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(54) An automatic public toilet

(57) The present invention relates to an automatic public toilet for outdoor use having a public area (2) confined by a roof (3), four walls (5-8) and a floor (4), and comprising a lavatory unit (10) including a toilet seat (25) and bowl, and a sink (11), the lavatory unit and the sink being supported on a wall (8 and 6, respectively) of

the toilet. According to the invention the lavatory unit (10), the sink (11) and the floor (4) have separate devices (26,24,17,18) for automatic cleaning thereof.

The invention also relates to a floor for such a toilet.

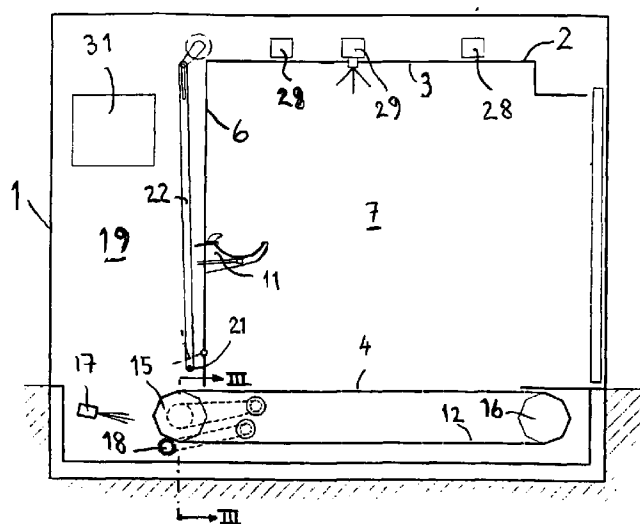


FIG. 1

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an automatic public toilet for outdoor use having a public area confined by a roof, four walls and a floor, and comprising a lavatory unit including a toilet seat and bowl, and a sink, the lavatory unit and the sink being supported on a wall of the toilet, and especially to a floor for such a toilet.

[0002] In order to provide a fresh and hygienic appearance for the user thereof, public toilets of the kind referred to above are automatically cleaned after use. A lavatory unit with an automatic cleaning device is known from EP-B1- 0 179 725, for example. Another self-cleaning lavatory unit is commercialised by Sanitaire Equipement, France under the trade mark HYGIFLO®. JCDecaux, France commercializes an automatic public toilet in which the floor and the wall supporting the lavatory unit are tilted during cleaning, the cleaning of the lavatory unit and the floor being made with the same cleaning device. Such a cleaning device makes use of a lot of water for cleaning and demands also a powerful drying device for drying after cleaning.

[0003] The object of the present invention is to improve a toilet of the aforementioned kind in order to ensure that all components used by the public are automatically cleaned and in order to minimise the amount of water necessary for cleaning.

SUMMARY OF THE INVENTION

[0004] This object is achieved by an automatic public toilet for outdoor use having a public area confined by a roof, four walls and a floor, and comprising a lavatory unit including a toilet seat and bowl, and a sink, the lavatory unit and the sink being supported on a wall of the toilet, characterized in that the lavatory unit, the sink and the floor have separate devices for automatic cleaning thereof. In such a toilet all components used by the public are automatically cleaned and since a separate cleaning device is provided for each component, the amount of cleaning liquid necessary can be minimised for each component to be cleaned.

[0005] In a preferred embodiment the floor is movable into and out of the public area of the toilet and the cleaning device for the floor is placed outside the public area. Such a floor ensures that objects left on the floor by a user can be removed from the public area. Moreover, the cleaning device does not intrude on the space available in the public area.

[0006] Advantageously, the floor consists of the upper part of an endless chain conveyer driven by a chain wheel. Moreover, the floor is made up of a row of planks having the same width as the links in the chain of the conveyer, the row of planks extending around the whole periphery of the endless chain conveyer. The planks have such a width that no gap exist between opposite

longitudinal edges of adjacent planks, the longitudinal edges of the planks being undercut in such a way that opposite longitudinal edges of adjacent planks lie tight together also during the planks passage over the chain wheel. The upper part of the endless conveyer passes under a wall of the toilet when the floor is moved out of the public area and the lower part of said wall is upwardly swingable in order to permit objects left on the floor to pass under the wall when the floor is moved out of the public area.

