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(54) **ODOR EXTRACTION SYSTEM FOR A SANITARY APPLIANCE HAVING A FLUSHING TANK, AND FLUSHING TANK COMPRISING SUCH AN ODOR EXTRACTION SYSTEM**

(57) An odor extraction system (1) for a sanitary appliance having a flushing tank (3) comprises: a powered fan (14) having a suction inlet (16) and a delivery outlet (17); a suction pipe (18), connected to the suction inlet (16) of the fan (14); and a delivery pipe (19) connected

to the delivery outlet (17) of the fan (14); the delivery pipe (19) is shaped so as to be inserted, in use, into the flushing tank (3) with a free end (23), provided with an air outlet (24), immersed in the water contained in the flushing tank (3).

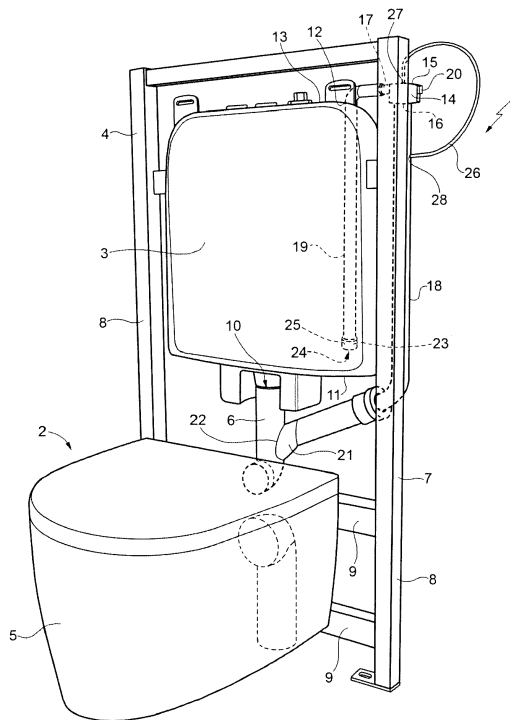


FIG. 2

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Description

[0001] The present invention relates to an odor extraction system for a sanitary appliance having a flushing tank, and to a flushing tank comprising such an odor extraction system.

[0002] It is known to employ extraction systems of various type for removing unpleasant odors from the environments in which the sanitary appliances are installed.

[0003] In the case of sanitary appliances (toilets, urinals, etc.) having a flushing tank which discharges water to a bowl via a drain tube, it is known, in particular, to aspirate air directly from the bowl by means of a fan having a suction pipe which is engaged in the drain tube.

[0004] The aspirated air may be filtered in a specific filter and reintroduced into the room itself in which the sanitary appliance is installed or may be expelled through a conduit which discharges outside the room.

[0005] Therefore, the known systems are not free from drawbacks because they require the use of filters with consequent complications of construction and use (maintenance/cleaning or filter replacement needs); and/or of pipes which discharge the air outside.

[0006] It is an object of the present invention to provide an odor extraction system for a sanitary appliance having a flushing tank which is free from the drawbacks of the prior art illustrated above; in particular, it is an object of present invention to provide an odor extraction system which is simple and cost-effective to be implemented and used, which does not require external pipes and discharges, and which is highly effective.

[0007] The present invention thus relates to an odor extraction system for a sanitary appliance having a flushing tank as defined in essential terms in appended claim 1 and, for its additional features, in the dependent claims.

[0008] The odor extraction system of the invention is simple and cost-effective to be implemented and used, does not require the use of filters or other similar components or of external pipes and discharges, and is highly effective in terms of odor abatement.

[0009] Moreover, the odor extraction system may be integrated in the supporting structure of the sanitary appliance and may be completely concealed from sight, thus not altering the appearance of the sanitary appliance or of the environment in which it is installed.

[0010] Further features and advantages of the present invention will become apparent from the following description of a non-limitative embodiment thereof, with reference to the figures in the accompanying drawings, in which:

- figure 1 is a diagrammatic rear view of a sanitary appliance having a flushing tank, in particular a sanitary appliance mounted on a concealed installation structure, and provided with an odor extraction system according to the present invention;
- figure 2 is a diagrammatic perspective view, with parts in transparency and parts removed for clarity,

of the sanitary appliance in figure 1 with the odor extraction system of the invention.

[0011] In the accompanying figures, reference numeral 1 indicates as a whole an odor extraction system installed on a sanitary appliance 2 having a flushing tank 3, in particular a sanitary appliance mounted on a concealed installation structure 4.

[0012] The sanitary appliance 2, as well as the flushing tank 3 and the structure 4 are of known type and are not thus described in detail for simplicity.

[0013] In the non-limiting example shown, the sanitary appliance 2 is a toilet or urinal having a sanitary bowl 5 connected to the flushing tank 3 by means of a drain tube 6.

[0014] Bowl 5 and flushing tank 3 are supported by a supporting frame 7 of the installation structure 4.

[0015] The supporting frame 7 has a pair of uprights 8, which are vertical in use, and crossbars 9 arranged between the uprights 8.

[0016] The flushing tank 3 internally houses a discharge valve and a feeding device (both known and not shown).

