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(54) **AN AUTOMATIC PUBLIC TOILET**

(57) This invention concerns automatic public toilets. Especially this invention concerns cleaning arrangements of such toilets. The inventive toilet and toilet module comprises a toilet seat 10 installed parallel to and at a first end of the technical chamber wall 30 between the technical equipment chamber of the toilet and the toilet

area of the toilet. Further, the cleaning function is arranged as an assembly 100 that rotates out of the technical chamber wall 30 along a substantially vertical rotation axis located substantially at the first end of the technical chamber wall 30.

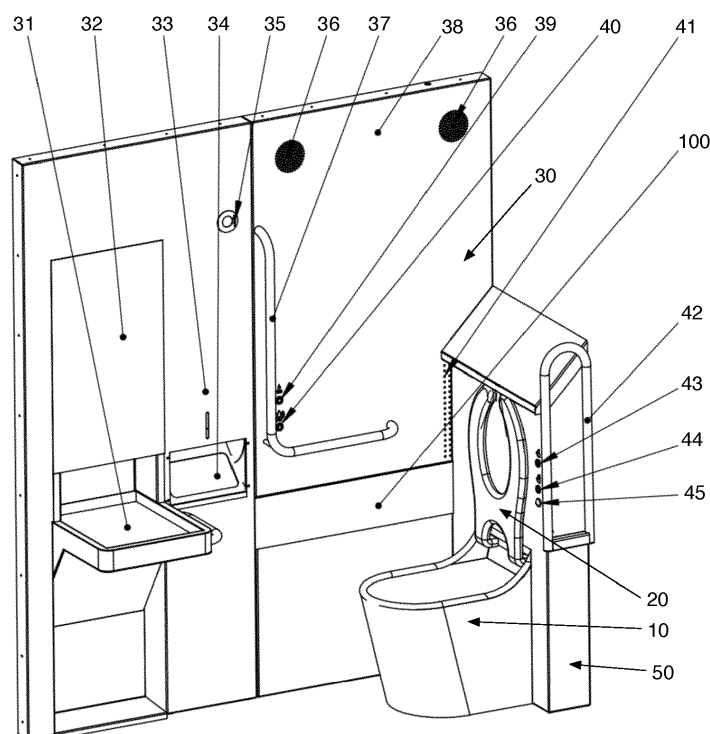


Fig. 1A

Description

1. Field of the invention

[0001] This invention concerns automatic public toilets. Especially this invention concerns cleaning arrangements of such toilets.

2. Description of prior art

[0002] Maintaining the cleanliness of public toilets requires a lot of manual work. This is expensive, which has driven development of automated cleaning solutions. A typical automatic toilet has a technical equipment chamber separated from the toilet area by a technical chamber wall.

[0003] Many solutions move the toilet bowl from the toilet area to the technical chamber for cleaning. For example, patent US5279008 describes an automatic toilet which has two toilet bowl attached to the same horizontal axis so that one bowl is inside the technical chamber for cleaning and the other in the toilet area for use. After each use, the bowls are rotated 180 degrees to bring the cleaned bowl into the toilet area and the soiled bowl into the technical chamber for cleaning. Patents US5647074, US5857228 and US5090069 also describe arrangements in which the toilet bowl is rotated into the technical chamber for cleaning. While these arrangements are able to clean the bowl well and limit the spraying of cleaning liquids into the toilet area, they do not address the need of cleaning the immediate surroundings of the toilet bowl, without which a toilet becomes quite odorous rather quickly.

[0004] The patent US6349430 addresses the need of cleaning the surroundings of the toilet bowl by arranging the floor of the toilet to be rotated into the technical chamber for cleaning.

[0005] Some patent publications such as US4881284 and US3869732 describe solutions in which walls to which the toilet bowl and the sink are attached have hinges and are arranged to fold close together, so that a single spraying unit can clean both the toilet and the sink at the same time, as well as the surroundings of the toilet bowl.

[0006] Some solutions use moving cleaning arrangements with covers limiting the spraying of water outside the area to be cleaned. For example, patent US8484772 describes an arrangement in which a mechanism lowers a plate from the technical chamber wall to provide an enclosed space for cleaning. Patent US2605478 describes an arrangement with a cover with spraying equipment that is rotated around a horizontal axis from a vertical position to a horizontal position covering the toilet bowl for cleaning of the same. Patent US5454123 describes a similar solution, but which employs horizontal movement of the cleaning arrangement and its cover. Patent application WO06048490 describes a cleaning arrangement having a folding cover that can be unfolded from above the toilet bowl to cover the toilet bowl for

cleaning action.

[0007] While the prior art solutions described above each provide a partial solution to the field of problems with automation of public toilets, each leave something to be desired.

[0008] Public automatic toilets face a very hard environment which creates many kinds of problems. Anything in public use must withstand very heavy use and even vandalism, public toilets especially so. All parts must be very sturdy, and mechanisms must be as simple as possible to have any hope of survival of everyday use without frequent repairs. Long interval between service calls is needed in order for e.g. municipalities to be able to afford a a dense enough network of automatic toilets and manage to keep them serviced and functional.

[0009] Public toilets also become quickly smelly and unhygienic, if the cleaning cycle does not work well. Both the toilet bowl as well as the toilet seat needs to be washed often, optimally between each use. After washing, the cleaned area should be dried before the next use. The cleaning and drying cycle should be as quick as possible to avoid the need for users to wait.

[0010] Despite automatic cleaning arrangements, periodical manual cleaning of the toilet is required to maintain cleanliness. For example, at the time of writing of this specification, even automatic toilets that have the best available automatic cleaning arrangements need to be cleaned manually every day if they are in heavy use, or even multiple times per day. As manual cleaning is expensive, any improvements in the cleaning arrangements and consequent reductions in the need for manual cleaning are greatly beneficial for the operator of the automatic toilets.

[0011] These requirements are very difficult to fulfill, and existing solutions each have their drawbacks. A better solution is needed.

