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**E03D 9/04**

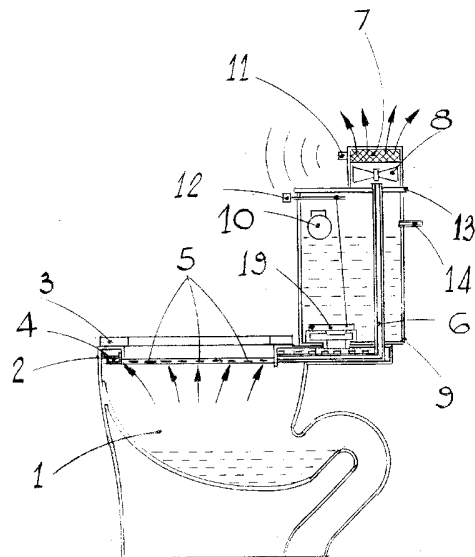
(52) UK CL (Edition X):  
**E1C C38**

(56) Documents Cited:  
**US 6615410 B1**                      **US 6314591 B1**  
**US 5029346 A**                      **US 3763505 A**  
**US 20030163863 A1**

(58) Field of Search:  
UK CL (Edition W) **E1C**  
INT CL<sup>7</sup> **E03D**  
Other:

(54) Abstract Title: **Toilet ventilation system**

(57) A toilet ventilation system comprises a flexible duct 4 which is fitted under the rim 2 of an existing toilet. The duct 4 may be removed for cleaning, inspection and maintenance. In use, air is drawn out of the toilet bowl 1 by an extractor fan 8 via air duct sections 4 and 6 and then either passed over a fragrant element 10 or vented to the outside atmosphere.



*FIG 1*

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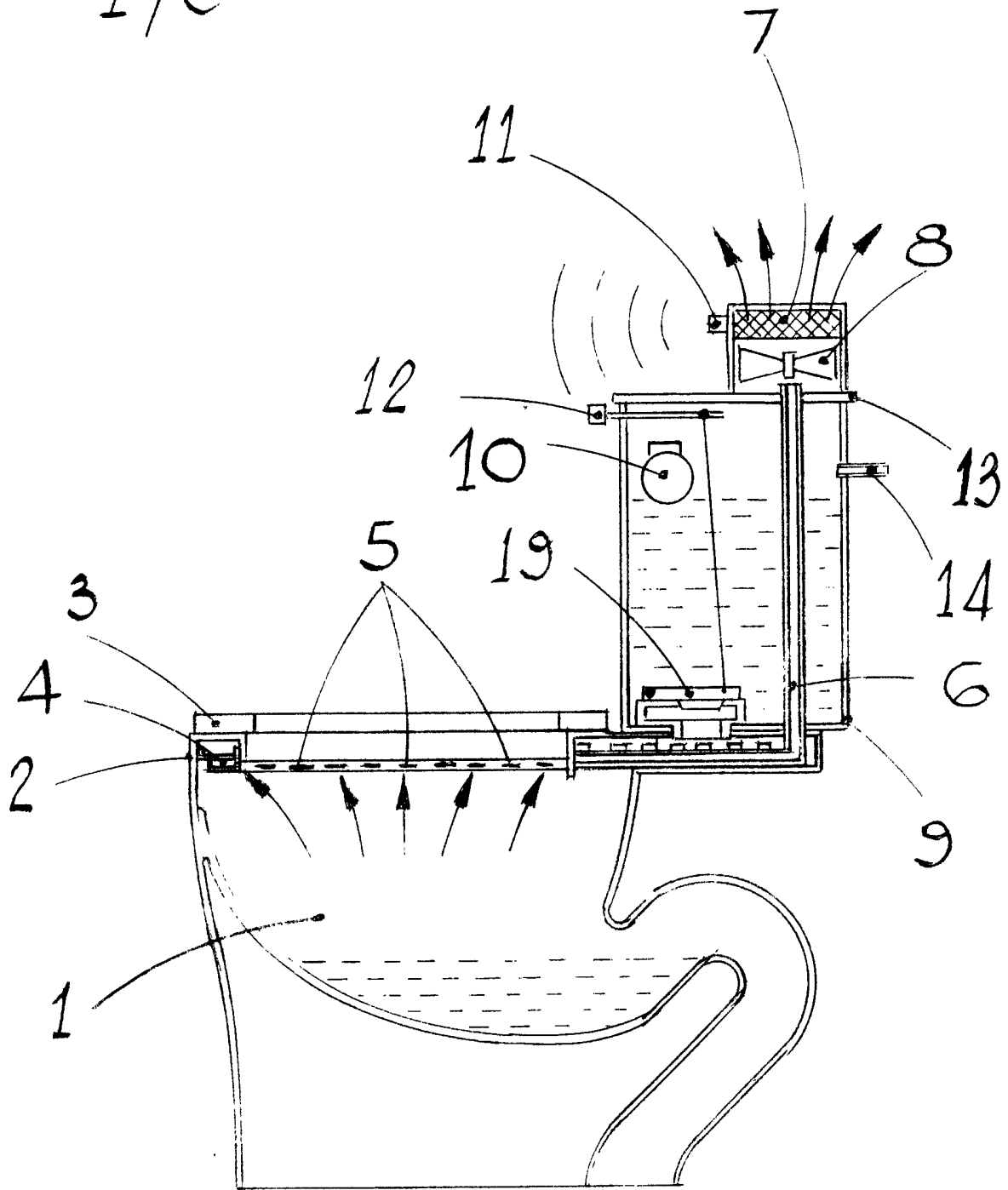