[0017] The flushing tank 3 has a lower outlet 10 formed in a bottom wall 11 of the flushing tank 3 and connected to the drain tube 6, and a service opening 12 formed in a side or upper wall 13 of the flushing tank 3.

[0018] System 1 comprises a powered fan 14, driven for example by an electric motor 15 and having a suction inlet 16 and a delivery outlet 17; a suction pipe 18, connected to the suction inlet 16 of fan 14; and a delivery pipe 19 connected to the delivery outlet 17 of fan 14.

[0019] Fan 14 and its motor 15 are, for example, housed in a casing 20 which is fixed in use to the supporting frame 7, for example to an upright 8, or to the flushing tank 3; the suction pipe 18 and the delivery pipe 19 extend from fan 14 thus protruding from casing 20.

[0020] The suction pipe 18 joins with the drain tube 6 and is connected to the drain tube 6 by means of a branch 21 placed on the drain tube 6 between the flushing tank 3 and the bowl 5; branch 21 communicates with the drain tube 6 through an auxiliary opening 22 formed in an side wall of the drain tube 6.

[0021] The suction pipe 18 connects the suction pipe 16 of fan 14 to the auxiliary opening 22 of the drain tube 6.

[0022] The delivery pipe 19 enters into the flushing tank 3, e.g. through opening 12.

[0023] The delivery pipe 19 extends from the delivery opening 17 of the fan and ends with a free end 23 placed (in use) inside the flushing tank 3 and having an air outlet 24.

[0024] The delivery pipe 19 has a length such that end 23 with the air outlet 24 is, in use, in proximity of the bottom wall 11 and immersed in the water contained in the flushing tank 3, at least when the flushing tank 3 is full.

[0025] End 23 is preferably provided with a diffuser 25, shaped so as to diffuse and/or disperse the air exiting from the air outlet 24 in the water in which end 23 is

immersed.

[0026] In particular, diffuser 25 has a plurality of emission nozzles or pores distributed around an axis of diffuser 25 and in which the air flow circulating in the delivery pipe 19 is divided.

[0027] For example, diffuser 25 comprises a porous piece through which the air exiting from end 23 passes.

[0028] Furthermore, system 1 comprises a recirculation conduit 26 which conveys the cooling air of motor 15 from the inside of casing 20 to the suction pipe 18.

[0029] In particular, casing 20 has a cooling outlet 27, formed through a wall of casing 20 and facing motor 15; the recirculation conduit 26 connects the cooling outlet 27 to an auxiliary inlet 28 of the suction pipe 18.

[0030] The auxiliary inlet 28 is formed through a side wall of the suction pipe 18.

[0031] System 1 may be automatically operated by a specific control device (known and not shown) which turns on fan 14 when necessary.

[0032] In use, when system 1 starts working, fan 14 aspirates air from bowl 5 through the suction pipe 18 and thus extracts the odors from bowl 5.

[0033] The air flows through the suction pipe 18 and the delivery pipe 19 and exits from end 23 through diffuser 25, which is immersed in the water contained in the flushing tank 3. The air is dispersed in the water which acts as a filter and prevents the odors from exiting into the environment.

[0034] The recirculation conduit 26 takes from casing 20 the hot air which has cooled motor 15, and discharges it into the suction pipe 18, thus preventing this air and the odors carried by the same from being dispersed into the environment.

[0035] The air which cools motor 15 is, for example, a fraction of the air which circulates in system 1 by means of fan 14; the air flow moved by fan 14 crosses the suction pipe 18 and enters into casing 20 where, at least in part, it is used to cool motor 15.

[0036] The air flow circulating in system 1 is thus divided into a first portion which crosses the delivery pipe 19 and is dispersed in the water contained in the flushing tank 3, and in a second portion which is recirculated, through the recirculation conduit 26, to the suction pipe 18.

[0037] Finally, it is understood that further changes and variations can be made to the odor extraction system described and shown herein, without departing from the scope of the appended claims.

Claims

1. An odor extraction system (1) for a sanitary appliance having a flushing tank (3), the system (1) comprising a powered fan (14) having a suction inlet (16) and a delivery outlet (17); a suction pipe (18), connected to the suction inlet (16) of the fan (14); and a delivery pipe (19) connected to the delivery outlet

(17) of the fan (14); the system (1) being **characterized in that** the delivery pipe (19) is shaped so as to be inserted, in use, into the flushing tank (3) with a free end (23), provided with an air outlet (24), immersed in the water contained in the flushing tank (3).

2. A system according to claim 1, wherein the delivery pipe (19) has a length such that the free end (23) is located, in use, in proximity of a bottom wall (11) of the flushing tank (3) and immersed in the water contained in the flushing tank (3), at least when the flushing tank (3) is filled with water.

3. A system according to claim 1 or 2, wherein the free end (23) is provided with a diffuser (25), shaped so as to diffuse and/or disperse air exiting from the air outlet (24) in the water in which the free end (23) is immersed.