[0007] The present invention is also related to a floor for an automatic public toilet for outdoor use having a public area confined by a roof, four walls and a floor, and comprising a lavatory unit including a toilet seat and bowl, and a sink, the lavatory unit and the sink being supported on a wall of the toilet, characterized in that the floor is movable into and out of the public area of the toilet and the cleaning device for the floor is placed outside the public area.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The invention will now be described with reference to the enclosed figures, of which;

Fig. 1 is a schematic side view of an embodiment of an automatic public toilet according to the invention, the inner and outer side walls facing the viewer of Figure 1 being removed,

Fig. 2 is a schematic planar view of the toilet in Figure 1 with the inner and outer roofs removed,

Fig. 3 is a sectional view along line III-III in Figure 1,

Fig. 4 is a schematic side view of the end part of the endless floor and the cleaning device thereof,

Fig. 5A,B show the opposing end parts of adjacent floor planks in horizontal position of the planks and in an inclined position due to passage around the chain wheel, respectively,

Fig. 6 is a planar view of a portion of the floor and the chain,

Fig. 7 and 8 show the left portion of Figure 1 with the left inner wall in two different positions,

Fig. 9 is a schematic sectional side view of the sink and its cleaning device,

Fig. 10 is a partly sectional rear view of a portion of the toilet of Figure 1 with the outer walls and the rear inner wall removed, and

Figs. 11 and 12 disclose a perspective view of a self-cleaning lavatory unit used in the shown

embodiment of the invention in use condition and cleaning condition, respectively.

DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

[0009] The automatic public toilet disclosed in the figures consists of an outer shell 1 enclosing an inner shell 2 having a roof 3, a floor 4, a front wall 5, a rear wall 6 and two side walls 7 and 8. The inside of the inner shell 2 defines the public area of the toilet, i.e. the space available for the user of the toilet. A sliding door 9 permits access to the public area.

[0010] A lavatory unit 10 and a sink 11 are contained in the public area supported by the rear wall 6 and the side wall 8, respectively.

[0011] The floor 4 consists of the upper part of an endless chain conveyer 12 supported by a pair of drive wheels 15 and a pair of support wheels 16 and is made up of a continuous row of planks 13 attached to the links 14 of the driven chains of the chain conveyer. The width of the planks corresponds to the length of the chain link 14 so that the longitudinal edges of adjacent planks 13 lie tight together, as is evident from Figure 6 disclosing a portion of the upper part of the conveyer 12 seen from above. In the Figures only one drive chain is disclosed but each of the planks 13 is attached to a chain link 14 in both of the short ends thereof. In Figure 5B, the longitudinal edges of two adjacent planks 13 are shown in a sectional view. In order to permit the bending of the chain when passing over the drive wheels 15 and the support wheels 16, the longitudinal edges of the planks 13 are undercut so that the planks can follow the bending of the chain as is illustrated in Figure 5A. Such an undercutting of the longitudinal edges of the planks makes it possible to ensure that no gap will exist between the longitudinal edges of adjacent planks 13 in the conveyer. From Figure 5A and 5B one realizes that the pivot axis through two opposite chain links 14 passes close to the uppermost portion of the longitudinal edges of the two adjacent planks 13 illustrated in these Figures.

[0012] In Figures 1 and 4 a cleaning device for cleaning the floor 4 is shown. This device consists of a spray nozzle 17 and a brush 18 placed outside of the public area in the space between the rear walls of the outer and inner shells 1 and 2. This space constitutes a service area 19 accessible by a door 20. The floor cleaning device also includes conduits (not shown) for feeding cleaning liquid to the spray nozzle and means for regulating the device (not shown). Such conduits and regulating means are well known to the skilled man and a detailed description thereof need not burden this text.