FIG 1

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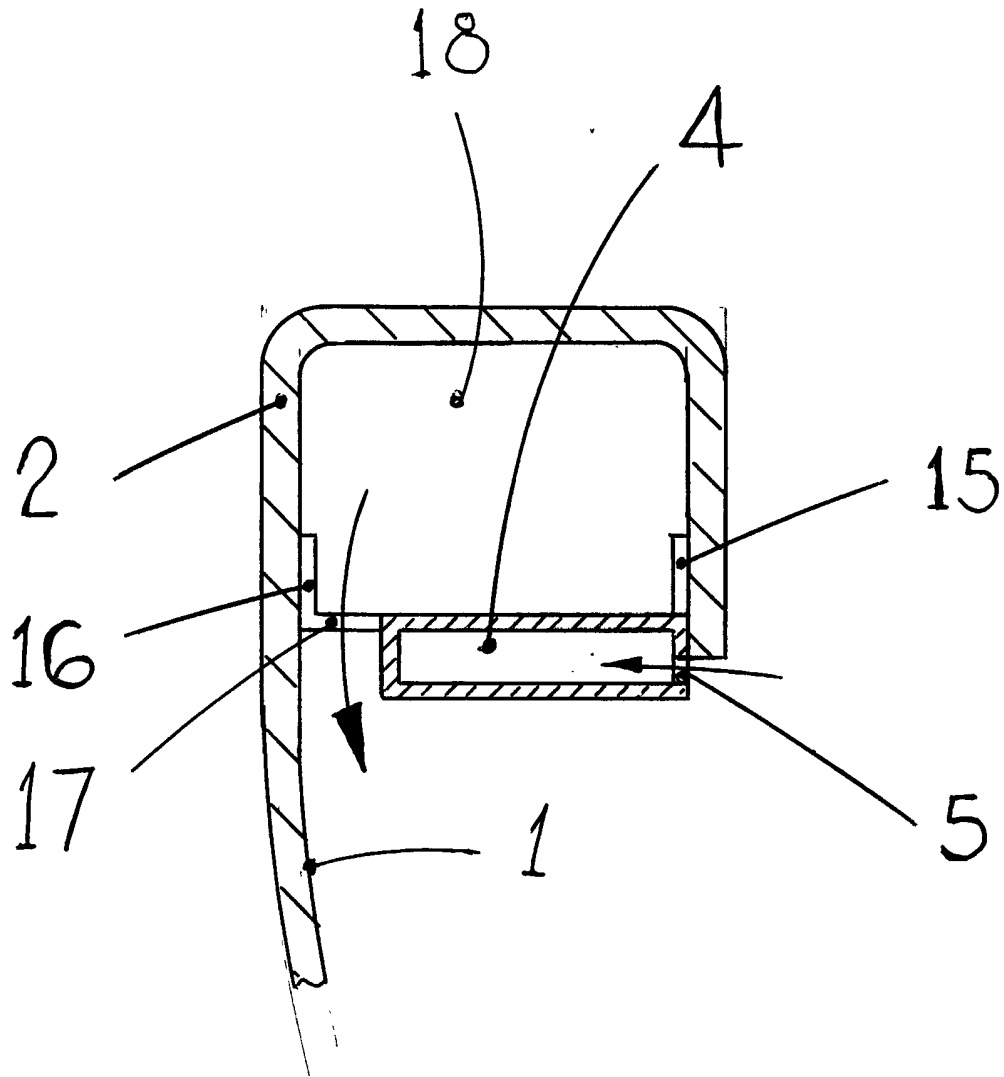