SUMMARY OF THE INVENTION

[0012] The invention solves the problems of prior art by arranging the toilet bowl to be situated substantially parallel to the technical chamber wall substantially at a first end of the technical chamber wall. Further, the cleaning function is arranged as an assembly that rotates out of the technical chamber wall along a substantially vertical rotation axis located substantially at the first end of the technical chamber wall.

[0013] The cleaning assembly comprises cleaning liquid nozzles for spraying cleaning liquid and/or rinsing water. The cleaning assembly preferably also comprises drying nozzles for blowing pressurized air in order to dry the washed area. The cleaning assembly preferably comprises a cover plate and a side plate for limiting the spread of cleaning liquid outside area under the cleaning assembly.

[0014] The positioning of the toilet bowl allows the cleaning assembly to cover the toilet bowl with a roughly 90 degree rotation along one axis, which allows the

mechanism of the cleaning assembly to be simple and robust. Further, the positioning of the toilet bowl parallel to the technical chamber wall further allows cleaning and drying of the toilet bowl and toilet seat using machinery within the technical chamber wall - for example, drying of the toilet seat using air blown through an air vent in the technical chamber wall. Therefore, this positioning of the toilet bowl allows locating the components participating in the cleaning and drying cycle at the technical chamber wall, while minimising the complexity of moving parts needed to perform the cleaning and drying cycle.

[0015] In an embodiment of the invention the toilet comprises an arrangement for raising and lowering the toilet seat. In such an embodiment, the toilet seat can be lowered on the toilet bowl in order to be cleaned in the cleaning cycle under the cleaning assembly, and raised after the cleaning cycle to be ready for next use and for finalizing drying of the seat in airflow blown through an air vent in the technical chamber wall.

[0016] In a further embodiment of the invention, the air that is blown through an air vent in the technical chamber wall for finalizing the drying of the toilet seat is heated in order to enhance the drying and for heating the toilet itself. In colder climates heating of the toilet is often needed during the winter season, and in such an embodiment the heating airflow is also used to dry the toilet seat.

[0017] The above summary relates to only one of the many embodiments of the invention disclosed herein and is not intended to limit the scope of the invention, which is set forth in the claims herein. These and other features of the present invention will be described in more detail below in the detailed description of the invention and in conjunction with the following figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] Various embodiments of the invention will be described in detail below, by way of example only, with reference to the accompanying drawings, of which

Figures 1A, 1B and 1C illustrate an embodiment of the invention,

Figure 2 illustrates elements of the cleaning assembly according to an embodiment of the invention, and

Figures 3A, 3B, and 3C illustrate a toilet module according to an embodiment of the invention.

DETAILED DESCRIPTION OF CERTAIN EMBODIMENTS

[0019] The following embodiments are exemplary. Although the specification may refer to "an", "one", or "some" embodiment(s), this does not necessarily mean that each such reference is to the same embodiment(s), or that the feature only applies to a single embodiment. Features of different embodiments may be combined to

provide further embodiments.

[0020] In the following, features of the invention will be described with a simple example of an automatic public toilet with which various embodiments of the invention may be implemented. Only elements relevant for illustrating the embodiments are described in detail. Details that are generally known to a person skilled in the art may not be specifically described herein.

[0021] Figure 1A illustrates several components of an automatic public toilet according to an embodiment of the invention, while figures 1B and 1C illustrate the movement of a cleaning assembly 100 according to an embodiment of the invention. For clarity, figure 1A does not show the external walls or other structures of the public toilet structure itself, but rather concentrates on components that provide the core functionality of a public toilet.

[0022] A typical automatic public toilet comprises a toilet area accessible by members of public and a technical equipment chamber for holding various technical equipment needed for the automation. The technical equipment chamber is typically only accessible to service technicians. A technical chamber wall 30 separates the technical equipment chamber from the toilet area. Figure 1A illustrates the technical chamber wall 30 viewed from the direction of the publicly accessible toilet area. In addition to the inventive functionality according to an embodiment of the invention, figure 1A also illustrates various common components of an automatic public toilet.

[0023] In the example of figure 1A the toilet has a sink 31, a stainless steel mirror 32, a toilet paper dispenser 33, and a trash bin 34. Figure 1A also shows a waste disposal receptacle for injection needles 35, ventilation holes 36, a grab rail 37, a movement sensor 38, as well as button switches for flushing the toilet 39 and for calling for help 40. The toilet of figure 1A further has a rotating grab bar 42 and a button switch 43 for lowering the toilet seat 20. The toilet also has a disinfectant dispenser 45 operated by a button switch 44, which allows the user of the toilet to obtain some disinfectant on a piece of toilet paper and wipe the toilet seat or other surfaces before use.

[0024] Figure 1A illustrates positioning of the toilet bowl 10 and the toilet seat 20. In typical prior art solutions, the toilet bowl is located perpendicular to the technical chamber wall, in which case the technical chamber wall is behind the user, when the user sits on the bowl. Figure 1A illustrates placement of the bowl according to an embodiment of the invention in which the toilet bowl and seat are positioned substantially parallel to the technical chamber wall 30. Further, the toilet bowl is not located in the middle of the technical chamber wall 30 as is common with prior art solutions, but substantially at one end of the technical chamber wall 30. In the example the toilet bowl 10 and the toilet seat 20 are attached to an extension 50 of the technical chamber wall 30.

[0025] This arrangement of the toilet bowl allows the cleaning assembly 100 to have a simple structure while still being able to cover the toilet bowl and its immediate

surroundings for cleaning.

[0026] The movement of the cleaning assembly 100 is illustrated in figures 1B and 1C. The cleaning assembly 100 is located beside the toilet bowl 10 at the same end of the technical chamber wall 30. The cleaning assembly rotates around a vertical axis as shown in figure 1B, where the cleaning assembly is partially rotated, and figure 1C, where the cleaning assembly 100 is fully rotated to cover the toilet bowl 10. Figures 1B and 1C show the cover 102, side plate 103, and front plate 106 of the cleaning assembly 100. The cleaning assembly 100 comprises cleaning liquid nozzles for washing the toilet bowl. Details of the cleaning assembly 100 are described in more detail later in this specification with figure 2.

