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(54) **SELF-CLEANING TOILET**

(57) The invention relates to the hygiene equipment, which can be suitably used in a stand-alone cabin, or in a built-in structure outdoors, or in any premises intended therefor. The self-cleaning toilet comprises a floored cabin having walls and a door, subdivided into the accommodation and technical compartments, the latter having a washing chamber formed therein; and in which compartments mounted is the hygiene equipment including: at least two lavatory pans implemented in the form of a bowl with seats and adapted to be rotated axially by a drive, and an automatic washing system provided with nozzles and a control unit. The toilet further comprises: a support frame disposed between said compartments and adapted to be rotated about said axis, and fences, each one of which fences is implemented as two lateral panels disposed at opposite sides with respect to the vertical axis, coupled to one another and secured on the support frame; the lavatory pans and seats being secured on the support frame and coupled to one another.

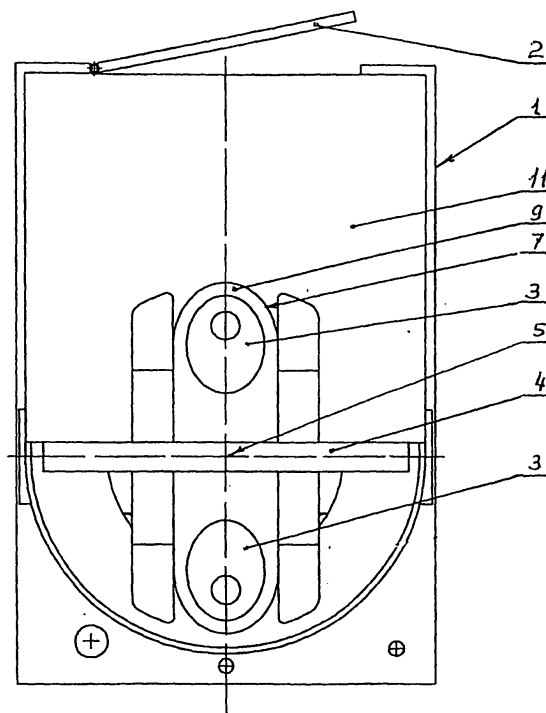


FIG. 1

Description

[0001] The invention relates to the hygiene equipment, which can be suitably used in a stand-alone cabin, or in a built-in structure outdoors, or in any premises intended therefor.

[0002] Known is the self-cleaning toilet, comprising a floored cabin having walls and a door, subdivided into the accommodation and technical compartments, the latter having a washing chamber formed therein; and in which compartments mounted is the hygiene equipment including: at least two lavatory pans implemented in the form of a bowl with seats and adapted to be rotated axially by a drive, and an automatic washing system provided with nozzles and a control unit (RU patent No. 2.123.559 Cl, cl. E 03 C 1/01, 1998). Said toilet is adopted as the most pertinent art with respect to this invention.

[0003] But said known toilet has a rather complicated design, for it has a movable floor having the sophisticated drive and cleaning system, furthermore this prior art has a low performance, i.e. - a low reliability of equipment and poor manufacturability.

[0004] This invention is directed to simplification of the design, improvement of the operation quality and durability to be obtained and achieved using a toilet having the properties that ensure its corrosion resistance and wear resistance, and provide the same with the capability to withstand various unallowable doings, i.e. anti-vandalic properties.

[0005] Said objective is to be accomplished as follows: a self-cleaning toilet, comprising a floored cabin having walls and a door, subdivided into the accommodation and technical compartments, the latter having a washing chamber formed therein; and in which compartments mounted is the hygiene equipment including: at least two lavatory pans implemented in the form of a bowl with seats and adapted to be rotated axially by a drive, an automatic washing system provided with nozzles and a control unit; further has a support frame disposed between said compartments and adapted to be rotated about said axis, and also has fences, each of which comprises two lateral panels positioned at the opposite, with respect to the vertical axis, sides (at the angle determined by a number of lavatory pans), which panels are coupled to one another and secured on the support frame; the lavatory pans and seats being coupled to one another and secured on the support frame.