[0013] The endless chain conveyer 12 is supported by the outer shell 2 via weight sensors, schematically indicated by the reference numeral 30 in the Figures. Thereby, the presence of a person on the floor 4 can be

automatically determined.

[0014] In Figure 9, the sink 11 and its cleaning device are schematically shown. The sink is recessed and have an outlet 23 leading to a sewage tank (not shown) or the like located in the service area 19. The sink has two taps, one for water and soap and another for air-drying, both taps being operated by sensors, photo-cells, for example, detecting the presence of the hands of a user. Around the upper edge of the recessed sink 11 a ring-shaped tube is running. This tube is provided with downwardly directed perforations and connected with an inlet conduit 24 for pressurized cleaning liquid. When cleaning liquid is fed to the tube via the inlet conduit 24, jets of cleaning liquid are sprayed onto the inside of the sink. The pattern of perforations can be different in different portions of the tube in order to obtain an even distribution of the cleaning liquid.

[0015] In Figures 10-12 the lavatory unit used in the embodiment shown is disclosed. This lavatory unit 10 is a self-cleaning lavatory unit commercialized by Sanitaire Equipement, France under the trade mark HYGI-FLO[®]. The cleaning device of this unit consists essentially of a rotatable seat 25, a wiper 26 and an outlet for cleaning liquid located immediately before the wiper in the direction of movement of the seat 25. The wiper and outlet are swingable from an inactive position shown in Figure 11 to an active position shown in Figure 12. The self-cleaning device includes of course also regulating means for the operation thereof. A button 27 permits manual flushing of the unit by the user. The lavatory unit is supported by the wall 8 via weight sensors so that the presence of a person sitting on the seat 25 can be detected.

[0016] The lower portion 21 of the rear wall 6 of the inner shell 2 is swingable from a vertical to a horizontal position by a motor driven link arm 22. In Figure 7 the lower portion 21 is shown in its horizontal position. In Figure 8, a safety feature of the operating mechanism of the lower portion 21 of wall 6 is illustrated, namely that the link arm 22 is slidably connected to its drive mechanism thereby permitting the lower portion 21 to take a position between its open (horizontal) and closed (vertical) positions if an object O obstructs the closing of portion 21.

[0017] In the roof 3, movement sensors 28 are installed as well as a disinfection spraying device 29. In the service area 19, a control device 31, for example a microprocessor, controlling all operations of the door 9, the floor 4 and all cleaning devices is installed. All information from the different sensors is fed to this device.

[0018] The automatic public toilet functions in the following way. A person wanting to use the toilet inserts a coin in a coin slot of a coin apparatus accessible from the outside of the toilet. Access to the toilet is thereby allowed for a certain time, for example twenty minutes. When the user of the toilet has left the public area, which is automatically determined with the help of the different sensors installed therein, the control device 31

initiates the self-cleaning devices for the lavatory unit, the sink and the floor as well as the activation of the endless conveyer, thereby substituting the upper part thereof with the already cleaned lower part. During these operations the public area is closed to the public and this fact is indicated by a sign or the like on the outside of the toilet. When the cleaning operations are finished followed by a possible drying of the public area with hot air or of the cleaned object by individual drying devices, the toilet is ready to be used again.

[0019] In the floor cleaning device of the present invention, parts of the moving floor successively are brought before the cleaning device. This means that only a part of the floor must be covered by the spray nozzle 17. Furthermore, the cleaning device is located outside the public area. Thereby the spray device can be designed to eject cleaning jets under considerable pressure against the floor without any risk for splashing the walls of the public area with dirty water. Moreover, since only a part of the floor is cleaned at a time, the cleaning device can be made small, thereby enabling considerable savings of cleaning liquid by reuse thereof during each cleaning cycle for the floor. In order to enhance the removal of cleaning liquid from the lower part of the conveyer 12 wiper means can optionally be arranged after the brush 18 as seen in the movement direction of the conveyer. Such wiper means will also ensure that the lower part is sufficiently dry when successively substituting the upper part during the next cleaning cycle thereof and thereby becoming the floor of the public area.