[0027] Figures 1A and 1B also illustrate that if the toilet seat 20 is in the vertical position at the start of the cleaning cycle, it is lowered onto the toilet bowl as shown in figure 1B in order to have the toilet seat 20 cleaned as well with the toilet bowl 10. After the cleaning cycle, when the cleaning assembly 100 has been returned to its default position as shown in figure 1A, the toilet seat 20 is raised to vertical position as shown in figure 1A. In public toilets, it is advisable to have the toilet seat in an upright position at the start of using of the toilet and require the user to lower the toilet seat, as otherwise male users may urinate on the toilet seat as well.

[0028] In the embodiment illustrated in figures 1A, 1B, and 1C the toilet seat is returned to the vertical position after the cleaning assembly 100 has returned to its default position illustrated in figure 1A. Further, in this embodiment the toilet seat 20 is further dried using airflow from air vent 41 in the technical chamber wall.

[0029] In a further embodiment of the invention the airflow from the air vent 41 in the technical chamber wall is heated to heat the toilet area as well as to enhance the drying of the toilet seat 20.

[0030] In a still further embodiment of the invention the airflow for drying the toilet seat 20 can be provided via other means than an air vent 41 in the technical chamber wall. For example, a drying nozzle can be located above the toilet seat in the surface beside the toilet seat, or any other location allowing airflow to be provided along the toilet seat.

[0031] In a further embodiment of the invention the cleaning assembly 100 comprises at least one cleaning liquid nozzle behind the front plate 106. In such an embodiment the cleaning liquid nozzle can spray cleaning liquid already during the rotation of the cleaning assembly 100 to cover the toilet bowl 10, which maximises the time the cleaning liquid can affect the surfaces being cleaned before rinsing.

[0032] Figure 2 illustrates the structure of a cleaning assembly 100 according to an embodiment of the invention. Figure 2 shows a schematical side view of the toilet bowl 10 and the cleaning assembly 100. Figure 2 illustrates the cleaning assembly in the washing position, i.e. covering the toilet bowl 10.

[0033] Figure 2 illustrates various components of the

cleaning assembly 100. Figure 2 shows the cover plate 102 of the cleaning assembly, which limits the spraying of cleaning and disinfectant liquids above the cleaning assembly. The cleaning assembly further comprises cleaning liquid nozzles 110 for spraying cleaning liquid on the toilet bowl 10, toilet seat and the immediate surroundings of the toilet bowl 10. For clarity, the toilet seat is not shown in figure 2. Also, figure 2 does not show any pipes or hoses for providing the cleaning liquid nozzles 110 with cleaning liquid.

[0034] In the embodiment of the invention illustrated in figure 2 the cleaning assembly 100 comprises drying nozzles 120 for blowing air to dry the toilet seat and the toilet bowl 10. In the example of figure 2, the drying nozzles are supplied with air using a blower unit 122 located in the cleaning assembly 100.

[0035] In other embodiments of the invention the blower unit 122 can be located in the technical equipment chamber and the airflow can be provided to the drying nozzles using hoses or pipes. In the example of figure 2, the blower unit 122 is arranged in close proximity to the air nozzles 120 to provide a high pressure airflow to the drying nozzles 120 allowing the drying nozzles to provide an air knife for drying the toilet seat and the toilet bowl.

[0036] Figure 2 also illustrates an embodiment in which the air nozzles 120 are located next to the front plate 106 for drying the toilet seat and the toilet bowl using the air knife provided by the drying nozzles 120 while the cleaning assembly is rotated from the washing position illustrated in figures 2 and 1C back to the default position within the technical chamber wall 30, which position is illustrated in figure 1A. For clarity, the front plate 106 is not illustrated in figure 2.

[0037] Figure 2 also illustrates an embodiment of the invention which comprises ultraviolet lights 130 within the cleaning assembly 100 for disinfecting the area covered by the cleaning assembly using ultraviolet light.

[0038] Figure 2 also shows a disinfectant nozzle 112 for spraying disinfectant on the toilet seat during the cleaning, and additional cleaning liquid nozzles 111. In this exemplary embodiment, the disinfectant nozzle 112 and the additional cleaning liquid nozzles 111 are located in the technical chamber wall.

[0039] Figures 3A, 3B, and 3C illustrate a further embodiment of the invention, in which the main functionality of an automatic toilet, including the inventive functionality, is provided as a toilet module 300 for installation in a public toilet and for provisioning the technical functionality of an automatic public toilet.

[0040] Figure 3A illustrates a toilet module 300 according to an embodiment of the invention, viewed from the direction of the toilet area. The toilet module 300 provides a section of the technical chamber wall 30 comprising a sink element 310, a service door element 320, and a cleaning element 330. The toilet module also comprises the toilet bowl 10, and an extension 50 of the technical chamber wall for connecting the toilet bowl to the rest of the equipment of the module. The service door element

320 comprises a service door 325 which allows access to the technical equipment chamber once the module is installed in a public toilet.

[0041] In the example of figures 3A, 3B, and 3C the sink element 310 comprises the sink 31. The cleaning element 330 comprises the cleaning assembly 100.

[0042] Figure 3B shows the toilet module from above. In the example of figure 3B, the cleaning assembly 100 is shown in its rest position, where the front plate of cleaning assembly 100 is aligned with the technical chamber wall 30. Figure 3B also illustrates the toilet bowl 10, and the extension 50 of the technical chamber wall.

[0043] Figure 3C shows the toilet module from above, showing the service door 325 for accessing the technical chamber in an open position. In this embodiment, the service door 325 is also used for housing other needed components of a toilet, such as the toilet paper dispenser 33. Figure 3C also illustrates the cleaning assembly 100 in the cleaning position, where the cleaning assembly covers the toilet bowl.