4. A system according to claim 3, wherein the diffuser (25) has a plurality of emission nozzles or pores distributed around an axis of the diffuser (25) and in which the air flow circulating in the delivery pipe (19) is divided.

5. A system according to claim 3 or 4, wherein the diffuser (25) comprises a porous piece located at the air outlet (24).

6. A system according to one of the preceding claims, wherein the suction pipe (18) is connectable to a drain tube (6) which connects the flushing tank (3) to a sanitary bowl (5) of a sanitary appliance (2).

7. A system according to one of the preceding claims, wherein the fan (14) is driven by a motor (15), and the fan (14) and the motor (15) are housed in a casing (20) having a cooling outlet (27) facing the motor (15); the system (1) comprising a recirculation conduit (26) which connects the cooling outlet (27) of the casing (20) with an auxiliary inlet (28) of the suction pipe (18), so as to recirculate cooling air of the motor (15) from the inside of the casing (20) to the suction pipe (18).

8. A flushing tank (3) of a sanitary appliance (2), having a drain tube (6) connectable to a sanitary bowl (5) of the sanitary appliance (2) and **characterized by** comprising an odor extraction system (1) according to one of the preceding claims.

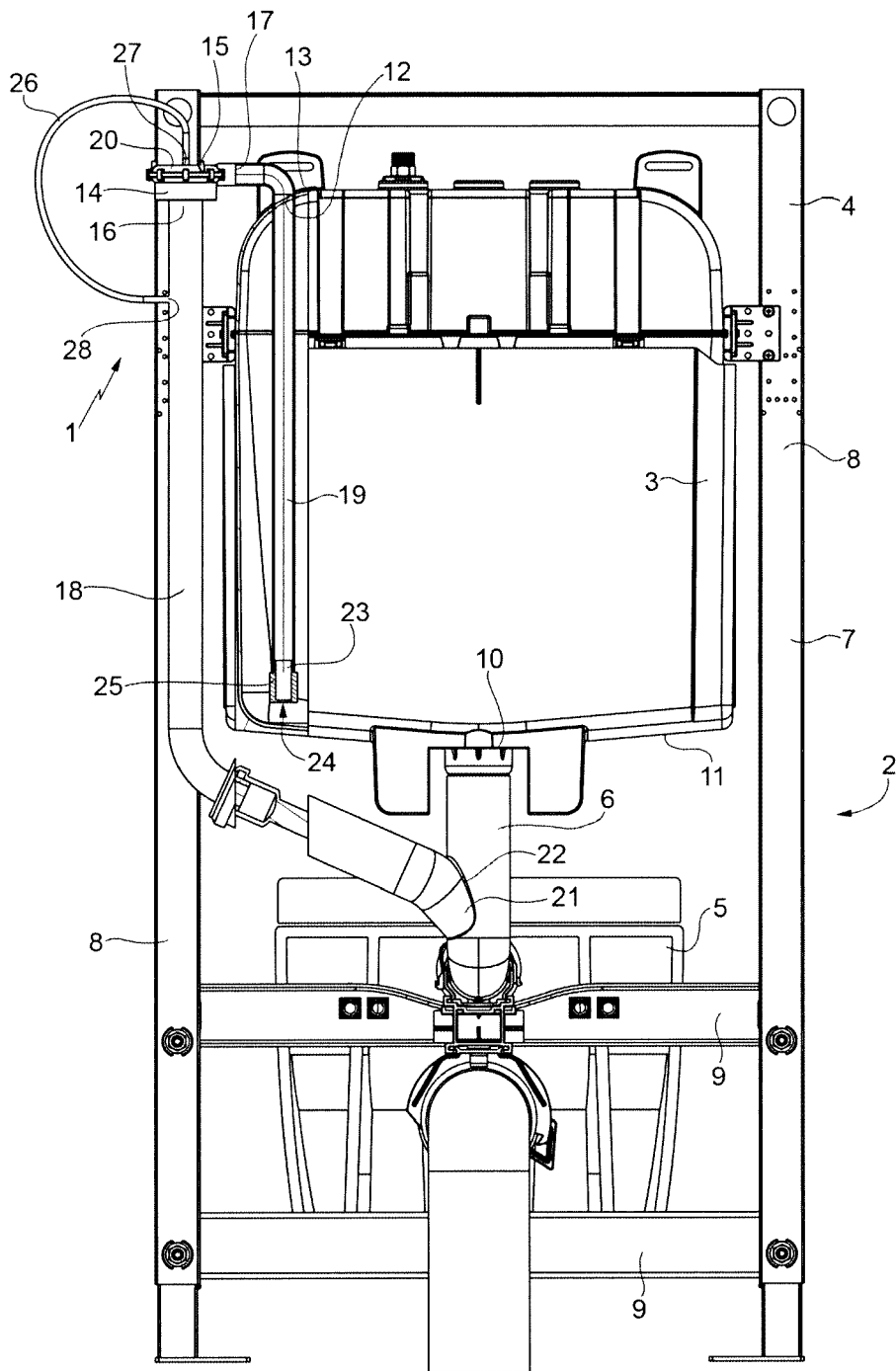


FIG. 1