FIG 2

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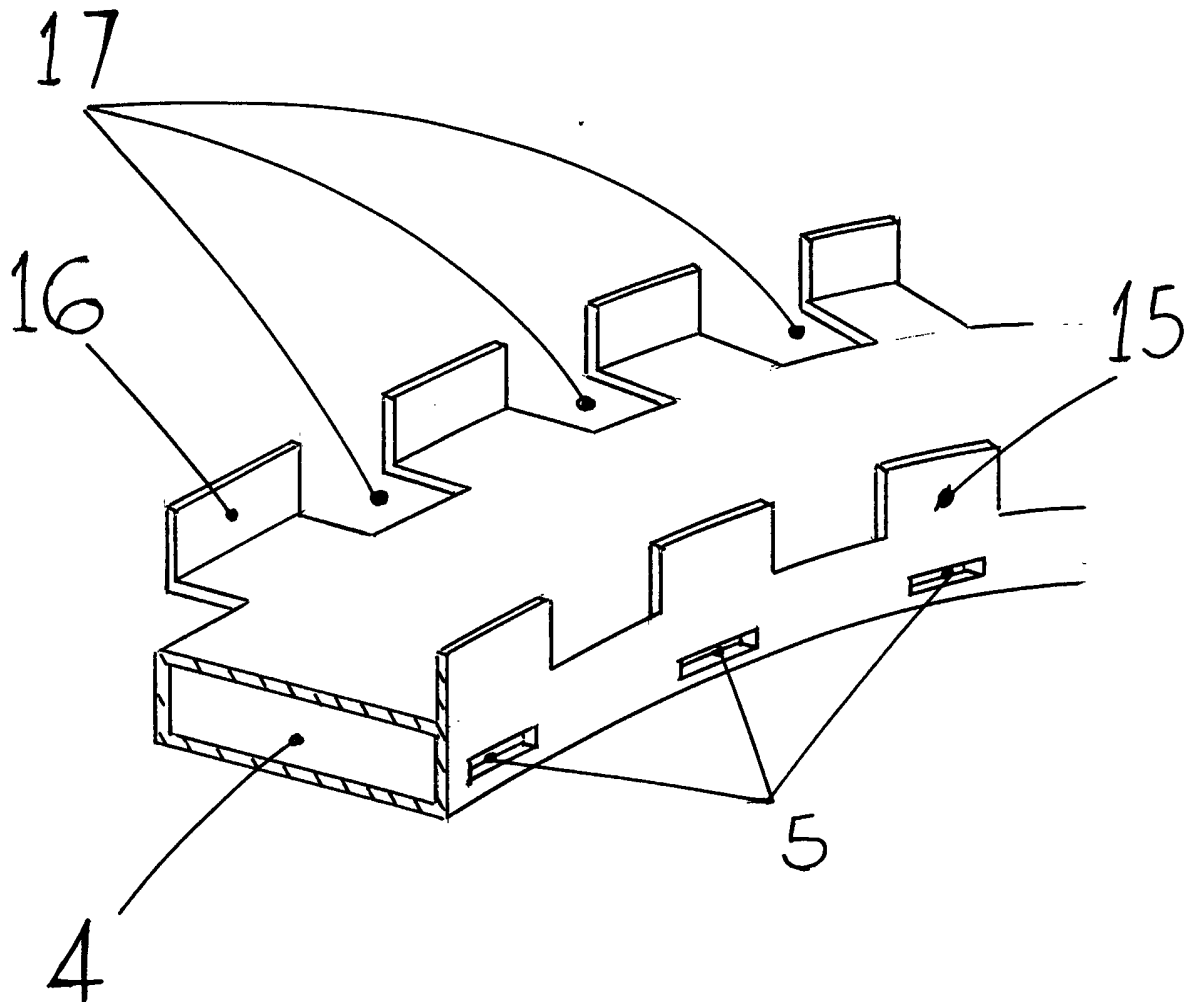


FIG 3

### **A Toilet Air Flow Freshening System**

The invention relates to an air flow freshening system using air suction to remove unpleasant toilet odors, more particularly the airborne smells in and around the rim and the bowl of the toilet. The odors are extracted by suction through a one piece flexible air duct, part of which is positioned and retained inside the peripheral contour of the toilet rim in such a way that it also forms separate passageways between the external profile of the air duct and the internal profile of the toilet rim through which the flushing water circulates around the toilet rim and discharges into the toilet bowl. Furthermore, the said air duct can be totally, or partially, removed from the toilet for inspection, cleaning and maintenance. Also, because the said water passageways no longer need to be produced as an integral part of the toilet rim construction, it simplifies the design and the manufacture of the toilet rim. The air duct has the characteristic that it is flexible so that a standard design is able to fit the inside peripheral contours of different toilet rim designs. The air duct upon leaving the region of the toilet rim then passes through the water tank and the lid of the toilet to connect to an extractor fan or similar device which produces the air suction within the air flow freshening system. The extracted toilet odors as they exit the said extractor fan pass through or over a fragrant element or similar perfumed media or device before being returned into the room or vented directly to the outside atmosphere.