[0020] The lower portion 21 of the wall 6, which is uplifted during the cleaning cycle for the floor, ensures that objects left on the floor by a user of the toilet will be brought out of the public area and will fall off the conveyer before cleaning liquid is sprayed thereon by the nozzle 17.

[0021] The described embodiment can be modified in several ways within the scope of the present invention. A nursery table supported via weight sensors on one of the walls of the public area can for example be included in the toilet. Furthermore, lavatory units and sinks of different types and/or having different self-cleaning devices than in the disclosed embodiment can of course be used. It is also possible, but not preferable, to use other types of movable floors. The scope of the invention shall therefore only be limited by the wording of the enclosed set of Claims

Claims

1. An automatic public toilet for outdoor use having a public area (2) confined by a roof (3), four walls (5-8) and a floor (4), and comprising a lavatory unit (10) including a toilet seat (25) and bowl, and a sink (11), the lavatory unit and the sink being supported on a wall (8 and 6, respectively) of the toilet, **characterized in that** the lavatory unit (10), the sink

(11) and the floor (4) have separate devices (26,24,17,18) for automatic cleaning thereof.

2. A toilet according to Claim 1, **characterized in that** the floor (4) is movable into and out of the public area (2) of the toilet and the cleaning device (17,18) for the floor is placed outside the public area.
3. A toilet according to Claim 2, **characterized in that** the floor (4) consists of the upper part of an endless conveyer (12)
4. A toilet according to Claim 3, **characterized in that** the endless conveyer (12) is a chain conveyer driven by a chain wheel (15) and in that the floor (4) is made up of a row of planks (13) having the same width as the links (14) in the chain of the conveyer (12), the row of planks extending around the whole periphery of the endless chain conveyer.
5. A toilet according to Claim 4, **characterized in that** the planks (13) have such a width that no gap exist between opposite longitudinal edges of adjacent planks, the longitudinal edges of the planks being undercut in such a way that opposite longitudinal edges of adjacent planks lie tight together also during the planks passage of the chain wheel (15).
6. A toilet according to Claim 5, **characterized in that** the upper part of the endless conveyer (12) passes under a wall (6) of the toilet when the floor (4) is moved out of the public area (2) and in that the lower part (21) of said wall is upwardly swingable in order to permit objects (O) left on the floor to pass under the wall when the floor is moved out of the public area (2).
7. A floor (4) for an automatic public toilet for outdoor use having a public area (2) confined by a roof (3), four walls (5-8) and a floor (4), and comprising a lavatory unit (10) including a toilet seat (25) and bowl, and a sink (11), the lavatory unit and the sink being supported on a wall (8 and 6, respectively) of the toilet, **characterized in that** the floor (4) is movable into and out of the public area (2) of the toilet and the cleaning device (17,18) for the floor is placed outside the public area.