[0044] An embodiment in which the inventive functionality is provided as a toilet module, for example as shown in figures 3A, 3B, and 3C, is well suited for providing the inventive functionality to existing public toilets. After removing the old equipment, the module merely needs to be installed in place and connected to water supply, electrical supply and the sewer.

[0045] In a further embodiment of the invention, the toilet seat 20 is warmed for convenience of the user by warming the wall surface beside the toilet seat when the toilet seat is in the vertical position. This can be effected for example using a resistive heating element attached to the wall surface. The invention is not limited to any specific ways of heating the wall surface as this can be performed in many different ways known to a man skilled in the art.

[0046] Figures 1A, 1B, and 1C illustrate an embodiment of the invention in which the cover plate 102 and the side plate 104 are fixed in construction, whereby in the rest position when the cleaning assembly 100 is retracted within and behind the technical chamber wall 30, the side plate 104 and the cover plate 102 extend far into the technical equipment chamber. However, different embodiments of the invention can use different structures, such as folding or telescopic structures.

[0047] In an embodiment of the invention the cover of the cleaning assembly 100 comprises a folding cover, whereby the cover 102 and the side 104 of the cleaning assembly is implemented using a folding material such as textile or tarp material. The invention is not limited to any specific way of implementing the cover 102 and the side 104 of the cleaning assembly 100.

[0048] In some embodiments of the invention the cleaning assembly 100 is implemented as a single construction, which is moved as one piece. While this is a structurally simple solution requiring the mechanism driving the rotational movement to only need to rotate one object, the invention is not limited to such embodiments.

In further embodiments of the invention the cleaning assembly 100 is implemented using more than one separately rotated subassembly.

[0049] In a further embodiment of the invention the cover consisting of the cover plate 102 and side plate 104 can be moved separately from the cleaning liquid nozzles 110 as well as the drying nozzles 120. Such an embodiment has the advantage that the washing process can be implemented in several varying stages moving said cleaning liquid nozzles 110 around the area to be washed while keeping the area to be washed completely covered. Similarly, in an embodiment in which the drying nozzles 120 can be moved separately from the cover of the cleaning assembly the drying phase can be completed fully before retracting the cover.

[0050] In many locations in this specification various embodiments of the invention are described having elements that are arranged to move or perform some other actions. Although arrangements for causing these actions are not described in more detail, a man skilled in the art knows many different ways to create such actions. For example, movements can be created using electric motors under control of a control unit of the toilet. As a further example, spraying of a liquid can be arranged using an electric pump under control of the control unit. The invention is not limited to any specific way to arrange these actions.

[0051] The cleaning liquid nozzles 110 can be used to spray both a detergent first and following that, water to rinse the detergent and dirt away.

[0052] The invention has many benefits. The inventive structure allows provisioning of the cleaning functionality with a structure which is very simple in construction, and is therefore very robust and tolerates heavy use and even vandalism. The inventive structure also provides drying of the toilet seat and toilet bowl. Implementation of the inventive functionality as a module provides an easy way to renovate existing public toilets.

[0053] The cleaning assembly 100 cleans all surfaces under the cover of the cleaning assembly. The inventive structure focuses on cleaning those areas of a public toilet that are most subject to getting dirty: the toilet bowl, the toilet seat, and the immediate surroundings of the toilet bowl including the wall surface around the toilet bowl and the floor around the toilet bowl. This produces a very effective cleaning procedure, while saving electricity and water.

[0054] The increased cleaning effect reduces the need for manual cleaning. For example, in busy locations prior art toilets often need manual cleaning even twice or thrice a day. The inventive functionality reduces the need for manual cleaning to such an extent, that even in heavy use locations, manual cleaning once a day is enough, whereby the manual cleaning can be performed during a single service call when supplies such as cleaning liquid and toilet paper are refilled and trash removed.

[0055] In a further embodiment of the invention, further energy and water savings and an increase in throughput

can be achieved by arranging the cleaning cycle to be executed not after every use but after every two, three, four or more uses.

[0056] In a further embodiment of the invention, the cleaning cycle is executed only after a preset time period has gone after previous use. The preset time period can be for example half a minute, one minute, or for example two minutes or more. Such an embodiment has the advantage, that in case there is a queue of users waiting for their turn, not running the cleaning cycle between each use increases the throughput of the toilet.

CERTAIN FURTHER EMBODIMENTS OF THE INVENTION

[0057] In the following, we describe a number of embodiments of the invention.

[0058] According to a first aspect of the invention an automatic public toilet, having a toilet area and a technical equipment chamber separated by a technical chamber wall 30, and a toilet bowl 10 in the toilet area is provided.

[0059] According to a first embodiment of this first aspect of the invention, the toilet bowl 10 is located substantially parallel to the technical chamber wall 30 substantially at a first end of the technical chamber wall 30;

and the toilet further comprises at least a cleaning assembly 100 arranged to move from a rest position along the technical chamber wall to cover the toilet bowl by rotating around a substantially vertical rotation axis;

said cleaning assembly 100 being located substantially at said first end of the technical chamber wall 30 and said cleaning assembly 100 being arranged to substantially cover the toilet bowl with a substantially quarter circle rotation; and said cleaning assembly 100 comprising cleaning liquid nozzles 110 for spraying cleaning liquid on the toilet bowl.

[0060] According to a second embodiment of this first aspect of the invention, said cleaning assembly 100 comprises drying nozzles 120 for blowing air, and the automatic public toilet is arranged blow air through said drying nozzles 120 in order to dry the toilet bowl 10 while the cleaning assembly is rotating back into said rest position.

[0061] According to a third embodiment of this first aspect of the invention, the toilet further comprises a toilet seat 20 arranged to be lowered on the toilet bowl and raised to a vertical position under control of the control unit, and the toilet seat 20 is arranged to be lowered on the toilet bowl 20 before a cleaning operation by said cleaning assembly 100 and raised after a cleaning operation by said cleaning assembly.