It is understood that the word toilet has the same meaning and serves the same purpose as a lavatory.

It is recognized that patents relating to toilet air extraction systems have already been applied for but at the present time none of these inventions appear to have been used and the problems associated with unpleasant toilet odors are still to be solved in such a way that it can be adopted as a standard installation in most homes. This invention claims a different approach which uses standard air duct design having a simple construction that can be fitted to different toilet rims and takes advantage of low cost production methods which is fundamental to gaining widespread acceptance, and therefore I pray a patent will be granted to me.

According to the present invention, the air immediately around the rim and the bowl of the toilet is extracted by air suction produced within the air flow freshening system which has air inlet ports which collectively form a radial suction network covering the top region over the toilet bowl to extract the toilet odors.

According to another aspect of the invention, the air duct is a continual and unimpeded air passageway made from a flexible material having a cross section so designed that it can flex in the horizontal, longitudinal and vertical plane in order that it can be fitted into and removed from different toilet designs. The air duct can be retained in position by having an interference fit with the inside shape of the toilet rim or abutments, or a detent, or any similar device making use of the flexibility of the material of the air duct.

According to another aspect of the invention, when the air duct is fitted to the inside of the toilet rim, the external profile of the air duct in cooperation with the inside profile of the toilet rim forms separate water passageways through which the flushing water circulates around the toilet rim and discharges into the bowl of the toilet.

According to another aspect of the invention, the device which produces the air suction within the air flow freshening system also makes use of the air outlet exhaust pressure to force the toilet odors over an element or media containing a perfume or similar pleasant fragrance which gets rid of the said toilet odors.

According to another aspect of the invention, the reduction in the air pressure which creates the said suction within the air duct of the air flow freshening system can be achieved in many different ways which result in a lowering of the air pressure, for example by using an extractor fan or vacuum pump which can be fitted directly to the toilet structure or remotely mounted.

According to another aspect of the invention, the suction device can be switched or turned on by hand, by foot or by a sensor which detects the presents of a person using the toilet.

In order that the invention may be well understood, it will now be described by way of example and with reference to the accompanying drawings, in which

Fig 1 is a sectional view of a toilet system fitted with the invention in which the air duct section 4 is positioned and retained within the rim 2 to form a horseshoe loop inside the peripheral contour of the rim 2 such that the air duct inlet ports 5 form an air suction network over the total region of the top of the bowl 1. The air flow freshening system leaves the rim 2 by means of air duct section 6 which is an uninterrupted continuation of section 4 but without air duct inlet ports 5 so that it is air tight and thus prevents the ingress of water when fitted inside the water tank 9. The air duct section 6 passed through the toilet lid 13 and is connected to the inlet side of the extractor fan 8 which produces the suction within the air duct sections 4 and 6 and extracts the toilet odor through air inlet ports 5. The extractor fan 8 transfers the extracted air to the outlet side of the extractor fan 8 and in so doing forces the air through the fragrant element 7 before the air is returned back into the room.

Fig 2 is a sectional view of a toilet rim 2 showing the air duct 4 held in position inside the rim 2 by fingers 15 and 16 which create a controlled interference fit with the inside walls of the rim 2 such that the air duct 4 can be removed when required. When air duct section 4 has been fitted into the rim 2, the external profile of the air duct section 4 and the rim 2 form a water passageway 18 through which the flushing water flows and discharges between the fingers 16 and the openings 17 into the toilet bowl 1. The air duct inlet ports 5 are so positioned that water passing through openings 17 do not interfere with the suction of toilet odors through the air duct ports 5.

Fig 3 is a freestanding sectional view showing part of the air duct 4 showing the fingers 15 and 16 which hold the air duct in place within the inside peripheral contour of the toilet rim by having an interference fit therewith. The openings 17 distribute the flushing water into the toilet bowl 1 and the air duct inlet ports 5 suck the air containing the toilet odors from the region of the toilet bowl 1 and rim 2 into the air flow freshening system. In designing the cross sectional area of the air duct 4 consideration is given to the bending moments and corresponding stresses to ensure the air duct can safely be fitted to different toilet rim designs without causing undue stress within the material which preferably would be a rubber or polymer based material or a thin section metal. For this reason the spacing and design of the fingers 15 and 16 together with openings 17 are most important in order to allow the material to be deformed without inducing said stresses.

