurized airflow to a surface of the washing unit, said surface of the washing unit comprising a geometry configured to orientate or guide by Coanda effect the direction of the pressurized drying air flow towards a drying position.

[0009] According to a second aspect, the present invention provides a method of anal and/or perineal washing and drying for a toilet with bidet functions, which is based on the washing and drying claimed system, and which is characterized in that it comprises the steps of;

a. providing a washing unit of the toilet, preferably a washing water outlet conduit, with a surface including a geometry configured to orientate or guide by Coanda effect a pressurized drying air flow,
b. driving a pressurized air flow from the drying unit up to said surface of the washing unit, and
c. orientating or guiding towards a drying position the direction of said pressurized drying air flow by means of said surface of the washing unit.

[0010] According to a third aspect, the present invention provides a water outlet conduit for anal and/or perineal washing, suitable for use in the claimed system. The water outlet conduit is characterized in that it comprises a surface provided with a geometry configured to orientate or guide by Coanda effect the direction of the pressurized drying air flow towards a drying position.

[0011] According to a fourth aspect, the present invention provides a toilet with bidet functions comprising a seat and a body which acts by way of bowl whereon said seat is mounted. The toilet is characterized in that it comprises the anal and/or perineal washing and drying system claimed.

[0012] Preferably, said toilet with bidet functions comprises a washing unit with a water outlet conduit modified to be able to be used in the claimed system, and a drying unit with a pressurized air flow channel arranged for guiding the air flow up to the modified washing water outlet conduit.

[0013] In the present invention, Coanda effect shall be understood, in fluid mechanics, as the physical phenomenon wherein a stream or jet tends to be attracted by a neighbouring surface and remains attached to this surface even when it entails a change of direction with respect to the initial direction of the stream or jet.

[0014] In the system and method claimed, the washing unit incorporates a surface whereon the pressurized drying air flow can be adhered by Coanda effect. This surface of the washing unit has a geometry configured to

orientate or guide the direction of the pressurized air flow towards a drying position. Thanks to these characteristics, a very simple anal and/or perineal washing and drying system is obtained which is also very efficient.

[0015] Indeed, in the present invention, the flow or stream of pressurized air is guided from the drying unit up to the surface of the washing unit. On this surface, the air flow remains adhered by Coanda effect so that the geometry of the surface causes a change in direction to guide and orientate it towards the drying position of the user's private parts. Thanks to this, the system may dispense with complex mechanisms to move air nozzles for blowing pressurized air.

[0016] Unlike the washing and drying systems of the state of the art, in the claimed system, the direction of the pressurized air flow is modified by means of a surface disposed in the anal and/or perineal washing unit. Thanks to this, the position of the pressurized air flow is substantially similar to that of the jet of water launched by the system's water outlet conduit, which contributes to very significantly improving the drying efficiency.

[0017] According to a preferred embodiment of the system, the surface of the washing unit which orientates or guides the direction of the pressurized air flow is arranged on a washing water outlet conduit, and the drying unit comprises means for guiding the pressurized air flow to said washing water outlet conduit. The surface of this water outlet conduit is provided with a geometry configured to orientate or guide by Coanda effect the direction of air flow as said air flow remains adhered by Coanda effect on this surface.

[0018] The water outlet conduit may be configured, for example, by way of a cannula, or water nozzle, with a portion provided with a wall which includes a modified surface to allow the adhesion of the air flow and guiding by Coanda effect the direction of the air flow towards the drying position. Preferably, this modified surface is provided in a lower wall of the washing water outlet conduit or water nozzle.

[0019] This preferred embodiment has the advantage that the water outlet conduit of the washing unit incorporates the modified surface that orientates or guides the direction of the jet of air. In this way, the system may dispense with air nozzles specifically aimed at orientating the jet or stream of pressurized air, which enables gaining space in the toilet seat. Furthermore, it makes use of the geometry of the lower wall of the water outlet conduit to modify and orientate or guide the pressurized air flow in upward direction towards the user's private parts.

[0020] The geometry of the surface which orientates or guides the pressurized air flow may comprise, for example, a curved surface, in particular, a curved surface with a predetermined radius to orientate by Coanda effect the jet of pressurized air from the drying unit towards an upward angle path when the system is in use. According to a preferred embodiment, the curved surface may be configured so that a line tangential to the curved profile forms an upward "α" angle with the horizontal axle.

[0021] Advantageously, the side view of the extremal portion of the water outlet conduit comprises a lower curved line which defines the surface guiding the direction of the pressurized drying air flow towards the drying position of the user's private parts.

[0022] Preferably, according to one embodiment, the surface which orientates the direction of the pressurized air flow is provided in a three dimensional extremal portion of a retractable water outlet conduit. This extremal portion may comprise, for example, a washing water outlet, for example, a washing water spray outlet. Alternatively, the water outlet conduit may not be retractable.

[0023] According to one mode of operation of the system, the washing water outlet conduit acquires a position wherein the water outlet remains protected from dirt behind a nozzle door whereas the lower curved surface of the extremal portion guides the direction of the pressurized air flow towards a drying position.

[0024] When the water outlet conduit is retractable, the water outlet conduit and thus the surface that modifies and guides the direction of the pressurized airflow may acquire a plurality of advance positions without losing the effect of air adhesion by Coanda effect, so that the drying area is significantly widened in an extremely simple way.

[0025] Preferably, according to the previous embodiment, the washing water outlet conduit is a retractable nozzle mounted displaceable from an initial retracted position to a plurality of intermediate advance positions. In this way, the surface which orientates and/or guides the direction of the pressurized air flow may take on one or several positions of use. The location of the pressurized air flow is different for each position of use of the water outlet conduit, which allows widening the drying area using the displacement mechanism of the water outlet conduit of the washing unit.

[0026] This embodiment allows implementing a method of anal and/or perineal washing and drying, comprising the step of modifying the drying position of the pressurized airflow by axially displacing the retractable water outlet conduit including the surface designed to orientate or guide by Coanda effect the direction of the pressurized air flow. In this way, it manages to widen the drying area in a very simple manner.

[0027] According to one embodiment of the system, the drying unit includes an air outlet channel arranged for guiding the pressurized air flow up to the surface which orientates or guides by Coanda effect the direction of said air flow, said surface being disposed adjacent to the air blow flow path coming from the air outlet channel to be able to orientate or guide the blowing direction of the air flow when the system is in use.

[0028] Preferably, the washing water outlet conduit is arranged adjacent to the blowing path of the air flow coming from the air outlet channel. The section of this air outlet channel or air nozzle may be adjusted in accordance with the flow of the pressurized air flow that circulates through it to achieve that the velocity of the pressurized air flow is suitable for favouring the adhesion of

the air by Coanda effect on the surface of the water outlet conduit of the washing unit, in particular, on the curved surface of said water outlet conduit or water nozzle designed to orientate or guide the pressurized airflow in upward direction.