[0062] According to a fourth embodiment of this first aspect of the invention, the technical chamber wall 30 comprises an air vent 41 arranged to direct a stream of air towards the toilet seat 20 when the toilet seat is in said vertical position.

[0063] According to a fifth embodiment of this first aspect of the invention, the toilet further comprises at least an arrangement for heating air vented through said air vent 41.

[0064] According to a sixth embodiment of this first aspect of the invention, the toilet further comprises at least an arrangement for heating a surface beside said vertical position of the toilet seat 20 for warming the toilet seat 20.

[0065] According to a seventh embodiment of this first aspect of the invention, said cleaning assembly further comprises at least an arrangement 130 providing ultraviolet light for disinfecting surfaces under the cleaning assembly during a cleaning operation.

[0066] According to a second aspect of the invention, a toilet module 300 for installation in a public toilet is provided. According to a first embodiment of this second aspect of the invention, the module 300 comprises at least a section of a technical chamber wall 30, a toilet bowl 10 attached to a first end of said section of a technical chamber wall 30, a cleaning assembly 100 arranged to move from a rest position along the technical chamber wall 30 to cover the toilet bowl by rotating around a substantially vertical rotation axis; said cleaning assembly 100 being located substantially at said first end of the technical chamber wall 30 and said cleaning assembly being arranged to substantially cover the toilet bowl 10 with a substantially quarter circle rotation; and said cleaning assembly 100 comprising cleaning liquid nozzles 110 for spraying cleaning liquid on the toilet bowl.

[0067] According to a second embodiment of this second aspect of the invention, said cleaning assembly 100 comprises drying nozzles 120 for blowing air, and the toilet module 300 is arranged blow air through said drying nozzles 120 in order to dry the toilet bowl 20 while the cleaning assembly 100 is rotating back into said rest position.

[0068] According to a third embodiment of this second aspect of the invention, the toilet module further comprises a toilet seat 20 arranged to be lowered on the toilet bowl 10 and raised to a vertical position under control of the control unit, and that the toilet seat 20 is arranged to be lowered on the toilet bowl before a cleaning operation by said cleaning assembly 100 and raised after a cleaning operation by said cleaning assembly 100.

[0069] According to a fourth embodiment of this second aspect of the invention, the technical chamber wall 30 comprises an air vent 41 arranged to direct a stream of air towards the toilet seat 20 when the toilet seat 20 is in said vertical position.

[0070] According to a fifth embodiment of this second aspect of the invention, the module further comprises at least an arrangement for heating air vented through said air vent 41.

[0071] According to a sixth embodiment of this second aspect of the invention, the module further comprises at least an arrangement for heating a surface beside said vertical position of the

toilet seat 20 for warming the toilet seat 20.

[0072] According to a seventh embodiment of this second aspect of the invention, said cleaning assembly 100 further comprises at least an arrangement 130 providing ultraviolet light for disinfecting surfaces under the cleaning assembly 100 during a cleaning operation.

CERTAIN FURTHER OBSERVATIONS

[0073] In view of the foregoing description it will be evident to a person skilled in the art that various modifications may be made within the scope of the invention. While a preferred embodiment of the invention has been described in detail, it should be apparent that many modifications and variations thereto are possible, all of which fall within the true spirit and scope of the invention.

[0074] It is to be understood that the embodiments of the invention disclosed are not limited to the particular structures, process steps, or materials disclosed herein, but are extended to equivalents thereof as would be recognized by those ordinarily skilled in the relevant arts. It should also be understood that terminology employed herein is used for the purpose of describing particular embodiments only and is not intended to be limiting.

[0075] Reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases "in one embodiment" or "in an embodiment" in various places throughout this specification are not necessarily all referring to the same embodiment.

[0076] As used herein, a plurality of items, structural elements, compositional elements, and/or materials may be presented in a common list for convenience. However, these lists should be construed as though each member of the list is individually identified as a separate and unique member. Thus, no individual member of such list should be construed as a de facto equivalent of any other member of the same list solely based on their presentation in a common group without indications to the contrary. In addition, various embodiments and example of the present invention may be referred to herein along with alternatives for the various components thereof. It is understood that such embodiments, examples, and alternatives are not to be construed as de facto equivalents of one another, but are to be considered as separate and autonomous representations of the present invention.

[0077] Furthermore, the described features, structures, or characteristics may be combined in any suitable manner in one or more embodiments. In the previous description, numerous specific details are provided, such as examples of lengths, widths, shapes, etc., to provide a thorough understanding of embodiments of the invention. One skilled in the relevant art will recognize, however, that the invention can be practiced without one or more of the specific details, or with other methods, com-

ponents, materials, etc. In other instances, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of the invention.

[0078] While the foregoing examples are illustrative of the principles of the present invention in one or more particular applications, it will be apparent to those of ordinary skill in the art that numerous modifications in form, usage and details of implementation can be made without the exercise of inventive faculty, and without departing from the principles and concepts of the invention. Accordingly, it is not intended that the invention be limited, except as by the claims set forth below.

LIST OF CERTAIN TERMS AND THEIR REFERENCE NUMBERS USED IN THIS SPECIFICATION

[0079]

20	automatic public toilet
	technical equipment chamber
	technical chamber wall 30
	toilet area
	toilet bowl 10
25	toilet seat 20
	sink 31
	stainless steel mirror 32
	toilet paper dispenser 33
	trash bin 34
30	waste disposal for injection needles 35
	ventilation hole 36
	grab rail 37
	movement sensor 38
	button switch for flushing the toilet 39
35	button switch for calling for help 40
	air vent 41 in the technical chamber wall
	grab bar 42
	button switch for lowering the toilet seat 43
	button switch for disinfectant dispenser 44
40	disinfectant dispenser 45
	extension 50 of the technical chamber wall
	cleaning assembly 100
	cover 102
	side plate 104
45	front plate 106
	cleaning liquid nozzles 110
	disinfectant nozzle 112
	drying nozzles 120
	blower unit 122
50	ultraviolet lights 130
	toilet module 300
	sink element 310
	service door element 320
	service door 325
55	cleaning element 330

