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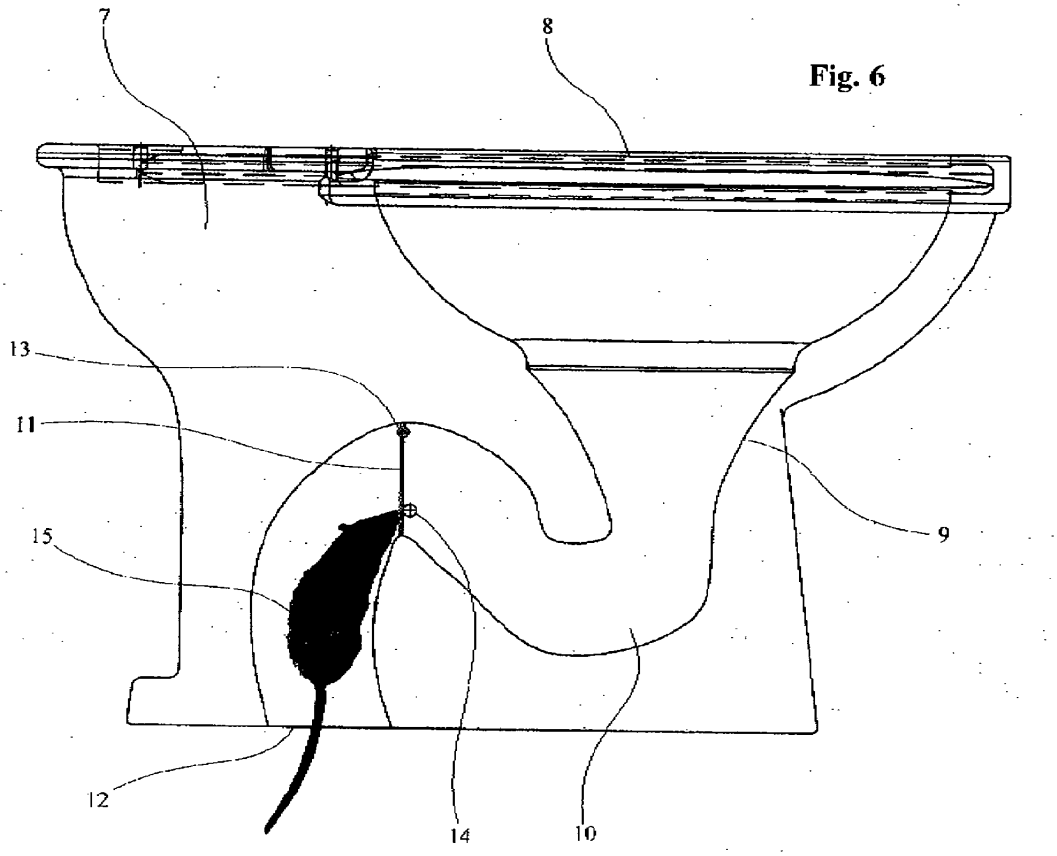
(71) Applicant: **Perdoncin, Benedetto**
35030 Vo' Euganeo (Padova) (IT)

(72) Inventor: **Perdoncin, Benedetto**
35030 Vo' Euganeo (Padova) (IT)

(54) **AUTOMATIC DEVICE FOR PREVENTING ANIMALS COMING UP DRAIN PIPES**

(57) The application concerns a device for preventing animals coming up a drain pipe. The device can be inserted into a drain pipe (10, 12) of a toilet connected to the discharge network (12) for waste water, and comprises a mobile divider (11) with with a hinge (13) at the top. The divider is able to swing in the direction of the outflow under the pressure of the flow of sewage, freeing the section for the outflow. The divider returns under the action of its own weight to a practically complete closed rest position thus preventing animals (15) coming through the discharge pipes (12).

Fig. 6



EP 3 101 187 A1

Description

[0001] The field of this invention concerns an automatic device for preventing animals coming up into drain pipes, and in particular into toilet bowls.

Prior art

[0002] There exist other animal guards for drainage pipes, however they are not used because of their complexity, their poor reliability and restricted scope.

[0003] Finally, there is also the difficulty of applying these animal guard devices in areas and/or systems that have not already been set up to use them.

[0004] In fact, existing devices rely on a series of lever mechanisms and kinematic systems for inserting a divider inside the pipes for discharging wastewater that is controlled by the operator.

[0005] Since these lever mechanisms need to be operated from time to time by the operator, the insertion of said divider is an operation that needs to be carried out by the operator after, or simultaneously with, flushing, so it is quite awkward.