[0029] For example, according to a preferred embodiment, the surface's curve radius is between 10 mm and 30 mm, since it has been observed that this curve geometry is suitable to provide an optimum Coanda effect when the velocity of the pressurized air flow 4 is between 20 m/s and 30 m/s.

[0030] Advantageously, the means that generate the pressurized air flow comprises a fan, or an equivalent device, susceptible of being mounted in a support housing of a toilet seat which includes, in addition to the drying unit, also a washing unit provided with a water outlet conduit for anal and/or perineal washing with the surface designed to orientate or guide by Coanda effect the direction of the air flow. Preferably, this water outlet conduit is arranged adjacent to the channel that guides the air from the fan. According to one embodiment, this air outlet channel includes a portion of nozzle susceptible of at least partially being housed in a recess made in the toilet bowl. The water outlet conduit may emerge from this air outlet channel, or from the toilet bowl recess, to perform the washing and, in the present invention, also the anal and/or perineal drying of the user's private parts.

Brief description of the figures

[0031] For a better understanding of all that has been stated, drawings are attached wherein, schematically and only by way of non-limiting example, a practical embodiment of the system has been represented wherein the washing unit incorporates a retractable water outlet conduit, preferably, a retractable water nozzle, which includes a surface which orientates by Coanda effect the direction of the pressurized airflow.

[0032] In these drawings;

Figure 1 is a schematic perspective view of a toilet with bidet functions which includes the washing and drying claimed system. This figure shows the system in operation. For reasons of clarity, one part of the support housing of the seat has been omitted to be able to appreciate the location of the fan and the path of the pressurized airflow.

Figure 2 is a schematic view of a section of the toilet with bidet functions of figure 1 showing the upward angle with horizontal axle of the pressurized air flow.

Figure 3 is a schematic view of a similar section to that of figure 2 which shows the system with the retractable water outlet conduit situated in a position of use different to that shown in figure 2.

Figure 4 is a schematic plan view of the toilet with bidet functions of figure 1.

Figure 5 is a schematic front view of the toilet with bidet functions of figure 1.

Figure 6 is a perspective view that shows the retractable water outlet conduit which incorporates in its lower extremal portion a surface which orientates or guides by Coanda effect the direction of the jet of pressurized air towards a drying position. This extremal portion is configured with a side view including a lower curve line defining the lower curved surface of the water outlet conduit guiding the pressurized air flow by Coanda effect.

Figure 7 is a perspective view of a toilet with bidet functions which incorporates a bowl and a seat mounted on the bowl which includes the anal and/or perineal washing and drying system of the present invention.

Figure 8a and 8b are a detailed side view and perspective view showing the water outlet conduit in a working position when protected by the nozzle door arranged on the support housing of the toilet seat.

Figure 9 is a schematic representation simulating the direction of the pressurized drying air flow at the outlet of the air outlet channel of the drying unit up to the surface of the water outlet conduit.

Description of a preferred embodiment

[0033] A preferred embodiment is described below of the anal and/or perineal washing and drying system and method claimed, making reference to figures 1 to 9.

[0034] Figures 1 to 5 show several schematic views of a toilet 1 with bidet functions, comprising an anal and/or perineal washing and drying system which includes;

- a washing unit provided with a water outlet conduit 2 for the anal and/or perineal washing of the user's private parts, and
- a drying unit which includes a fan 3 to generate a pressurized air flow 4, and an air outlet channel 5 for guiding the pressurized air flow up to a surface 6 arranged at the water outlet conduit 2, to orientate or guide by Coanda effect the direction of said air flow towards a drying position.

[0035] In the embodiment described, the surface 6 has been provided on a lower wall of an extremal portion of a water outlet conduit 2, which is retractable. The geometry of this surface 6 has been configured to allow the adhesion of air by Coanda effect, and to orientate or guide the direction of said pressurized airflow 4 towards a path in upward direction suitable for drying the user's private parts.

[0036] The water outlet conduit 2 is preferably retractable and may be displaced from an initial retracted position to a plurality of intermediate advance positions so that the surface 6 which orientates or guides the direction of the air flow may take on one or several positions of use to widen the drying area of the pressurized air flow 4.

[0037] As can be seen in figures 2 and 3, the Coanda effect is maintained when the water outlet conduit 2

moves, providing different drying positions of the pressurized air flow 4 according to the advance position said water outlet conduit 2 takes on. Thanks to this, unlike other systems in the state of the art, the drying area is widened using the mechanism of displacement of the washing water outlet conduit 2.

[0038] The geometry of the surface 6 which orientates or guides the direction of the pressurized air flow may comprise, for example, a suitable curved surface to allow the adhesion by Coanda effect of the jet 4 of pressurized air (see figure 6). This curved surface is designed with a predetermined radius to orientate or guide by Coanda effect the pressurized air flow 4 from the drying unit towards an upward "α" angle path when the system is in use. For example, according to a preferred embodiment, the surface's 6 curve radius is between 10 mm and 30 mm, since it has been observed that this curve geometry is suitable to provide an optimum Coanda effect when the velocity of the pressurized airflow 4 is between 20 m/s and 30 m/s.

[0039] As can be seen in figures 1 to 5, in the embodiment described, the washing water outlet conduit 2 is situated adjacent to the outlet channel 5 of pressurized air flow 4. The section of this air outlet channel 5 may be adjusted depending on the flow of the jet of pressurized air that circulates through it to achieve that the velocity of the pressurized airflow 4 is suitable for favouring the adhesion of the air on the curved profile of the surface 6 of the water outlet conduit 2. The surface 6 has been designed with suitable geometry to orientate or guide the jet 4 of pressurized air in upward direction. Preferably, according to the embodiment shown in figures 1 to 9, the side view of the extremal portion of the water outlet conduit 2 comprises a lower curved line defining the upward curved surface 6 of the water outlet conduit 2 guiding the upward direction of the pressurized air flow 4.

[0040] In the preferred embodiment shown in figures 2 and 3, the curved profile of the surface 6 is configured so that a line tangential to the curved profile forms an upward "α" angle with the horizontal axle, e.g. a "α" angle of 16 degrees, such as that shown in the section of figure 2.

[0041] The pressurized airflow 4 remains adhered to the surface 6 of the washing water outlet conduit 2 until the geometry of the surface 6 causes a change in direction to orientate or guide it towards the drying position of the user's private parts. Thanks to this, the system may dispense with specific air blowing nozzles provided with complex mechanisms to guarantee a correct orientation of the jet of pressurized air.