Claims**1.** An automatic public toilet, having

a toilet area and a technical equipment chamber separated by a technical chamber wall (30), and a toilet bowl (10) in the toilet area,

characterized in that

the toilet bowl (10) is located substantially parallel to the technical chamber wall (30) substantially at a first end of the technical chamber wall (30);

and **in that**, that the toilet further comprises at least

a cleaning assembly (100) arranged to move from a rest position along the technical chamber wall to cover the toilet bowl by rotating around a substantially vertical rotation axis;

said cleaning assembly (100) being located substantially at said first end of the technical chamber wall (30) and said cleaning assembly (100) being arranged to substantially cover the toilet bowl with a substantially quarter circle rotation; and

said cleaning assembly (100) comprising cleaning liquid nozzles (110) for spraying cleaning liquid on the toilet bowl.

2. A toilet according to claim 1, **characterized in that**

said cleaning assembly (100) comprises drying nozzles (120) for blowing air, and the automatic public toilet is arranged blow air through said drying nozzles (120) in order to dry the toilet bowl (10) while the cleaning assembly is rotating back into said rest position.

3. A toilet according to claim 1, **characterized in that**

it further comprises a toilet seat (20) arranged to be lowered on the toilet bowl and raised to a vertical position,

and that the toilet seat (20) is arranged to be lowered on the toilet bowl (20) before a cleaning operation by said cleaning assembly (100) and raised after a cleaning operation by said cleaning assembly.

4. A toilet according to claim 3, **characterized in that** the technical chamber wall (30) comprises an air vent (41) arranged to direct a stream of air towards the toilet seat (20) when the toilet seat is in said vertical position.**5.** A toilet according to claim 4, **characterized in that** the toilet further comprises at least an arrangement for heating air vented through said air vent (41).**6.** A toilet according to claim 3, **characterized in that** it further comprises at least an arrangement for heating a surface beside said vertical position of the toilet seat (20) for warming the toilet seat (20).**7.** A toilet according to claim 1, **characterized in that** said cleaning assembly further comprises at least an arrangement (130) providing ultraviolet light for disinfecting surfaces under the cleaning assembly during a cleaning operation.**8.** A toilet module (300) for installation in a public toilet,

characterized in that the module (300) comprises at least

a section of a technical chamber wall (30), a toilet bowl (10) attached to a first end of said section of a technical chamber wall (30) parallel to said section of a technical chamber wall (30),

a cleaning assembly (100) arranged to move from a rest position along the technical chamber wall (30) to cover the toilet bowl by rotating around a substantially vertical rotation axis;

said cleaning assembly (100) being located substantially at said first end of the technical chamber wall (30) and said cleaning assembly being arranged to substantially cover the toilet bowl (10) with a substantially quarter circle rotation; and

said cleaning assembly (100) comprising cleaning liquid nozzles (110) for spraying cleaning liquid on the toilet bowl.

9. A toilet module (300) according to claim 8, **characterized in that** said cleaning assembly (100) comprises drying nozzles (120) for blowing air, and the toilet module (300) is arranged blow air through said drying nozzles (120) in order to dry the toilet bowl (20) while the cleaning assembly (100) is rotating back into said rest position.**10.** A toilet module (300) according to claim 8, **characterized in that** it further comprises a toilet seat (20) arranged to be lowered on the toilet bowl (10) and raised to a vertical position, and that the toilet seat (20) is arranged to be lowered on the toilet bowl before a cleaning operation by said cleaning assembly (100) and raised after a cleaning operation by said cleaning assembly (100).**11.** A toilet module (300) according to claim 10, **characterized in that** the technical chamber wall (30) comprises an air vent (41) arranged to direct a stream of air towards the toilet seat (20) when the toilet seat (20) is in said vertical position.**12.** A toilet module according to claim 11, **characterized**

in that the module further comprises at least an arrangement for heating air vented through said air vent (41).

13. A toilet module (300) according to claim 10, **characterized in that** it further comprises at least an arrangement for heating a surface beside said vertical position of the toilet seat (20) for warming the toilet seat (20).

14. A toilet module (300) according to claim 8, **characterized in that** said cleaning assembly (100) further comprises at least an arrangement (130) providing ultraviolet light for disinfecting surfaces under the cleaning assembly (100) during a cleaning operation.