[0006] Said objective is further accomplished using the following features: said equipment is adapted to be rotated about the vertical axis;
the cabin floor is stationary;
the cabin floor is made of a plastic, for example;
the cabin floor has the internal reinforcement;
the accommodation compartment floor is implemented as a tray having uplifted edges, and has a flat area;
inclination of the accommodation compartment floor flat area is about 1° - 3° towards the technical compartment;
at least some of the nozzles of the automatic washing

system are disposed within the accommodation compartment and face the floor of said compartment;
the bowl of each one of the lavatory pans is made of a ceramic material or metal;

5 said fences can further include a convex central panel that surrounds a lavatory pan;
the fence is symmetric about the plane that extends through the vertical axis (inclusive of arrangement of the panels on the frame);
10 at least a portion of the surface of each one of said lateral panels has the flat shape;
said central panel and said lateral panels can be implemented as separate members made of plastic materials;
said fencing members, at least in some points of their connections, are provided with seals and/or overlap one another;
15 at least some fencing members have the internal reinforcement;
said fencing members and the frame are coupled to one another using threaded fastening members.
20

[0007] The essence of the invention is explained by drawings, wherein:

Fig. 1 - top view of the toilet according to the invention;
Fig. 2 - a portion of the design - frontal view;
Fig. 3 - a fragmentary view (arrow A in Fig. 2);
Fig. 4 - a general (spatial) view.

30 **[0008]** The self-cleaning toilet wherein the equipment according to this invention is mounted, comprises cabin 1 having door 2. Cabin 1 is made of aluminium structures, is subdivided into the accommodation and technical compartments; in its accommodation compartment disposed are at least two lavatory pans 3 secured on support frame 4, which frame is made of a metal and disposed between said compartments. Each one of lavatory pans 3 is a standard commercial article, has the shape of a bowl and is made of a ceramic material or metal to comply with the hygienic requirements as much as possible, to be serviced conveniently and to ensure its reliability. Each one of lavatory pans 3 is connected to a sewerage system (not shown), secured on frame 4 positioned along vertical axis 5, and is adapted to be rotated via a drive (not shown). Fence 6 is also secured on frame 4. Fence 6 is implemented as lateral panels 8 disposed at the opposite (different) sides with respect to vertical axis 5; and in a particular embodiment - in conjunction with central convex panel 7 that encloses lavatory pan 3, and with seat 9 that covers the upper surface of the lavatory pan bowl side and constitutes a fence that encloses a lavatory pan. Panels 7 and 8 are interconnected and secured on support frame 4. In this example: said constituents of the fence are implemented as separate members, and they, at least at some points of their connections, are provided with seals and/or overlap one another (not shown), and they are coupled to one another and to the frame using threaded fastening members - screws 10 (Fig. 3). Ac-

cording to another modification of its design, the fence can be implemented as an integral unit connected to frame 4 in the same manner. All the members that comprise fence 6, or some of said members, are made of a plastic material and have the internal reinforcement, in particular they are reinforced by a metal mesh (not shown). At least a portion of each one of lateral panels 8 has the flat shape. Each fence is symmetrical about the plane that extends through the vertical axis. For convenient use, the toilet is provided with two foot-rests disposed at both sides of each one of the lavatory pans and slightly below the upper edge of its bowl bead, and secured on frame 4. The cabin has stationary floor 11 in the form of a tray with uplifted edges (trough-shaped), which tray has an anti-skid surface, for example - a corrugated surface. The accommodation compartment floor has a flat area disposed with an inclination towards the technical compartment. An inclination value does not exceed 5 degrees and advantageously is within 1 - 3 degrees. The floor is made of a plastic material, which advantageously is an impact-proof plastic, and also can have an internal reinforcement. Some nozzles 12 of the automatic washing system are disposed within the accommodation compartment and face the floor of said compartment; and at least some of the nozzles disposed within the accommodation compartment are adapted to be rotated in the vertical plane. Operation of this toilet is controlled and supervised using a microcontroller positioned in the technical compartment, and using a system of sensors (not shown) that allow: determine the presence of a user, monitor a temperature, establish communication with an operator, provide anti-vandalic protection and door locking, eliminate failures, transmit voice messages and any tunes. The toilet is provided with a wash-stand capable of delivering a liquid soap, water and air for hand drying, with a covered paper holder, a clothes hanger. Washing heads for washing, disinfecting; and an equipment drying fan are also provided for (not shown).