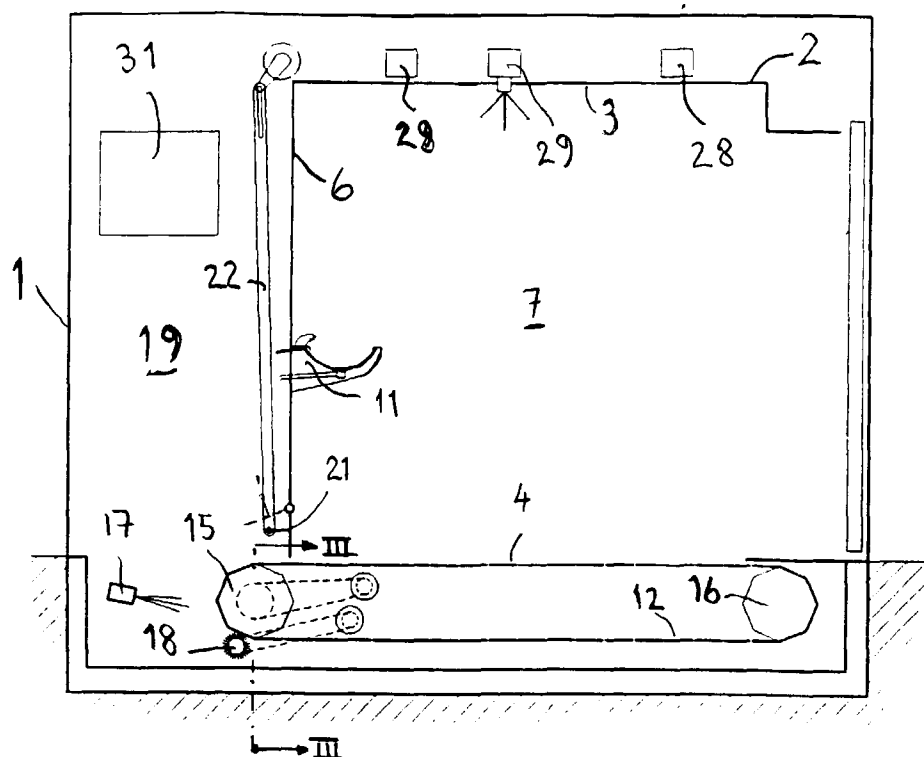


FIG. 1

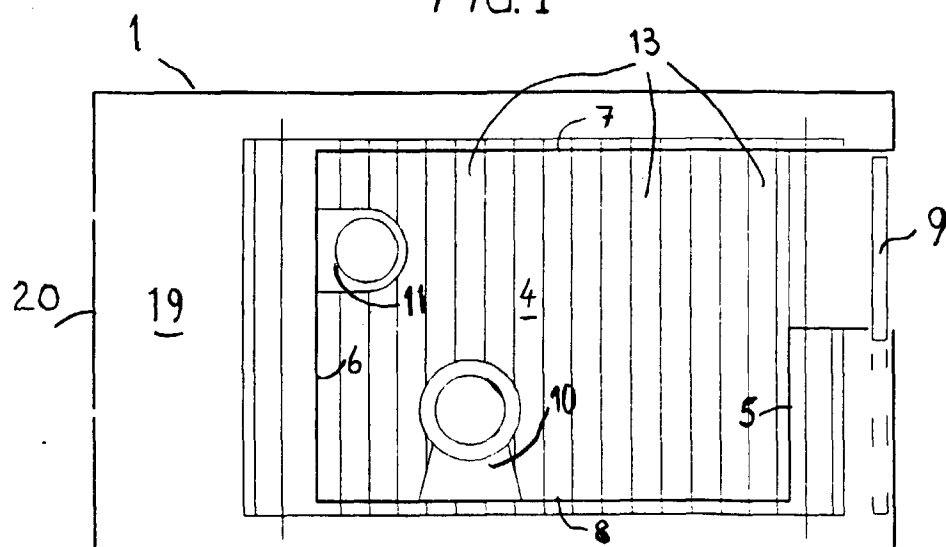


FIG. 2

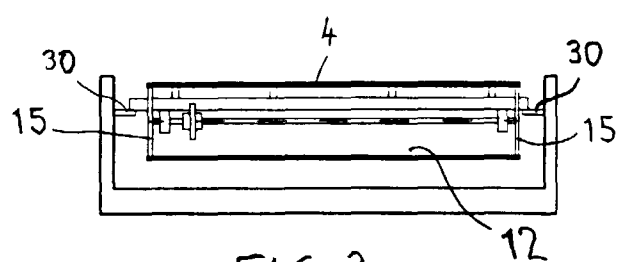