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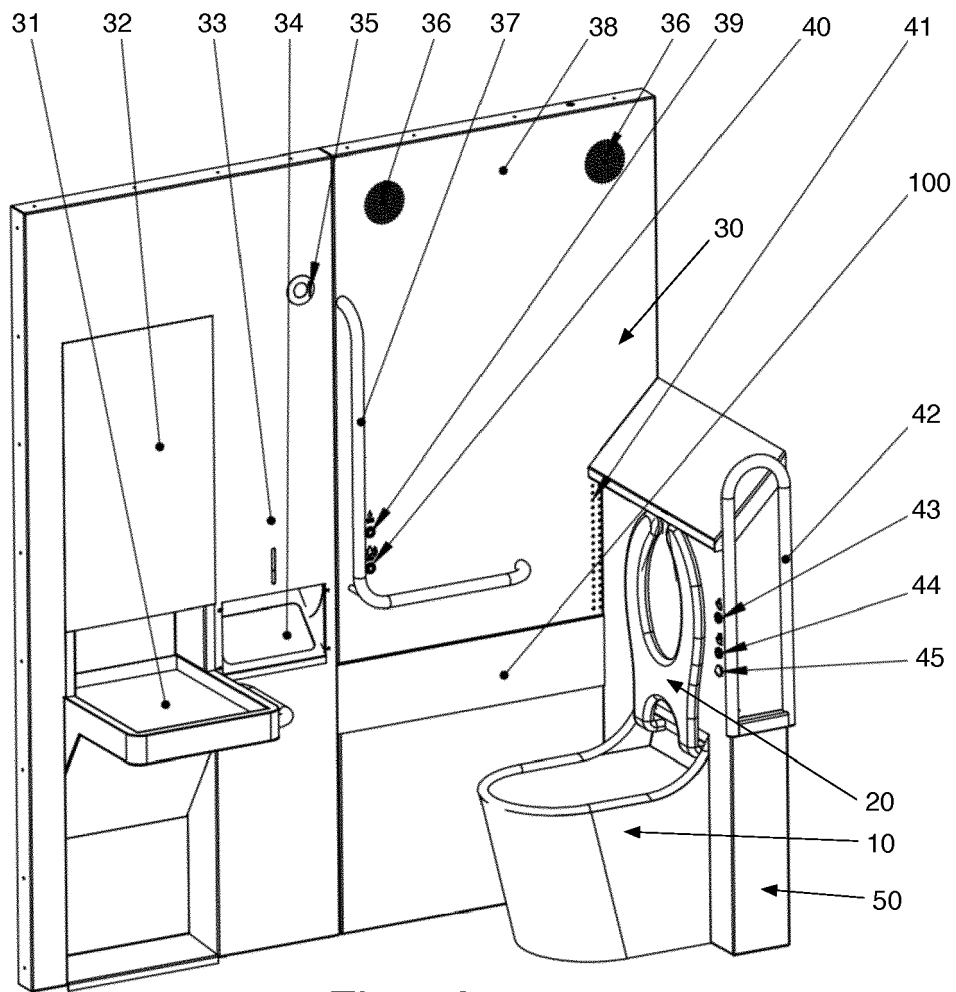


Fig. 1A

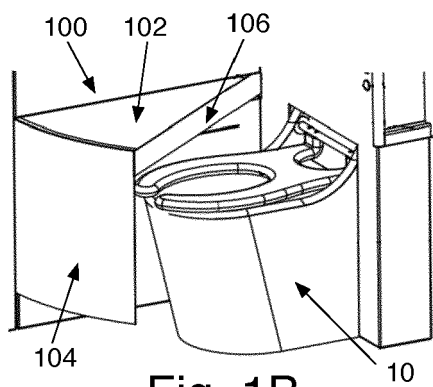


Fig. 1B

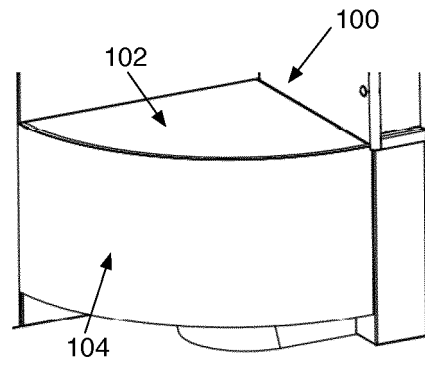


Fig. 1C

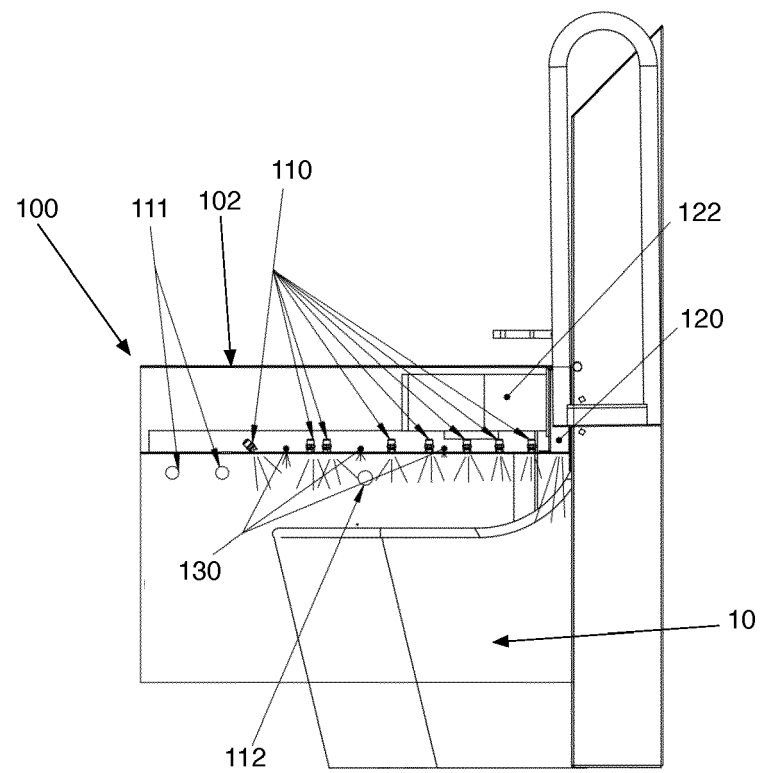
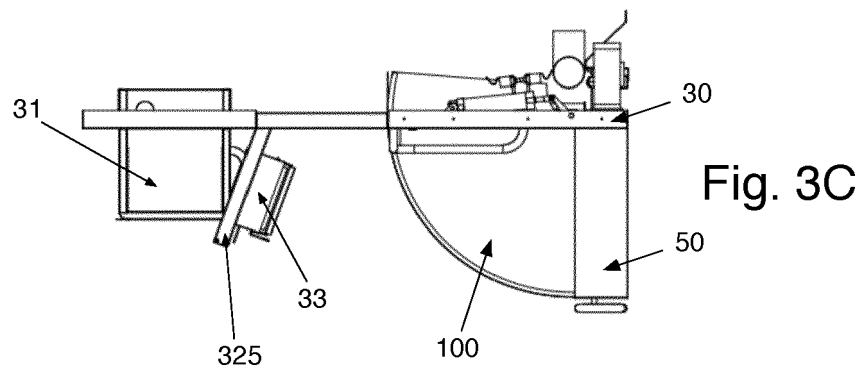
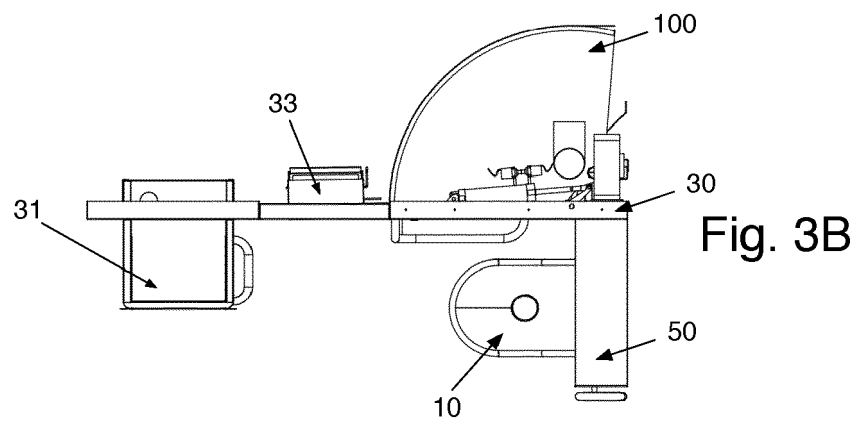
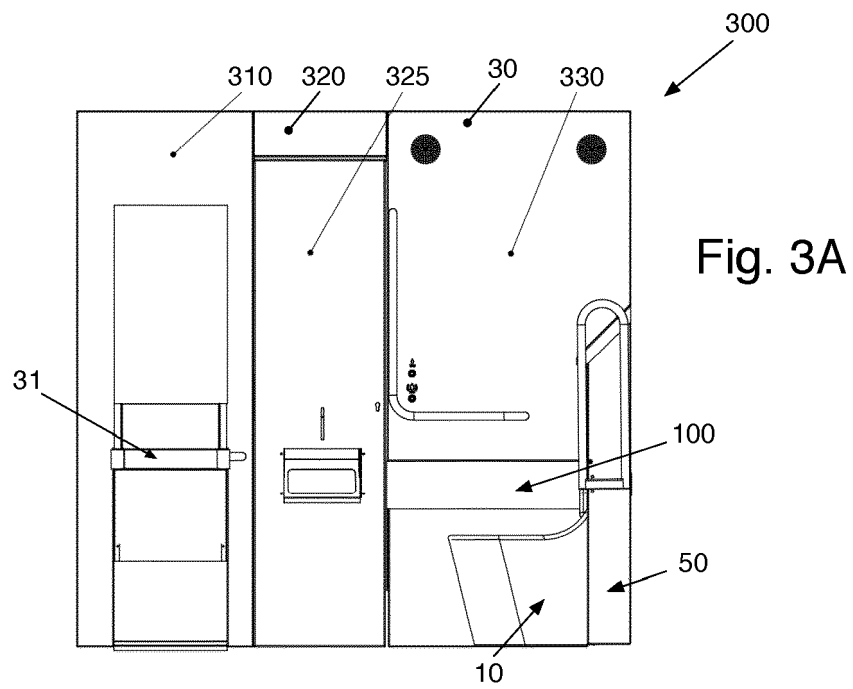