[0009] It will be obvious to a person skilled in the art that within the scope of this invention, some assemblies of the toilet can also have a different constructional implementation, which implementation will be determined by a number of lavatory pans 3 more than two, for example - three or four pans. In this case, there is no any basic difference in design of the toilet assemblies: a number of the points of securing of a selected number of lavatory pans will change, thus defining a shape of frame 4 and an angle of positioning of the fencing panels, which angle will be 120° and 90° respectively; and the surface area of the accommodation compartment may change (reduced) as well. The main constructional members, that is - a drive, automatic washing system with nozzles, floor, accommodation and technical compartments, including lavatory pans, seats, and arrangement and attachment of the fence 8 lateral panels on the support frame - will not change any way; and a person skilled in the art will not encounter any difficulties in devising the support frame having a required number of identical locations

(exactly the same as in the two-pan case) for securing a selected number of lavatory pans; and said main constructional members are entirely encompassed by the technical solution described herein. An increased number of lavatory pans allows improve, to an extent, durability of the toilet and its performance, and somewhat shorten the time needed for preparing the equipment for its use.

[0010] The toilet according to the invention is operated as follows.

[0011] A user inserts into a receptacle a token, money or a card that allow use a cabin, then the receptacle transmits a signal to a microcontroller to unlatch (unlock) door 2. The door is opened and closed by the user; when the user exits, the door will be locked automatically. The receptacle's display will indicate the "occupied" sign, and in this period (when the user is in the accommodation compartment), the interior lights in the cabin automatically remain lit. Once lavatory pan 3 has been used, the same is flushed automatically. The user may use a wash-stand and dry his/her hands afterwards. Once the user has left the cabin and the same become unoccupied, lavatory pan 3 rotates by 180° to be cleansed, and is replaced with a second lavatory pan, that was cleansed and dried before. In case of use of a toilet having any other number of lavatory pans, for example - four pans, the rotation angle significantly decreases and will be, accordingly, 90° (in case of the three-section design of the toilet, the rotation angle will be, accordingly, 120°). Floor 11 in the accommodation compartment is treated using a cleansing-disinfecting solution delivered through nozzles 12 to prepare the cabin for next user actually immediately after a previous user has left the same. This condition of the cabin is indicated by the "free" sign on its display.

[0012] The presence of a fence made of a plastic material on each ceramic lavatory pan 3 increases its service life, for the most vulnerable part of the equipment - the bowl - is securely protected against any external unallowable mechanical actions. Further, fence 6, that is secured on frame 4, ensures stability and equilibrium of the entire design both in its stationary state and when it is rotated. Thus, even in the event of any unallowable doings, such as vandalism, the design according to this invention improves ability of the most vulnerable parts thereof to withstand such doings.

[0013] As the cleansing and drying of the toilet parts are done simultaneously with use thereof, the time taken for preparing the toilet for next user - according to the test results - is as short as less than 20 seconds (with an increased number of lavatory pans this time period will be briefer: about 15 s for three lavatory pans, 1 and 10 s for four lavatory pans; and under these circumstances the workload imposed upon the equipment will be significantly reduced).

[0014] For regular maintenance of the toilet and for adjusting its systems, the special "maintenance" mode is provided for. In this mode, the toilet systems are con-

trolled also from the microcontroller with the use of switches.