[0042] Unlike the washing and drying systems of the state of the art, in the claimed system, the direction of the pressurized air flow is modified by means of a surface 6 of the washing unit which, preferably but without limiting the scope of protection of the invention, is situated in the washing water outlet conduit 2. Thanks to this, the position from which the pressurized air flow 4 is directed is substantially similar to that occupied by the jet of water of the water outlet conduit 2 of the system, which contributes to very significantly improving drying efficiency.

[0043] Figure 7 shows a toilet 1 with bidet functions with a seat provided with a support housing 7 of the system, and a body 8 which acts by way of bowl, whereon said support housing 7 is mounted. The fan 3 of the drying unit and the water outlet conduit 2 for spraying water from a storage and heating tank of the water (not represented) are disposed inside the support housing 7, which is mounted inside the same support housing 7.

[0044] As can be seen in the figures, the air outlet channel 5 of pressurized air from the drying unit includes a portion of nozzle dimensioned so that it is housed in a recess 9 of the body 8 of the toilet 1 bowl. The retractable water outlet conduit 2 is housed inside said recess 9 of the toilet 1 bowl in its retracted position.

[0045] A washing and drying method has been described below, based on the system of the present invention making reference to the embodiment of toilet shown in the figures.

[0046] The user of a toilet 1 with bidet functions such as that claimed, may actuate the displacement of the water outlet conduit 2 to perform the anal and/or perineal washing of his private parts through a water spray outlet (not represented) arranged at one upper end of the water outlet conduit 2. Next, he may switch on the fan 3 to drive a pressurized air flow 4. The wet area is dried by using the surface 6 disposed in the same washing water outlet conduit 2, which orientates by Coanda effect the direction of the jet of air towards the drying position (see figure 6 and figure 9).

[0047] The pressurized air flow 4 is oriented and guided directly towards the wet area for a very efficient drying. According to one mode of operation, the water spray outlet of the water outlet conduit 2 keeps protected behind a nozzle door 10 whereas the pressurized air flow 4 is guided by Coanda effect towards an upward drying position (see, figures 8a and 8b). If necessary, the user may widen the drying area by actuating the displacement of the retractable water outlet conduit 2 to a different advance position or even performing a swinging movement in axial direction of the same washing water outlet conduit 2. Optionally, the water outlet conduit 2 may be mounted so that it may rotate about its axis to further facilitate drying.

[0048] Despite the fact that reference has been made to a specific embodiment of the invention, it is evident for a person skilled in the art that the device 1 described is susceptible to numerous variations and modifications and that all the details mentioned can be replaced by other technically equivalent ones, without departing from the scope of protection defined by the attached claims. For example, although in the embodiment described the surface 6 which orientates or guides by Coanda effect the direction of the jet of air has been described arranged in a wall of a retractable washing water outlet conduit 2, according to another embodiment, this surface could be defined in a wall of a frame or support of the washing

unit, and not form part of the water outlet conduit 2 itself, provided that this wall also had a suitable geometry to guarantee the correct orientation by Coanda effect of the direction of the pressurized air flow on the user's private parts. Likewise, although in the described embodiment said surface 6 has been described with a particular geometry provided with a curved lower wall and a flat front wall it would be possible to obtain a surface 6 equally suitable for the drying which had a different geometry of the lower and front wall.

Claims

1. Anal and/or perineal washing and drying system for a toilet (1) with bidet functions, comprising a washing unit provided with a water outlet conduit (2) for anal and/or perineal washing, and a drying unit provided with means (3) to generate a pressurized air flow (4) for anal and/or perineal drying, **characterized in that** said drying unit comprises means (5) for guiding the pressurized air flow to a surface (6) of the washing unit, said surface (6) of the washing unit being provided with a geometry configured to be able to orientate by Coanda effect the direction of the pressurized drying airflow (4) towards a drying position.

2. Washing and drying system according to claim 1, wherein said surface (6) of the washing unit is arranged on the water outlet conduit (2), and the drying unit comprises means (5) for guiding the pressurized drying air flow (4) up to the water outlet conduit (2).

3. Washing and drying system according to claim 2, wherein the geometry of a lower wall of said water outlet conduit (2) defines the surface (6) of the washing unit configured to orientate by Coanda effect the direction of the pressurized air flow (4) towards a drying position.

4. Washing and drying system according to any of claims 2 to 3, wherein said surface (6) of the washing unit is provided in an extremal portion of a retractable washing water outlet conduit (2).

5. Washing and drying system according to claim 4, wherein said extremal portion comprises a washing water outlet.

6. Washing and drying system according to any of claims 1 to 5, wherein said water outlet conduit (2) is a water nozzle.

7. Washing and drying system according to any of claims 1 to 6, wherein the geometry of the surface (6) of the washing unit comprises a curved surface configured to orientate by Coanda effect the direction of the pressurized air flow (4) towards a drying position.

8. Washing and drying system according to any of claims 1 to 7, wherein the geometry of said surface (6) of the washing unit comprises a curved surface with a predetermined radius to orientate by Coanda effect the pressurized drying airflow (4) towards an upward "α" angle path when the system is in use.

9. Washing and drying system according to any of claims 7 to 8, wherein said curved surface of the washing unit is configured so that a line tangential to the curved profile forms an upward "α" angle with the horizontal axle.

10. Washing and drying system according to any of claims 7 to 9, wherein the side view of the extremal portion of the water outlet conduit (2) comprises a lower curved line defining the curved surface (6) guiding the direction of the pressurized drying airflow (4) towards the drying position of the user's private parts.

11. Washing and drying system according to any of the preceding claims, wherein said means for guiding the drying airflow comprises an air outlet channel (5) arranged for guiding the air flow (4) to the surface (6) of the washing unit, said surface (6) of the washing unit being arranged adjacent to the blowing path of the airflow (4) coming from the air outlet channel (5), to allow the adhesion of the air flow and orientate by Coanda effect the direction of said airflow (4).

12. Washing and drying system according to claim 11, wherein the air outlet channel (5) of the pressurized airflow (4) comprises a portion of channel dimensioned so that it is susceptible of being partially housed in a recess (9) of the body (8) of the toilet (1) bowl.

13. Washing and drying system according to claims 2 and 11, wherein said water outlet conduit (2) is a retractable nozzle mounted adjacent to said air outlet channel (5) and displaceable from a retracted position to an advance position, so that the surface (6) which orientates by Coanda effect the pressurized airflow (4) may take on one or several positions of use.

14. Washing and drying system according to claim 1, wherein said means to generate the pressurized air flow comprise a fan (3) mounted in a support housing (7) of a toilet (1) seat, said support housing (7) including a washing unit provided with the water outlet conduit (2) for anal and/or perineal washing, said water outlet conduit (2) being provided with the surface (6) designed to orientate by Coanda effect the pressurized airflow (4).