Fig. 2





EUROPEAN SEARCH REPORT

Application Number

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EPO FORM 1503 03.82 (P04C01)

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	US 2009/007328 A1 (FELTRI PAOLO [IT]) 8 January 2009 (2009-01-08)	1, 2, 7-9, 14	INV. E03D9/00
Y	* paragraphs [0001] - [0074]; figures 1-8	3, 10	E04H1/12
A	*	4-6, 11-13	
Y	IT TO20 110 212 A1 (GARZIA GERARDO; SPADA ADRIANO) 11 September 2012 (2012-09-11) * page 18, line 13 - page 20, line 27 *	3, 10	
A	EP 0 517 131 A1 (OTTO GEB KG [DE]) 9 December 1992 (1992-12-09) * abstract; figures 1-3 *	1-14	
A	NL 2 011 150 C2 (CLALECO B V) 15 January 2015 (2015-01-15) * abstract; figures 5A, 5B *	1-14	
A	US 2020/063423 A1 (BRUNO JOCELYN [US]) 27 February 2020 (2020-02-27) * abstract; figure 1 *	1-14	TECHNICAL FIELDS SEARCHED (IPC)
A	WO 95/30801 A1 (SELF CLEANING ENVIRONMENTS USA [US]) 16 November 1995 (1995-11-16) * abstract; figures 1-8 *	1-14	E03D
A	EP 0 274 588 A2 (PT MATIC SPA [IT]) 20 July 1988 (1988-07-20) * abstract; figure 1 *	1-14	
A	EP 2 898 807 A1 (LINEA CITTA S R L [IT]) 29 July 2015 (2015-07-29) * abstract; figures 1-15 *	1-14	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 19 May 2023	Examiner Posavec, Daniel
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			

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

EP 23 02 0041

5

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.

19-05-2023

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009007328 A1	08-01-2009	NONE	

IT T020110212 A1	11-09-2012		

EP 0517131 A1	09-12-1992	AT 117037 T	15-01-1995
		CA 2070479 A1	07-12-1992
		DE 4118588 A1	10-12-1992
		EP 0517131 A1	09-12-1992
		US 5279008 A	18-01-1994

NL 2011150 C2	15-01-2015	NONE	

US 2020063423 A1	27-02-2020	NONE	

WO 9530801 A1	16-11-1995	NONE	

EP 0274588 A2	20-07-1988	EP 0274588 A2	20-07-1988
		IT 1199799 B	30-12-1988

EP 2898807 A1	29-07-2015	NONE	

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EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 5279008 A [0003]
- US 5647074 A [0003]
- US 5857228 A [0003]
- US 5090069 A [0003]
- US 6349430 B [0004]
- US 4881284 A [0005]
- US 3869732 A [0005]
- US 8484772 B [0006]
- US 2605478 A [0006]
- US 5454123 A [0006]
- WO 06048490 A [0006]