[0006] Moreover, it is clear that said lever mechanisms can, over time, get worn making it impossible for the WC to continue working normally; therefore, they need to be continually serviced.

[0007] It is clear that the more complicated these lever mechanisms are, with their numerous levers and shafts, the less reliable it is due to the reasonable probability that at least one component could get blocked and/or break.

[0008] Lastly, said devices can be used only in the pipes for discharging wastewater and they adapt, badly or not at all, to other types of discharges, which also suffer from the same problem of animals coming up into the discharge outlets.

[0009] Since this intervention is made on drain pipes and these are always underneath plaster and/or encased flush with the wall, often behind tiling, it is clear that they cannot easily be adapted in existing contexts without involving serious building renovations.

[0010] For all the reasons set out above, and for others that will become clear in the following description of these existing animal guard devices for pipe outlets, they have not been widely used.

Presentation of the invention

[0011] The object of this invention is to overcome one or more of the drawbacks of the prior art.

[0012] Another object of this invention is to make available a completely automatic device to guard against animals coming up through WC drain pipes.

[0013] Another object of this invention is to make available a completely mechanical device to guard against animals coming up through drain pipes.

[0014] Another object of this invention is to make available a device to guard against animals coming up through drain pipes that can also be installed outside the pipes.

[0015] An important object of this invention is to make available a device to guard against animals coming up through drain pipes that is easy to construct and easy to operate.

[0016] A fundamental object of this invention is to make available a device to guard against animals coming up through drain pipes that is reliable also in the long term.

[0017] A further object of this invention is to make available a device to guard against animals coming up through drain pipes that works safely.

Description of the invention

[0018] One or more of the above-mentioned objects are achieved by this invention as described and characterised by the claims.

[0019] In particular, the automatic device for preventing animals coming into drainage pipes includes, between the drainage pipe of a facility connected to the hydraulic drainage system for waste water, a mobile divider in the water pipe, with automatic return, hinged at the top and swinging, being able to tilt in the direction of the outflow, i.e. capable under the thrust of the discharge water to tilt partially without excessive contrast, freeing the pipe section for the outflow of the water, and returning under the action of its own weight to assume a rest position closing practically all the section, to prevent animals coming up into the bowl.

Advantageous characteristics of the invention

[0020] Advantageously the object of the invention can be configured as a completely mechanical device.

[0021] Furthermore, as a particularly advantageous feature, the movement for the operation of said mobile divider is automatic, not requiring any external instigation to intervene with respect to the flow of water.

[0022] Very effectively, the closure made by the mobile divider on the stop is carried out by maintaining a light positive closing force (which can be given by the inclination that is slightly offset with respect to the vertical).

[0023] It is an important aspect that said device requires no maintenance because of the way it is made and as a result, it can be used in all circumstances since it can also be used in places that are not easily reached.

[0024] Evidently and consequently, the advantage of the mobile divider lies in the fact that it is not connected to any kinematic or lever mechanisms, also external.

[0025] Very advantageously said divider is flat and level, preferably with a smooth surface (facilitating the self-cleaning).

[0026] Another advantage of the mobile divider of the invention lies in the fact that it does not obstruct the outflow section, since it can tilt, without inserting any appreciable overpressure in the outflow and having practically a negligible effect on the outflow itself.

[0027] Much appreciated is how easy it is to install in pipes, in syphons and in bathroom fittings.

[0028] The above-mentioned quality is obtained even if the rooms and/or systems have not previously been prepared.

[0029] Very advantageously, said mobile divider can be inserted and become part of the toilet bowl, near to, or inserted in, the relative syphon of the discharge pipe.

Brief description of the drawings

[0030] The technical characteristics of the invention, according to the above-mentioned objects, can be clearly found in the content of the claims below and its advantages will become clearer in the detailed description that follows, made with reference to the attached diagrams, which show just one example of an embodiment, where:

- fig. 1 shows a vertical section existing toilet bowl that highlights the water course;
- fig. 2 shows the object of fig. 1 modified with the invention;
- fig. 3 shows the object of fig. 2 according to a vertical orthogonal section;
- fig. 4 shows the object of fig. 2 with the device at rest, highlighting the obstacle for any animals that want to come up the siphon into the toilet bowl;
- fig. 5 shows the object of fig. 2 with the device in a raised configuration under the thrust of the pressure of the outflow water released by the flushing system;
- fig. 6 shows the object of fig. 2 where the impossibility for any animal to get past the obstacle of the closed divider in the outflow pipe is clearly highlighted.