15. Toilet (1) with bidet functions, comprising a seat and a body (8) which acts by way of bowl, whereon the support housing (7) of the seat is mounted, **characterized in that** it comprises the anal and/or perineal washing and drying system according to any of claims 1 to 14.

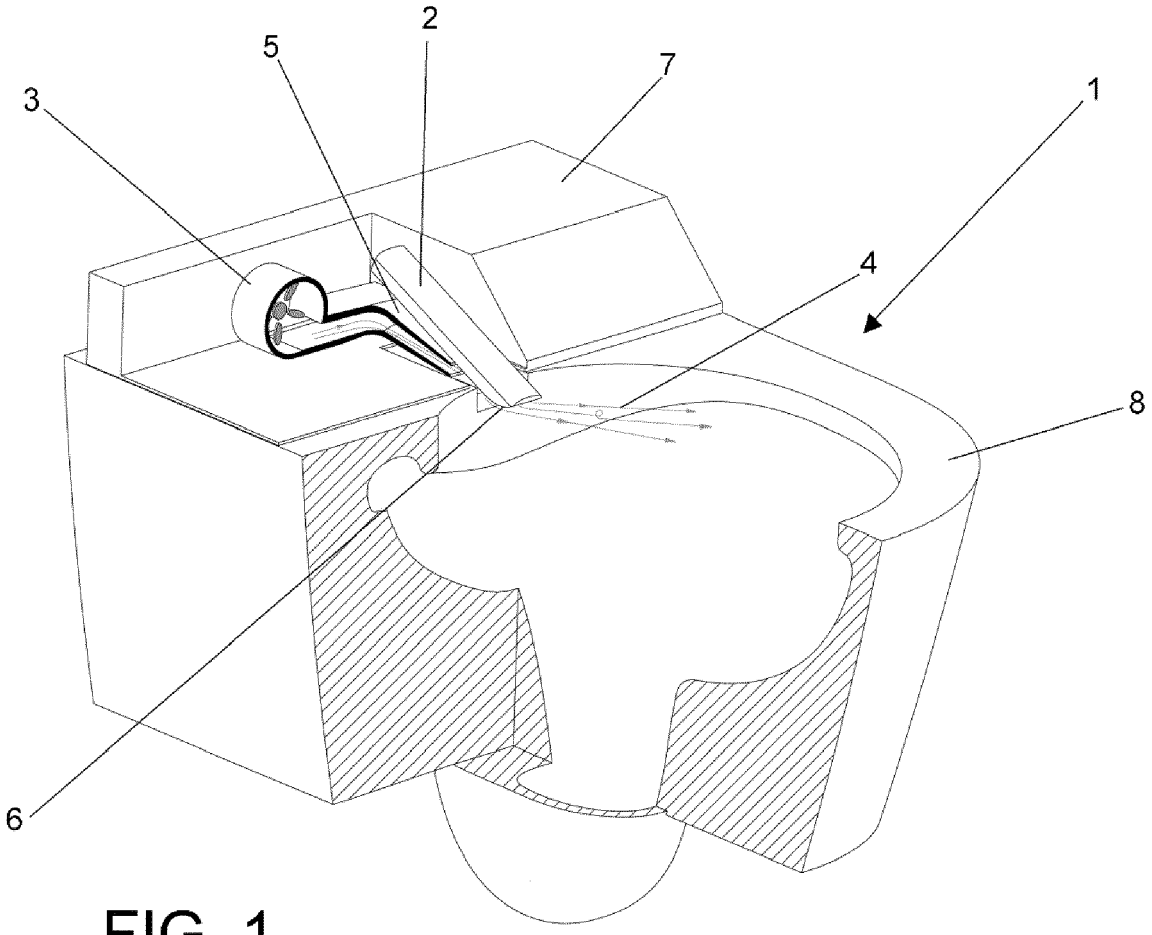

FIG. 1

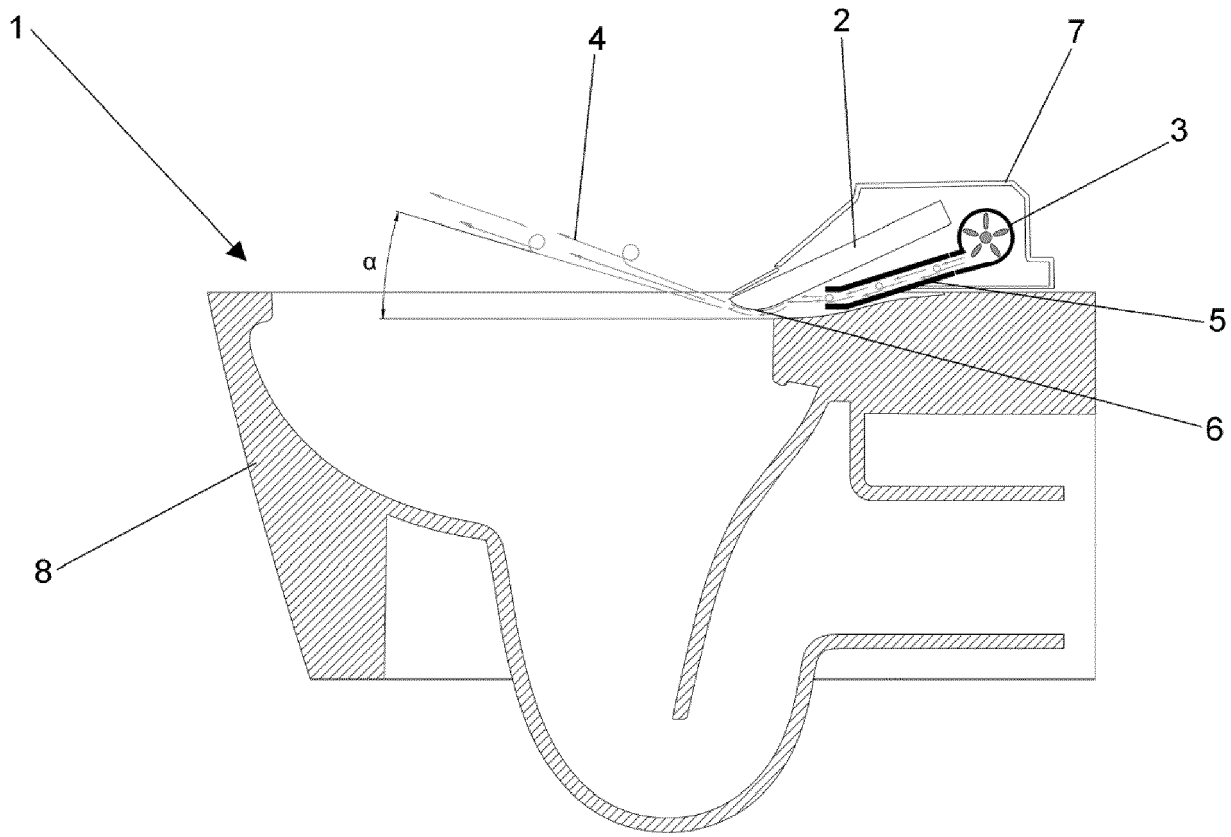

FIG. 2

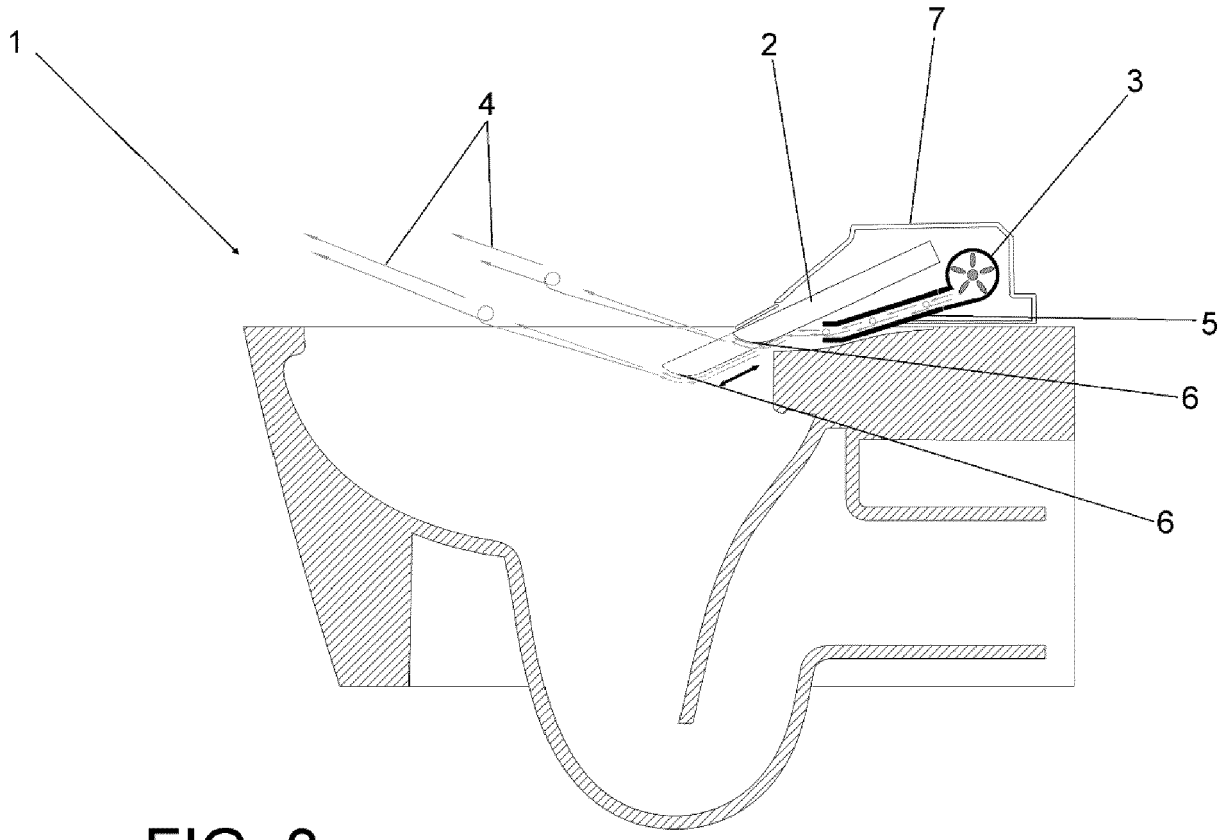

FIG. 3