[0015] The claimed toilet has improved operation properties, allows efficient operations for cleansing and hygienically treating the same, is inexpensive owing to use of cheap materials and commercially available stock components.

Claims

1. A self-cleaning toilet, comprising a floored cabin having walls and a door, subdivided into the accommodation and technical compartments, the latter having a washing chamber formed therein; and in which compartments mounted is the hygiene equipment including: at least two lavatory pans implemented in the form of a bowl with seats and adapted to be rotated axially by a drive, and an automatic washing system provided with nozzles and a control unit; **characterised in that** said toilet further has a support frame disposed between said compartments and adapted to be rotated about said axis, and also has fences, each of which fences comprises two lateral panels disposed at the opposite, with respect to the vertical axis, sides, which panels are coupled to one another and secured on the support frame; the lavatory pans and seats being coupled to one another and secured on the support frame.
2. The toilet as claimed in claim 1, wherein said equipment is mounted to be capable of rotating about the vertical axle.
3. The toilet as claimed in claim 2, wherein the cabin floor is stationary.
4. The toilet as claimed in claim 2, wherein the cabin floor is made of a plastic material.
5. The toilet as claimed in claim 4, wherein the cabin floor has the internal reinforcement.
6. The toilet as claimed in claim 1, wherein the accommodation compartment floor is implemented in the form of a tray having uplifted edges, and has a flat area.
7. The toilet as claimed in claim 6, wherein inclination of the flat area of the floor accommodation compartment is within 1° - 3° towards the technical compartment.
8. The toilet as claimed in claim 3, wherein at least some nozzles of the automatic washing system are disposed within the accommodation compartment and face the floor of said compartment.

9. The toilet as claimed in claim 8, wherein at least some said nozzles disposed within the accommodation compartment are adapted to be rotated in the vertical plane.
10. The toilet as claimed in claim 1, wherein the bowl of each one of the lavatory pans is made of a ceramic material.
11. The toilet as claimed in claim 1, wherein the bowl of each one of lavatory pans is made of a metal.
12. The toilet as claimed in claim 10, **characterised in that** said fences further include a convex central panel that encloses the lavatory pan.
13. The toilet as claimed in claim 1, **characterised in that** the fence is symmetric about the plane that extends through the vertical axis.
14. The toilet as claimed in claim 1, **characterised in that** at least a portion of the surface of each one of said lateral panels has the flat shape.
15. The toilet as claimed in claim 1, **characterised in that** said central panel and said lateral panels are implemented in the form of separate members made of plastic materials.
16. The toilet as claimed in claim 15, **characterised in that** said fencing members at least at some points of their connections are provided with seals and/or overlap one another.
17. The toilet as claimed in claims 12 or 15, **characterised in that** at least some fencing members have the internal reinforcement.
18. The toilet as claimed in claims 12 or 15, **characterised in that** said fencing members and the frame are coupled to one another using threaded fastening members.