Detailed description

[0031] The toilet bowl 1 has a seat 2 for the user, with a tapered zone 3 connected hydraulically with a siphon 4.

[0032] The siphon is usually adopted to prevent the outflow pipe 5 freely discharging the vapours of the waste water pipes to which the outflow pipe is connected with the room in which the toilet is installed.

[0033] In fact, in the siphon there is constantly the presence of a head of water 6 that interrupts this free discharge of said vapours. Evidently this solution, even if effective in disposing of waste, leaves a section of pipe for numerous animals 15 to come up and populate the drain pipe, like for example, rats, mice, lizards, snakes, cockroaches, etc.

[0034] This possibility to come up the drain pipe 5 and pass through the siphon of the toilet 4, provides free access to the toilet seat 2 to the consternation of any users.

[0035] The device of the invention is installed in a toilet bowl 7 that has been prepared for it, or else on a toilet bowl of the prior art that has been appropriately modified.

[0036] Said toilet bowl 7, which is the object of the invention, still has a seat 8 with a tapered zone 9 connected hydraulically to a siphon 10.

[0037] In proximity or near this siphon 10 or juxtaposed to it, there is a mobile divider 11 that interrupts, when at rest, the hydraulic connection with the drain pipe 12.

[0038] This hydraulic interruption of the connection between the tapered zone 9 of the toilet bowl 7 with the drain pipe 12 prevents animals 15 that populate the sewer network coming up.

[0039] Said divider 11 is mobile, it is held up at the top in a tilting manner by a hinge 13 with a horizontal axis, which allows said divider to swing, with a movement of partial rotation in the direction of the flow of the water, and under the pressure of this water when released from the flushing system to then take up its basically vertical rest position due to the effect of its own weight. This movement, then, is completely automatic and does not require either the opening of the discharge section or any action to close it with any kinematic or lever mechanisms operated externally. Moreover, since said divider 11 is subject to natural forces, like the pressure of the water flow to open it, and the force of gravity to close it, it is extremely reliable and does not need any maintenance or work to deal with wear and tear.

[0040] It is completely clear, as shown in the diagrams, that the movement between the completely open position of fig. 5 and the completely closed position of fig. 4 is restrained in its travel by stops or by suitable strikers.

[0041] In particular, preferably the limitation of the travel of the opening movement of the divider 11 can be realised by the inner surface of the pipe.

[0042] Moreover, preferably the limitation of the travel of the closing movement of the divider 11 is composed of one or more stop bushings or by one or more protrusions 14 that stick out slightly from the surface of the pipe, and therefore have no influence on the re-sectioning of the free section of the outflow.

[0043] Eventually said divider 11 remains pre-charged against the above-mentioned stop bushes or protrusions 14 with a positive pressure, to prevent it swinging around its state of balance at the lower dead centre.

[0044] Preferably, said pre-charge is obtained by keeping the divider 11 slightly inclined, offsetting the hinging point 13 with respect to the stop bushes or protrusions 14.

[0045] Naturally, there can be numerous variants drawing inspiration from the inventive concept of this invention, which should be understood as falling within the ambit of this patent.

[0046] The above-mentioned example of an embodiment, applied to a toilet bowl 7 is, however, the one that, in the opinion of the applicant, is the most simple and reliable, without having to make any structural modifications.

[0047] In fact, its operation remains subject to natural forces, without relying on lever mechanisms, springs, kinematic systems or the like for opening and closing.

[0048] Since this device is extremely reliable and requires no maintenance, it can also be recessed or hidden so it cannot be seen, allowing the toilet bowl to look the

way it looks in the prior art. Lastly, it should be noted that the presence of this divider 11, while closing completely and being an insurmountable and impossible obstruction for the animals 15 that live in the sewerage networks to get through, does not insert any sizeable element for restricting the free section of the outflow section.

[0049] Finally, we can appreciate the fact that the divider 11, arranged almost vertically with a positive pressure in a configuration that is slightly inclined with respect to the vertical, does not limit the release capacity, since the friction and resistances are negligible.

Claims

1. Automatic device for preventing animals coming up into drain pipes, **characterised by** the fact that it includes, inside the drain pipe (10, 12) of a toilet connected to the discharge network (12) for waste water, a mobile divider (11) in the hydraulic pipe (10, 12) with automatic return hinging (13) at the top and that tilts, being able to swing in the direction of the outflow, namely it can swing under the pressure of the outflow water, freeing the section for the outflow of the water and returning under the action of its own weight to a practically complete closed rest position to prevent animals (15) coming up through the discharge pipes (12).