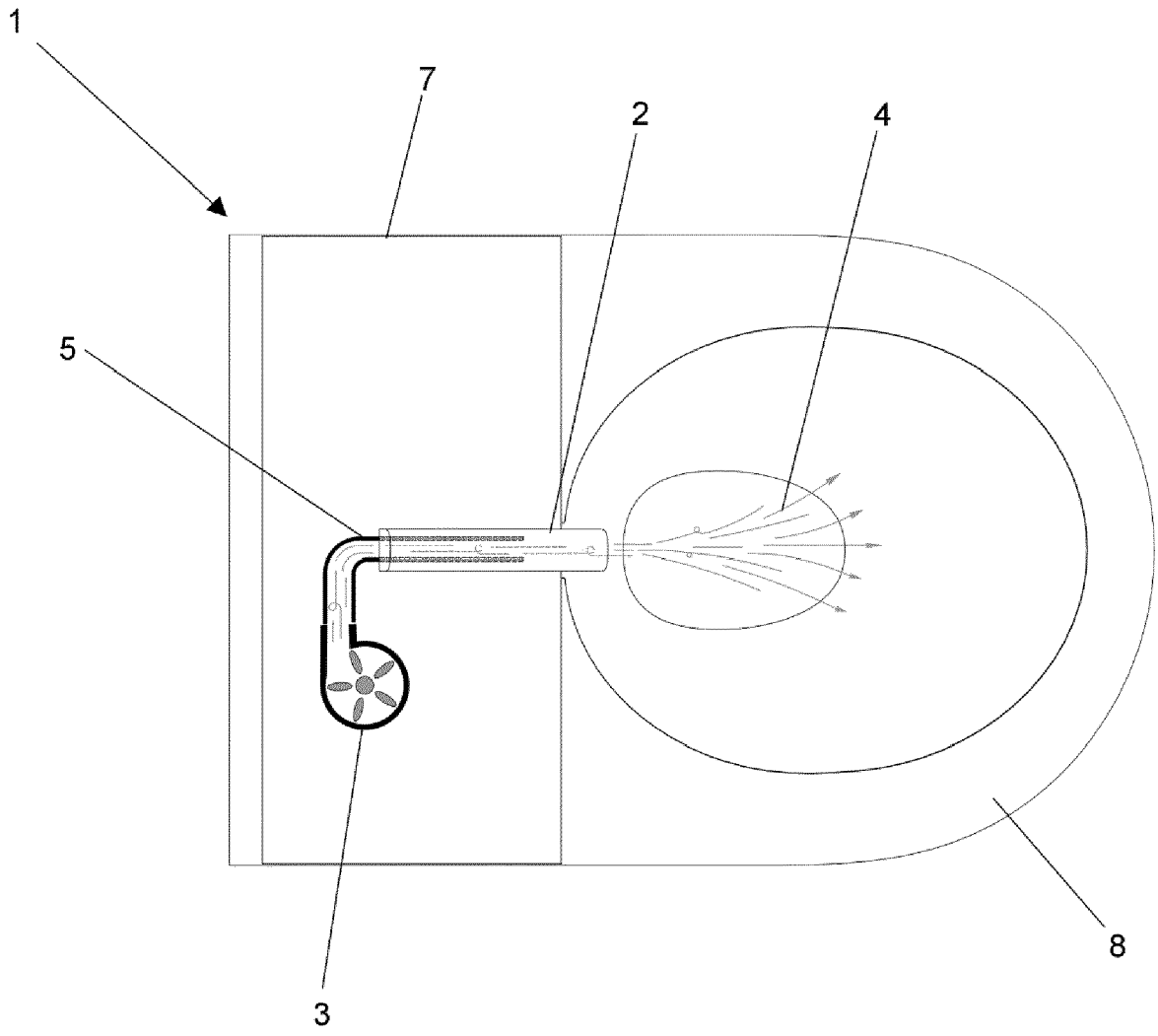

FIG. 4

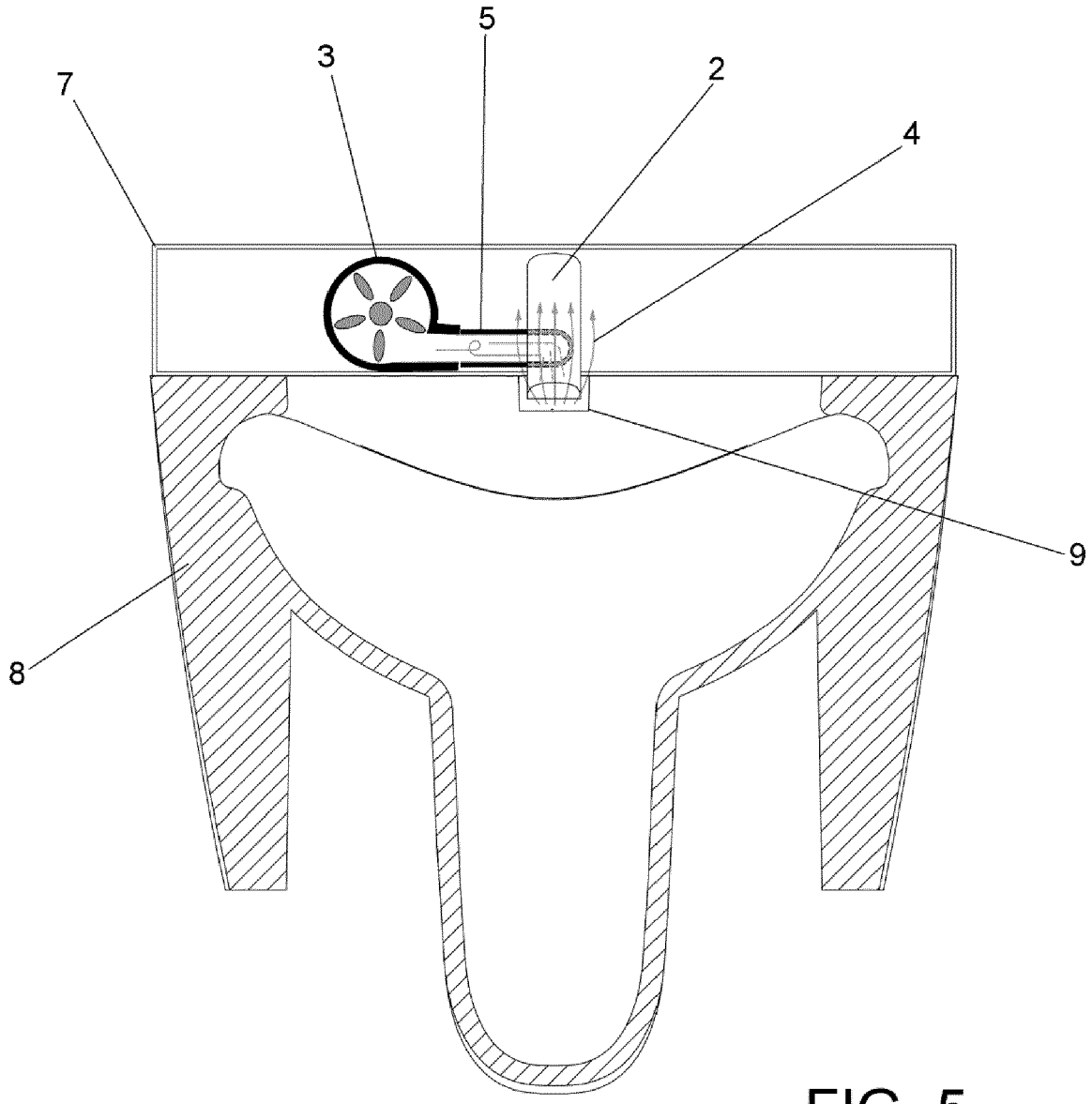

FIG. 5

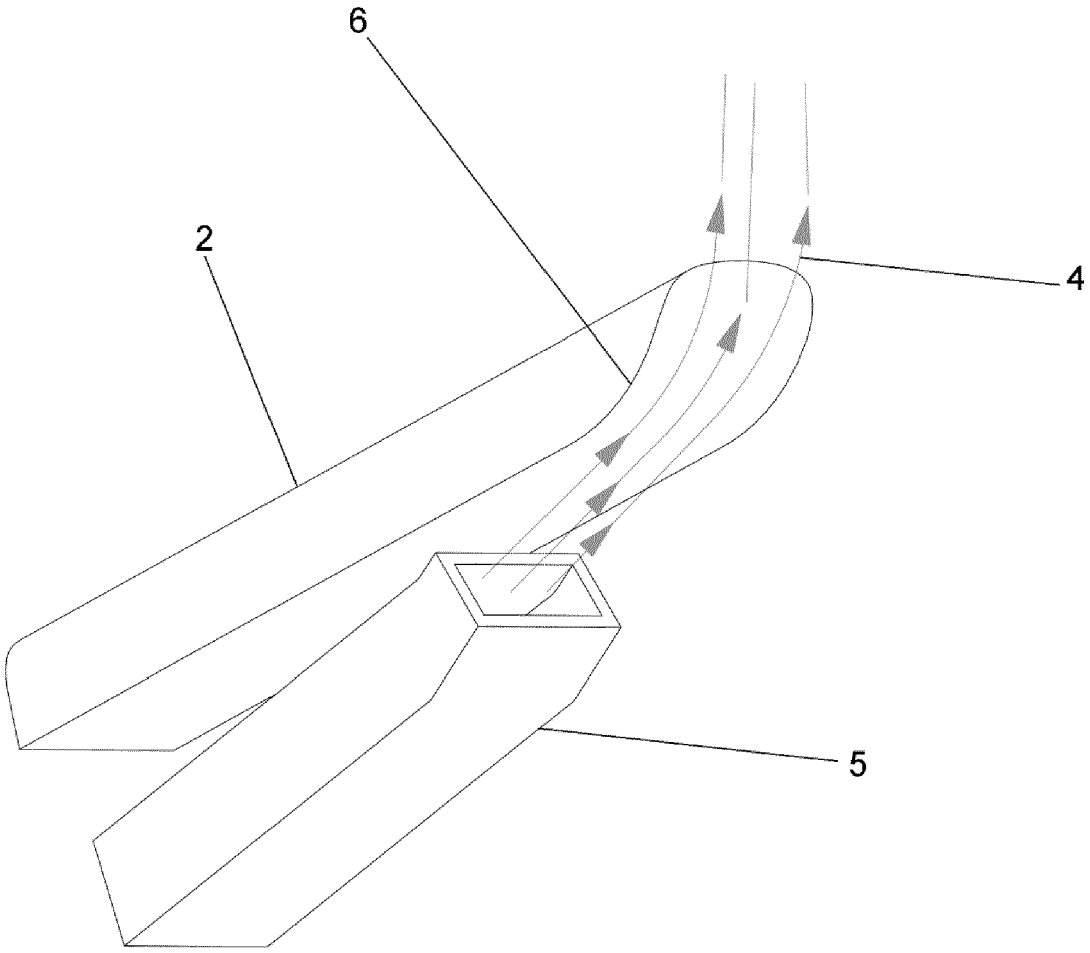

FIG. 6

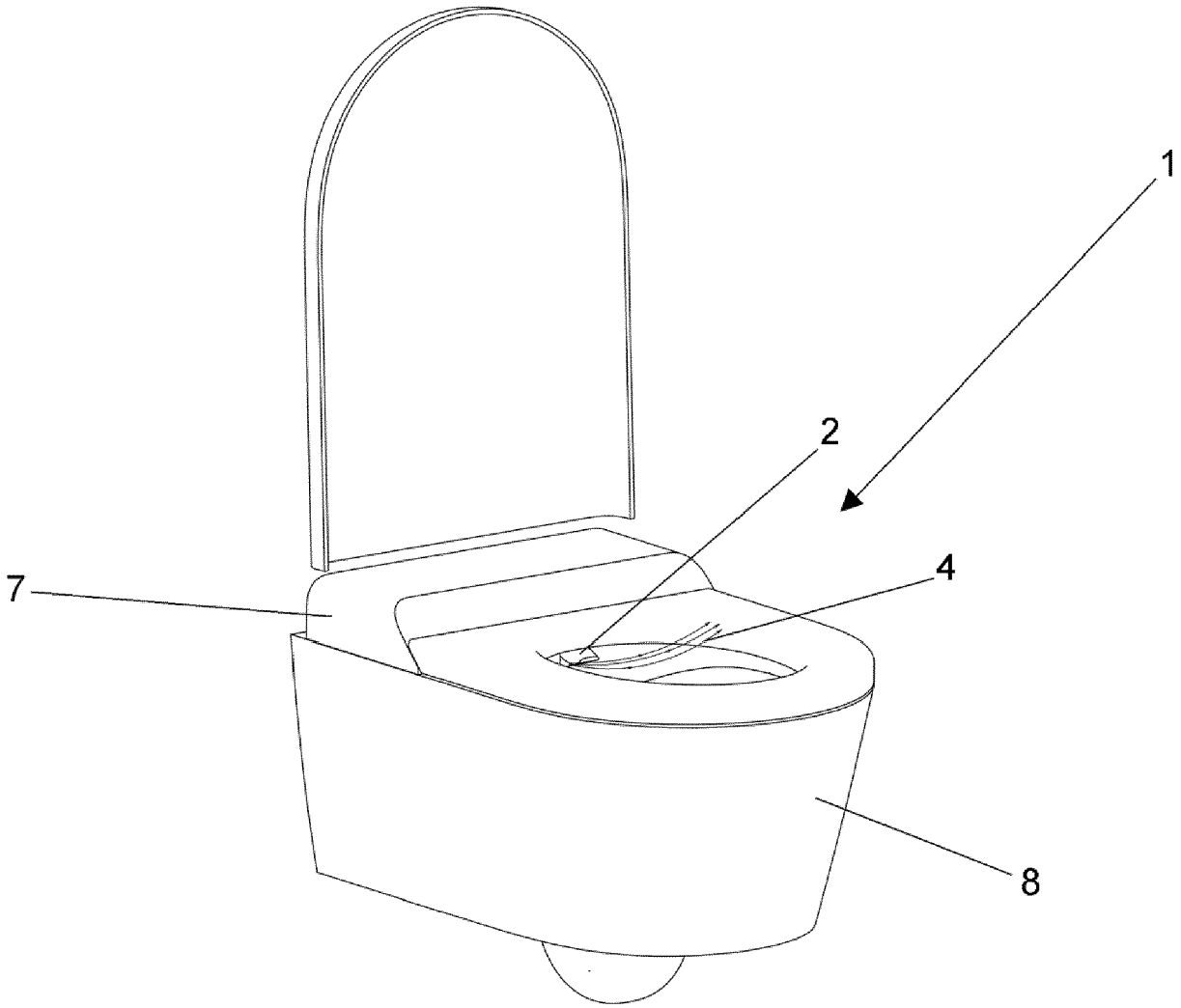

FIG. 7