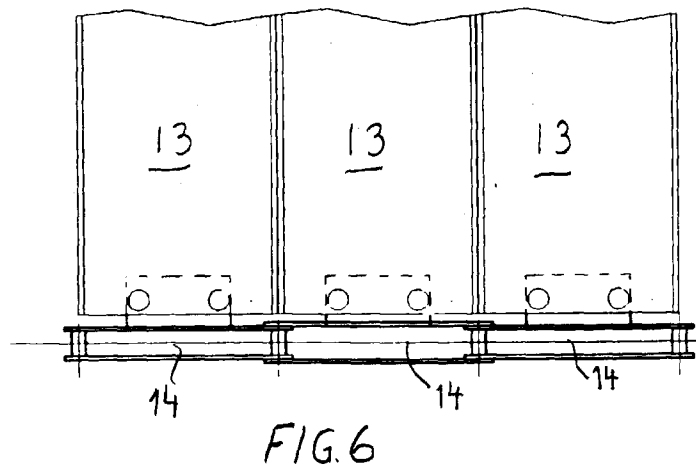
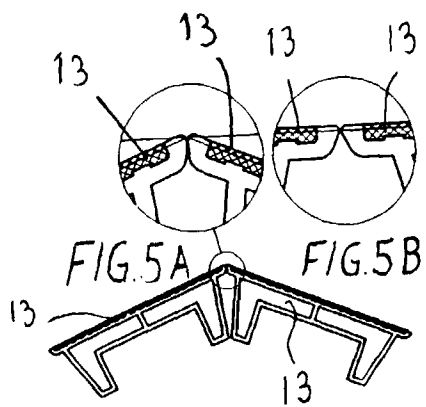
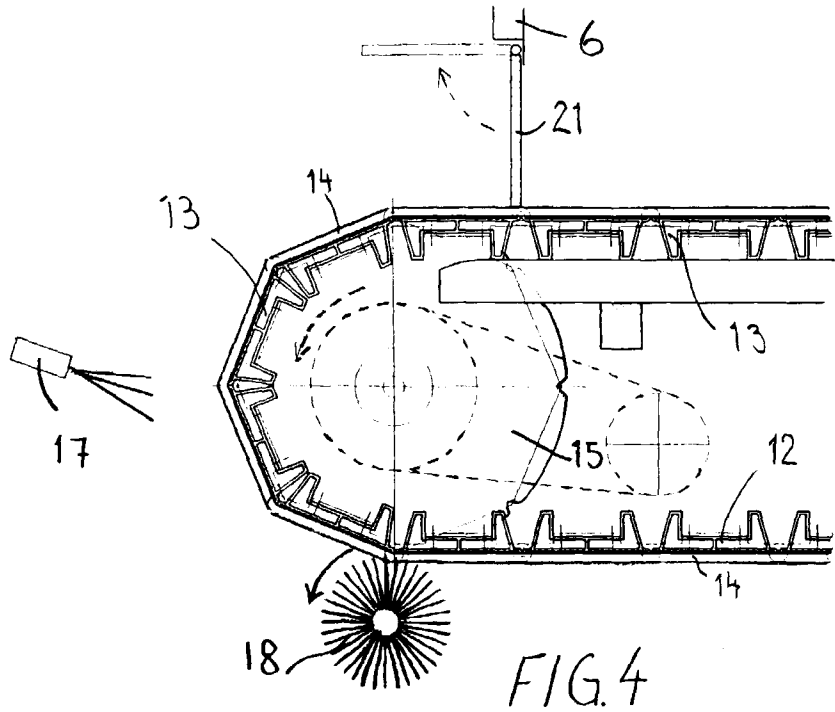