2. Automatic device for preventing animals coming up into the drain pipes according to claim 1, **characterised by** the fact that it is a fully mechanical device.

3. Automatic device for preventing animals coming up into the drain pipes according to claim 1 or 2, **characterised by** the fact that the movement for operating the mobile divider (11) is automatic.

4. Automatic device for preventing animals coming up into the drain pipes according to one or more of the previous claims, **characterised by** the fact that the closing made by this mobile divider (11) on a stop, composed of one or more stop bushings or by one or more protrusions (14), is carried out maintaining a slight positive closing force.

5. Automatic device for preventing animals coming up into the drain pipes according to the previous claim, **characterised by** the fact that said positive closing force is given by the inclination of the divider (11) that is slightly offset with respect to the vertical.

6. Automatic device for preventing animals coming up into the drain pipes according to one or more of the previous claims, **characterised by** the fact that it requires no maintenance.

7. Automatic device for preventing animals coming up into the drain pipes according to one or more of the previous claims, **characterised by** the fact that it has no kinematic or lever mechanisms even on the outside.

8. Automatic device for preventing animals coming up into the drain pipes according to one or more of the previous claims, **characterised by** the fact that said divider (11) is flat and not uneven.

9. Automatic device for preventing animals coming up into the drain pipes according to one or more of the previous claims, **characterised by** the fact that said divider (11) is installed adjacent to or inserted in the siphon (10) of the drain pipe (12) of a toilet bowl (7).

10. Automatic device for preventing animals coming up into the drain pipes according to one or more of the previous claims, **characterised by** the fact that said divider (11) has dimensions that correspond to the outflow section of the drain pipe (12), on whose surface one or more bushings or one or more protrusions (14) stick out protrude slightly from the surface of the pipe for the rest stop of said divider (7).