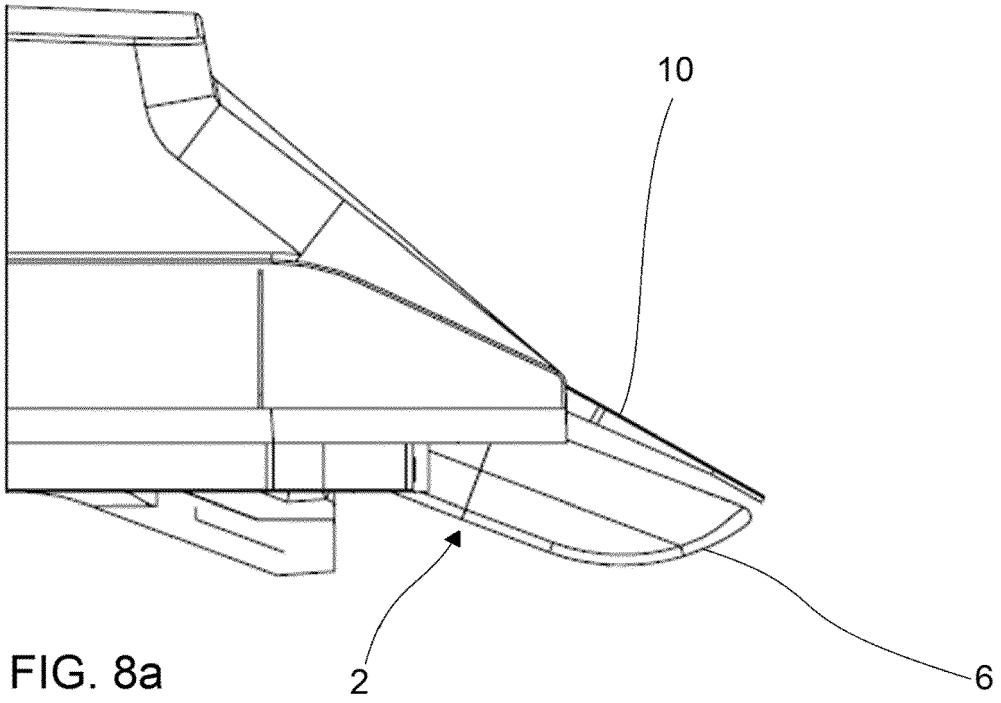

FIG. 8a

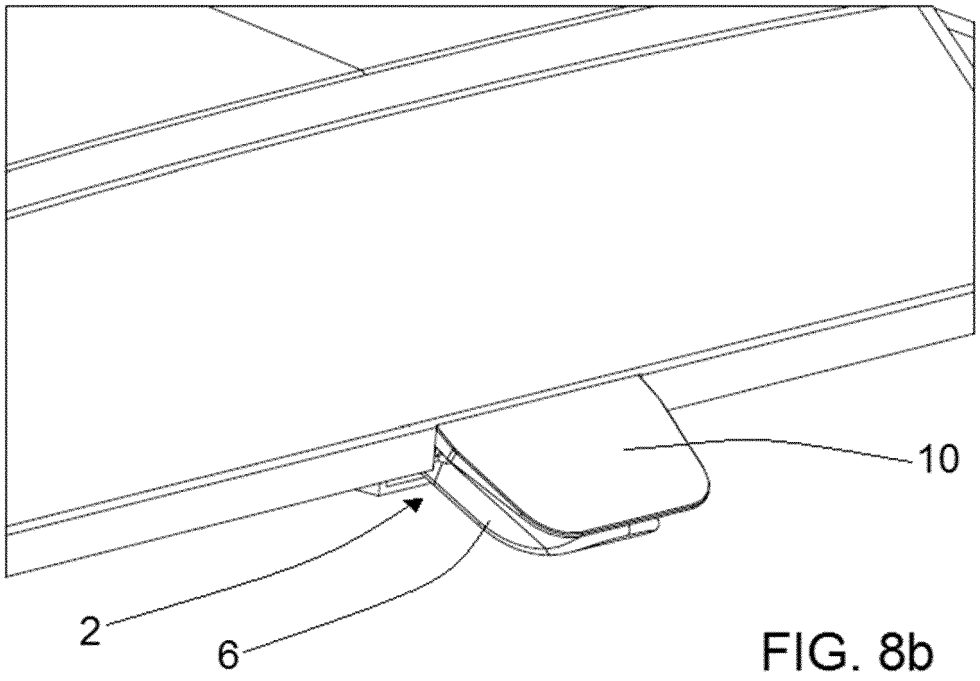

FIG. 8b

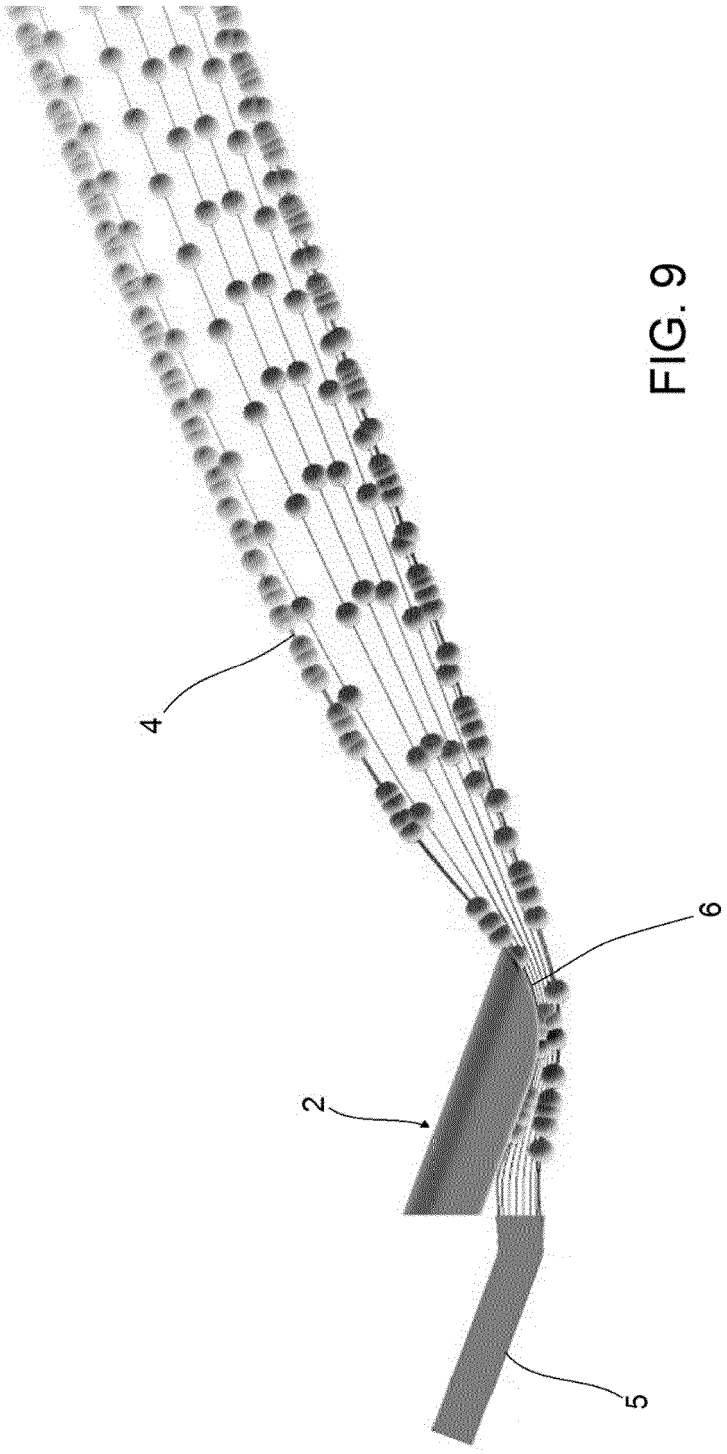

FIG. 9

Europäisches Patentamt
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EUROPEAN SEARCH REPORT

Application Number
EP 19 16 1871

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 July 2019	Posavec, Daniel

CATEGORY OF CITED DOCUMENTS

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