FIG. 3



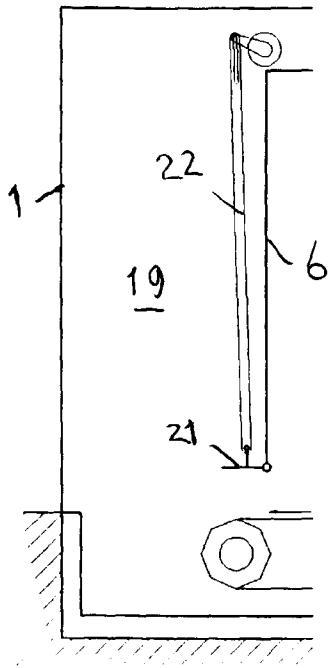


FIG. 7

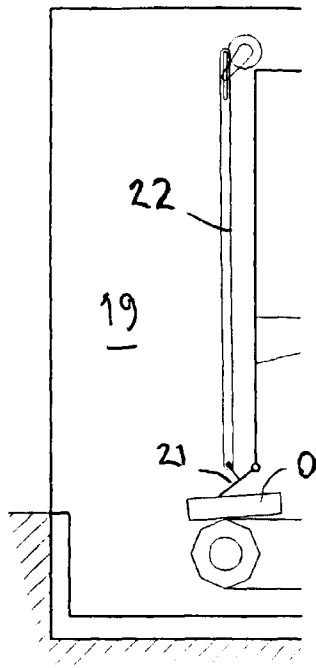


FIG. 8

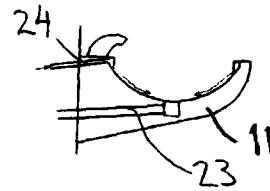


FIG. 9

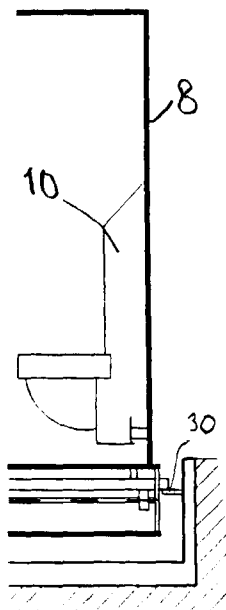


FIG. 10

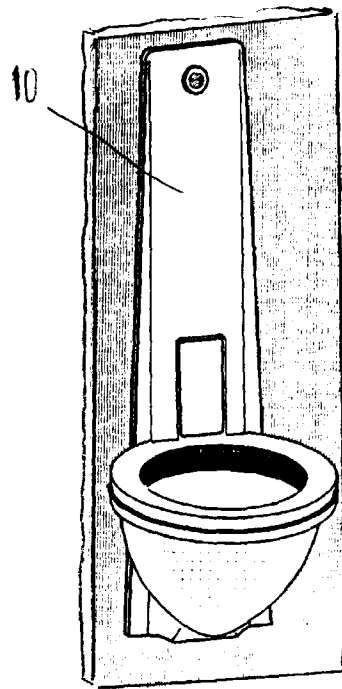


FIG. 11

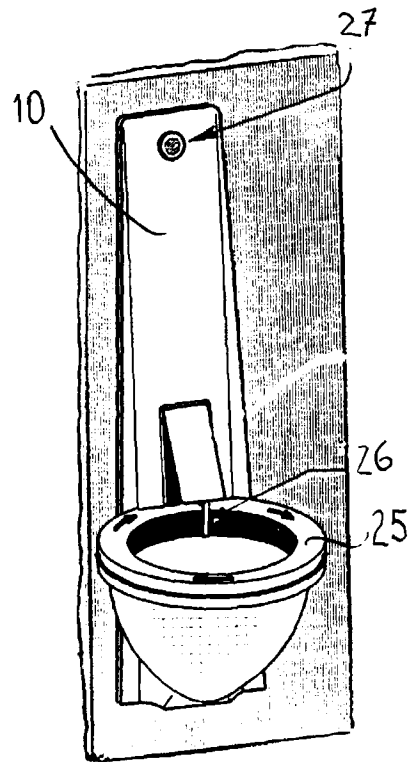


FIG. 12



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 98 85 0055

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE 40 06 676 A (GEBR. OTTO KG) 5 September 1991 * column 2, line 25 - column 3, line 51; figures *	1-3,7	E03D9/00
X	WO 94 01627 A (BEL & TOM INDUSTRIES LTD.) 20 January 1994 * page 10, line 28 - line 34 * * page 19, line 24 - line 36; figures 2,4,10 * * page 11, line 23 - page 12, line 3 * * page 13, line 3 - line 16 *	1-3,7	
X	US 3 755 826 A (ROBERTS) 4 September 1973 * column 2, line 8 - line 61; figures 1-3 *	1	
X	US 3 742 520 A (BERNARDI) 3 July 1973 * column 2, line 36 - column 3, line 33; figure *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E03D B65G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 September 1998	Examiner De Coene, P
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