Fig. 1

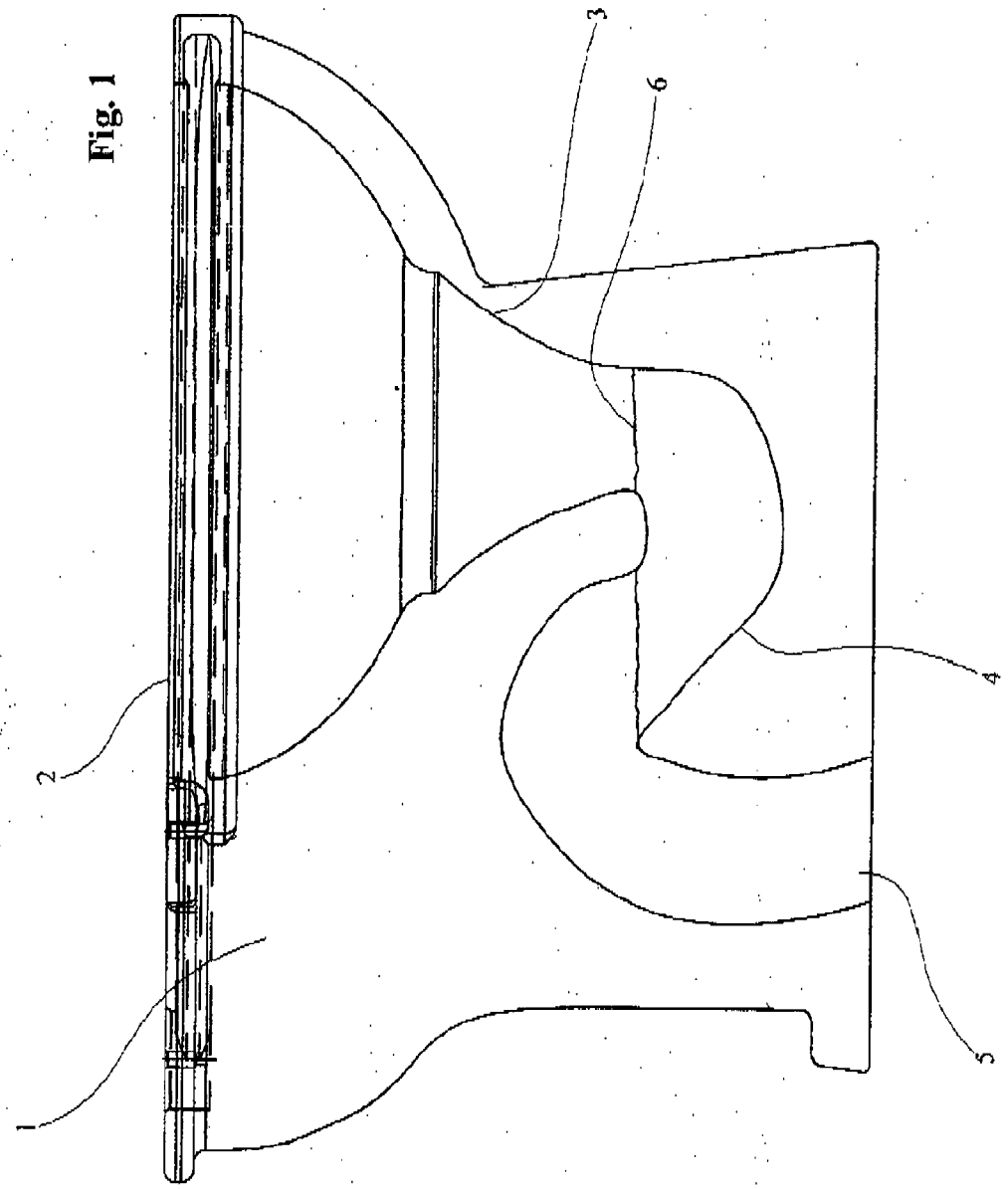


Fig. 3

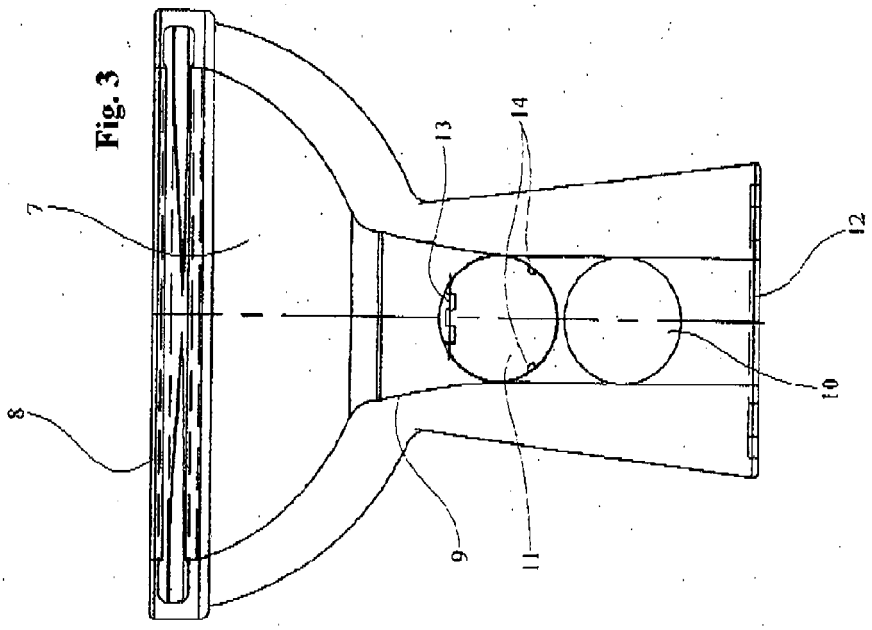


Fig. 2

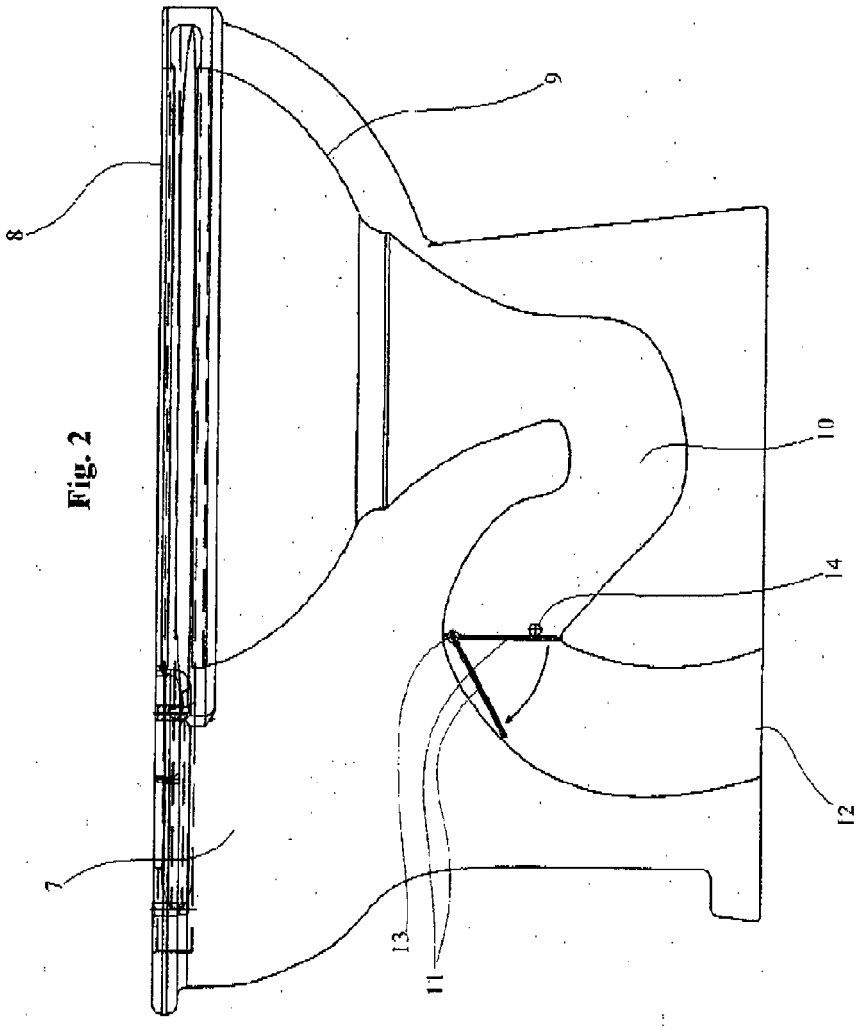


Fig. 4

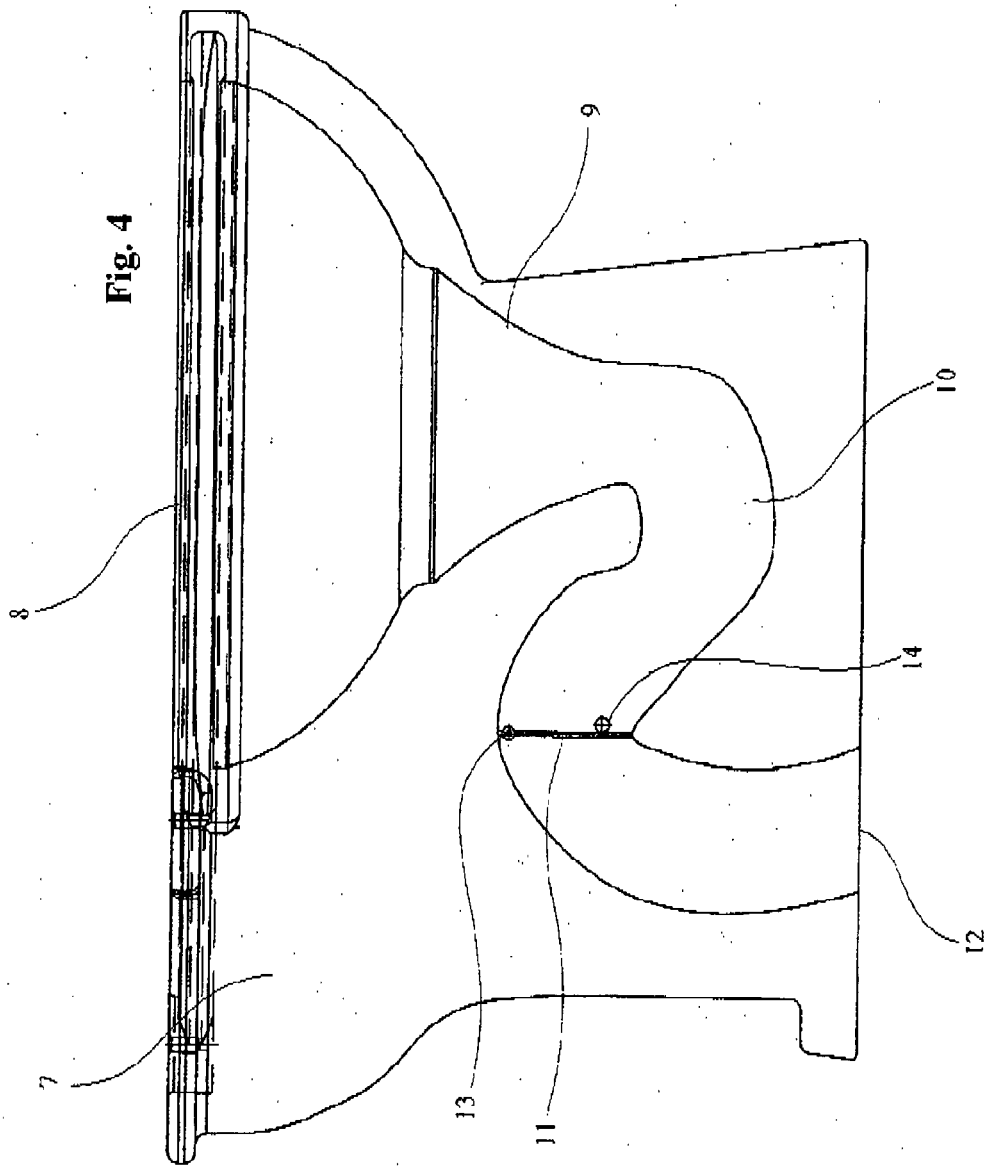