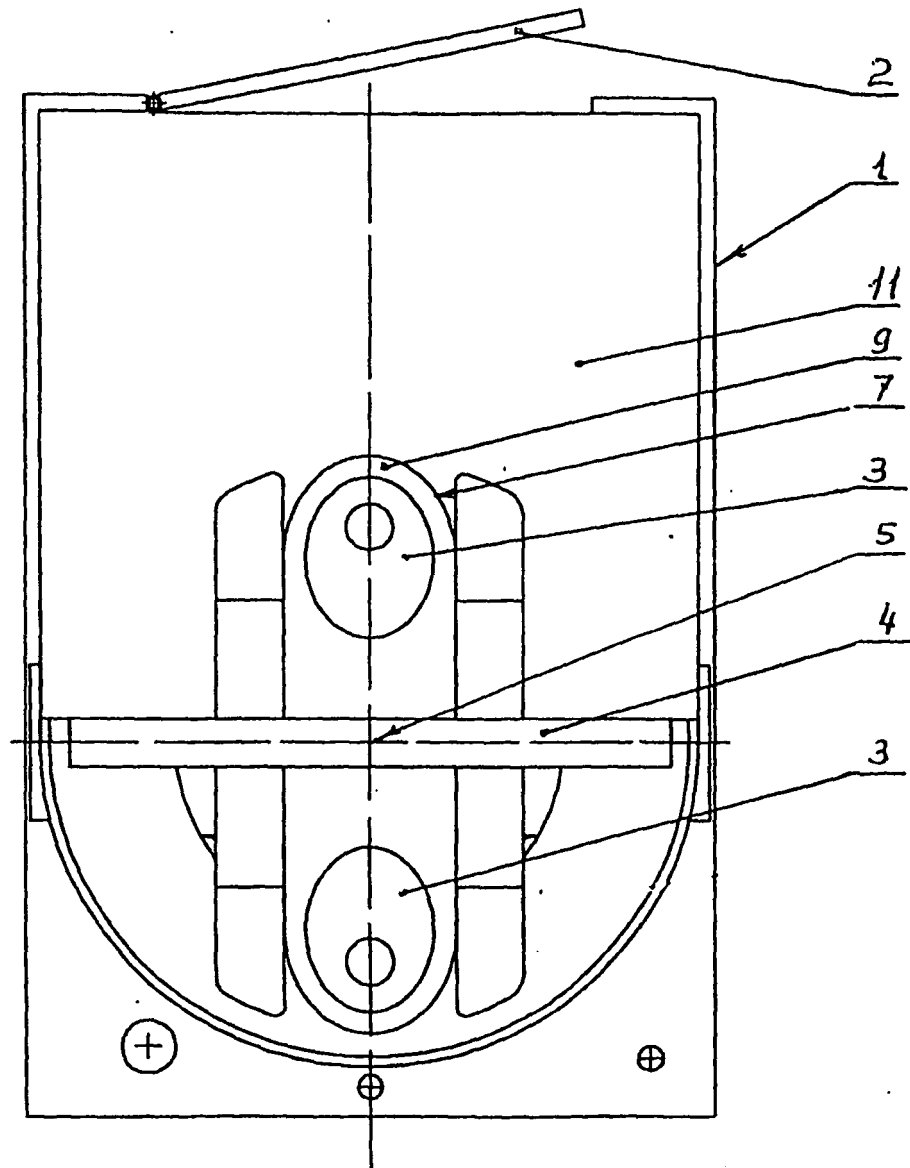


FIG. 1

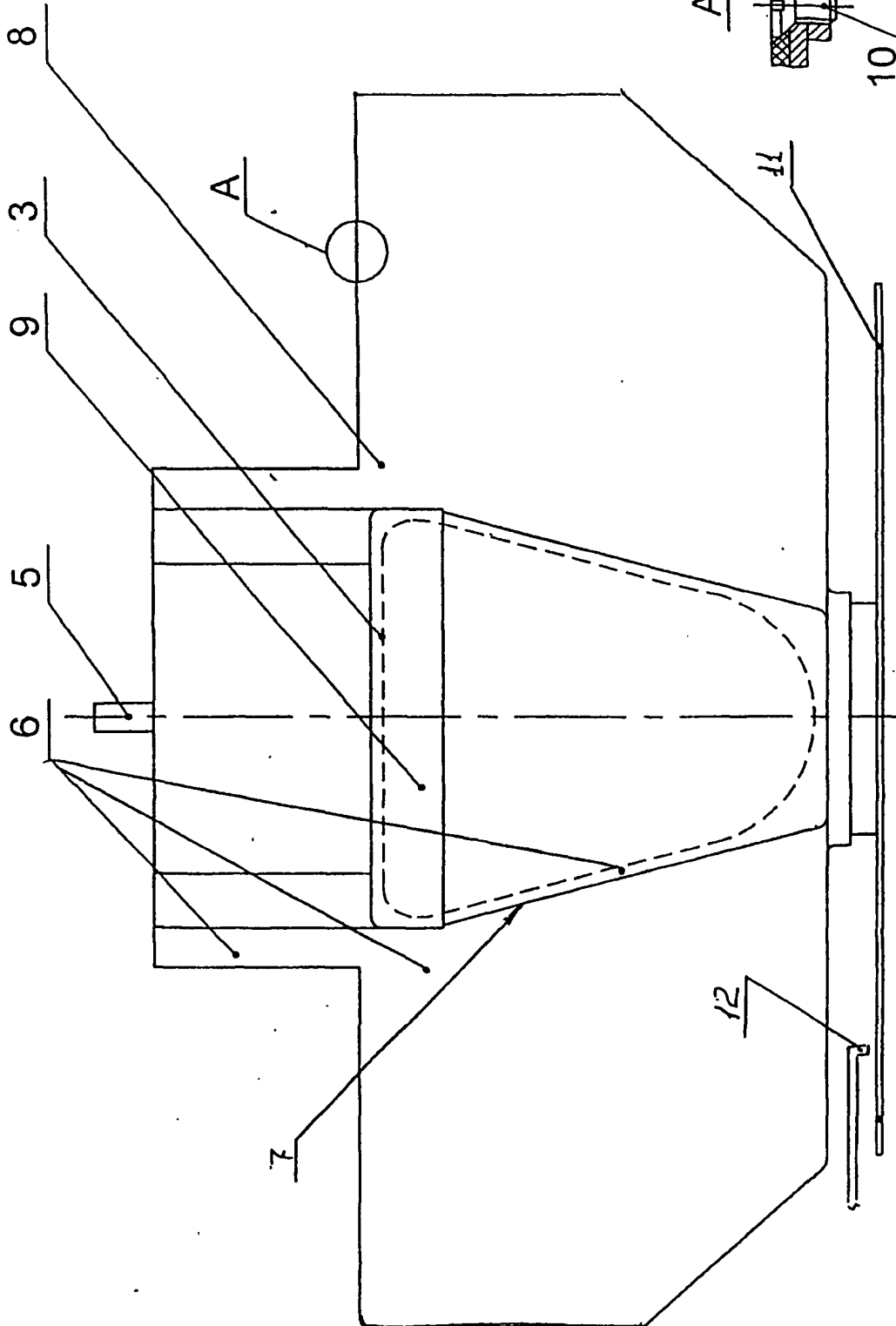


FIG. 2

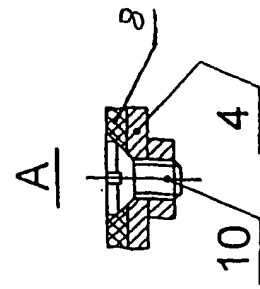


FIG. 3

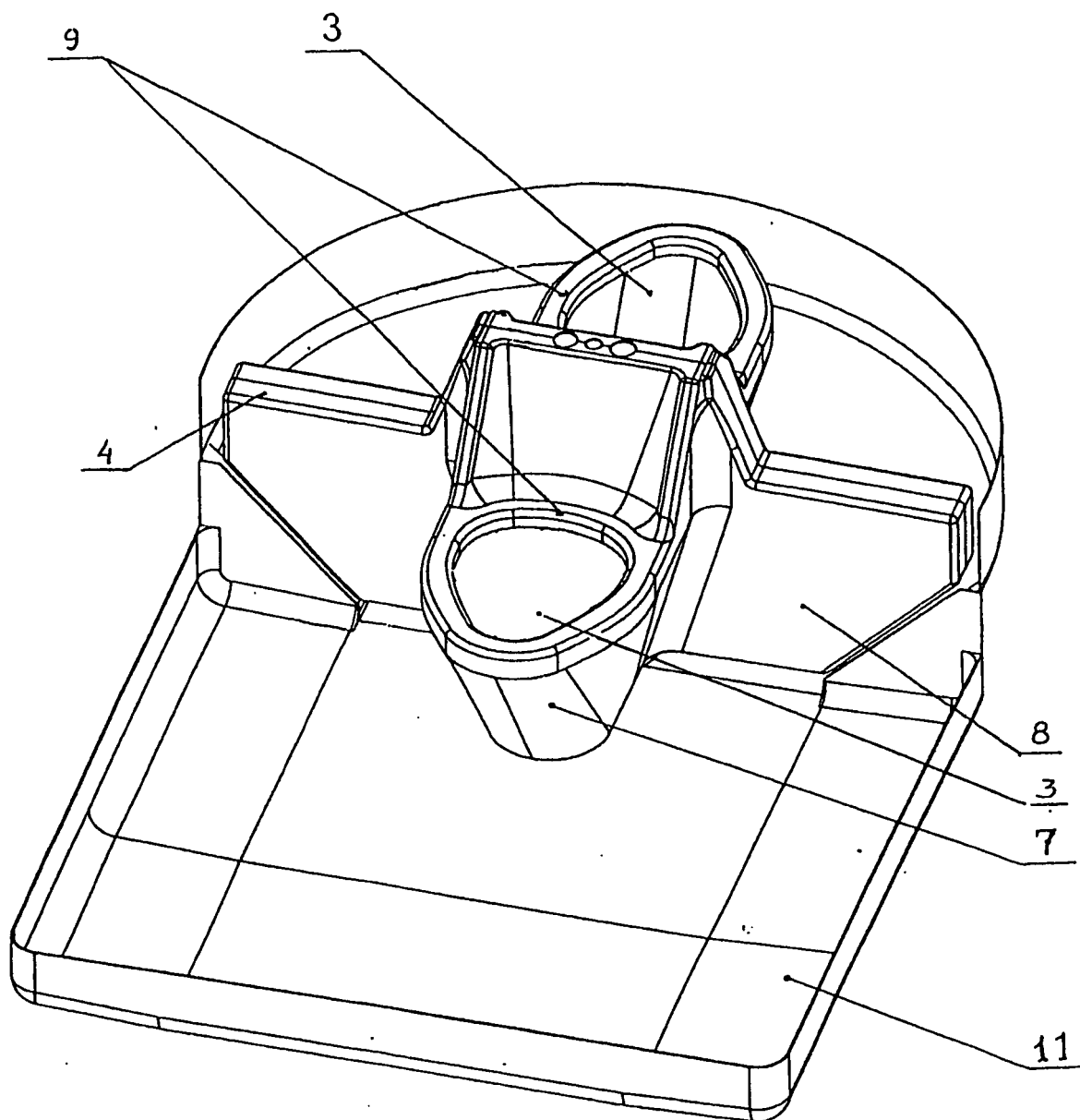


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/RU 2005/000072

A. CLASSIFICATION OF SUBJECT MATTER		
E03C 1/01, E03D 11/00, A47K 4/00		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
E03C 1/00-1/02, 1/05, 1/12, E03D 9/00, 11/00, 11/12, A47K 4/00, 11/00, 13/00, 17/00, 17/02		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	RU 2123559 C1 (ZAVALKOVSKY GRIGORY NAUMOVICH) 20. 12. 1998	1-18
A	SU 353444 A1 (RENE BUSHE) 24. 10. 1972	1-18
A	RU 6681 U1 (OBSHESTVO S OGRANICHENNOI OTVETSTVENNOSTIJU "TSIRKON-VAGON") 16. 06. 1998	1-18
A	DE 4400049 A1 (LUTHNER METALL-RECYCLING) 06. 07. 1995	1-18
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>		
Date of the actual completion of the international search		Date of mailing of the international search report
28 April 2005 (28.04.2005)		19 May 2005 (19.05.2005)
Name and mailing address of the ISA/		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- RU 2123559 [0002]