Fig. 5

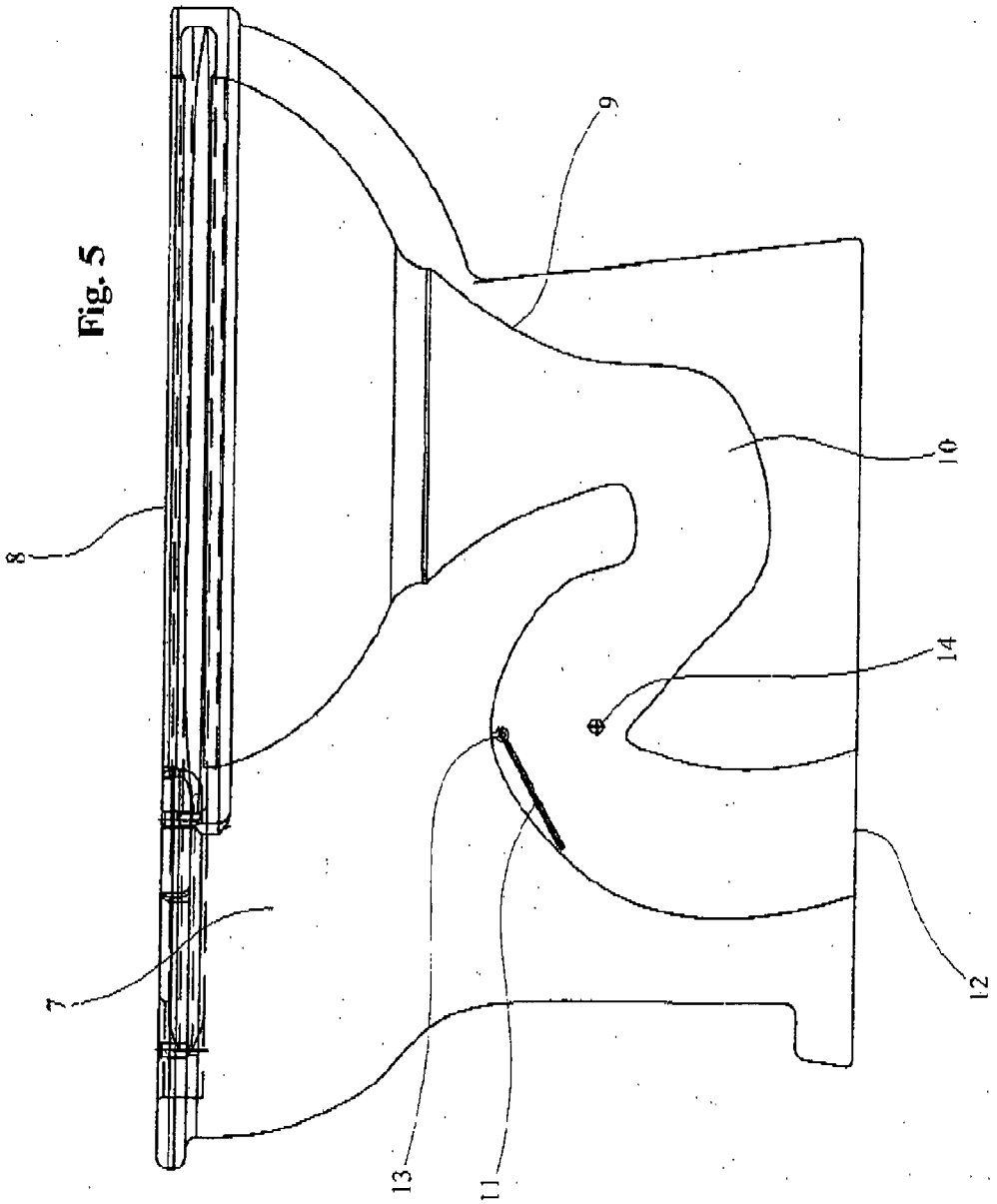
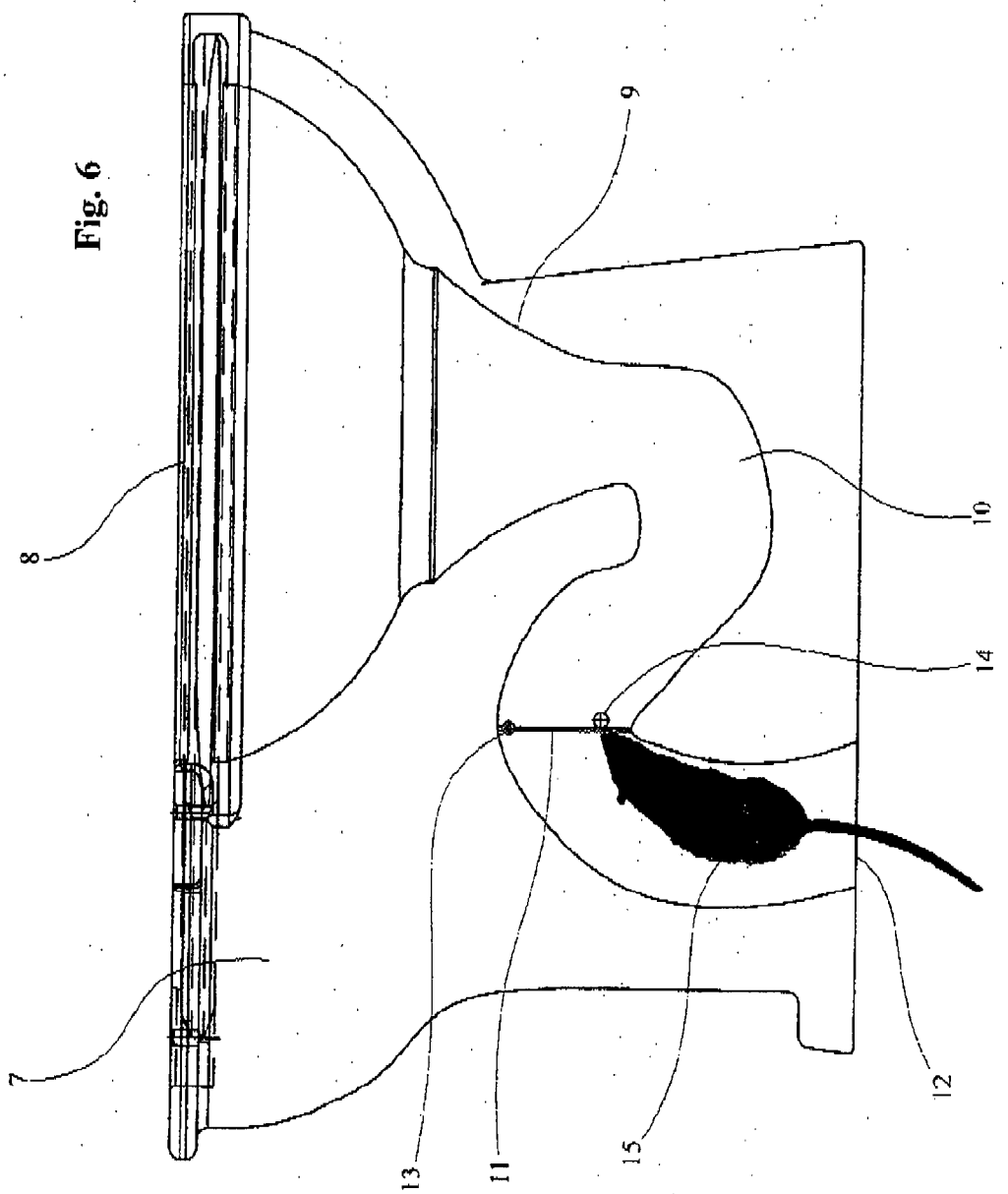


Fig. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 15 00 1675

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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			TECHNICAL FIELDS SEARCHED (IPC) E03F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 October 2015	Geisenhofer, Michael

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 00 1675

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27-10-2015

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