In the embodiments there is shown a toilet upon which a person using the toilet would sit on a seat 3 positioned immediately over the bowl 1. The toilet is flushed with water in order to clean the bowl 1 and remove the contents therein into a separate holding tank or directly into the sewer system. The lower section of the bowl 1 is designed such that after the toilet has been flushed, a quantity of water is retained in the bowl 1 which forms an air tight barrier between the bowl 1 and the sewer system. Accordingly, when a person is seated on the toilet, part of their body blocks off a large proportion of the projected area formed by the toilet rim 2, thus leaving the air within the bowl 1 substantially partitioned off so that the suction inlet of the air freshening system can be designed accordingly to extract the air containing the toilet odors.

The example of the invention shown in Fig 1 is an air flow freshening system in which the air in the bowl 1 and around the rim 2 is extracted through the air duct inlet ports 5 which are formed in the side face of the air duct section 4 which is retained inside of the rim 2. The extracted air passed through the air duct section 4 and into the air duct section 6 which is the continuation of the air duct section 4 but without air inlet ports 5 so as to provide a watertight air duct that can be passed through the water tank 9 and thereafter through the lid 13 to connect to the low pressure side of the extractor fan 8. The air is then transferred to the high pressure side of the extraction fan 8 and then forced through the fragrant element 7 before being returned back into the room. The extractor fan 8 is turned on by a sensor 11 which detects a person using the toilet. Once the person leaves the toilet the sensor 11 then turns the extraction fan 8 off. It will be observed that other features of the toilet such as the flush handle 12, flush valve 19, water overflow 14 and ball cock filler valve 10 all perform the same function as present toilet systems.

## CLAIMS

1 A toilet air flow freshening system which removes toilet odors using air suction and comprising a removable flexible air duct, part of which when fitted to the inside peripheral contour of the toilet rim forms passageways between the inside of the toilet rim and the external contours of the said air duct such that the flushing water circulates around the inside of the toilet rim and discharges into the toilet bowl without interfering with the suction of the toilet odors which are extracted through multiple inlet ports positioned in the side face of the air duct cooperating with each other such that they form a radial network of inlet ports which suck in the toilet odors from across and around the region of the rim and bowl of the toilet and transfer the toilet odors into another part of the air duct without the said inlet ports and which forms a continual and unimpeded airtight air duct which passes through the water tank and connect to the air suction device which lowers the air pressure within the air duct and which at the outlet exhaust side of said air suction device causes the toilet odors to pass through or over a fragrant element or perfumed media to remove said toilet odors such that the air is made pleasant enough to be recycled back into the room.

2 A toilet air flow freshening system according to Claim 1, in which the flexible air duct is constructed such that the part of the air duct with the said air suction inlet ports take up the inside peripheral contour of the toilet rim and is retained therein by having an interference fit or abutments, or a detent or a similar retaining devices which make use of the flexibility of the material to install and retain the air duct in position and when required also allow the air duct to be readily removed.

3 A toilet air flow freshening system according to the previous Claims, in which the physical sections of the air duct are so designed that the air duct is flexible in the conventional horizontal, longitudinal and vertical planes such that one design of air duct has sufficient flexibility to be able to fit to into wide range of different toilet rim designs and by so doing enable the air duct to be produced in volume quantities and hence in a cost effective way.

4 A toilet air flow freshening system according to Claim 3 in which the air duct would be made from a rubber, polymer or a very thin section metal that could be flexed as described in Claim 3 without inducing unacceptable stresses in the air duct material.

5 A toilet air flow freshening system according to Claim 1 whereby instead of passing the air containing the toilet odors through or over a fragrant element, the air is vented directly to the outside atmosphere.





INVESTOR IN PEOPLE

Application No: GB0325551.0

Examiner: Sarah Harrison

Claims searched: 1-5

Date of search: 28 April 2004

## Patents Act 1977: Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular reference
A	-	US2003/0163863 A1 (Stone)
A	-	US6314591 B1 (Schildt)
A	-	US5029346 A (Fernald, Sr.)
A	-	US6615410 B1 (Gurrola)
A	-	US3763505 A (Zimmerman)

### Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>W</sup> :

E1C

Worldwide search of patent documents classified in the following areas of the IPC<sup>07</sup>

E03D

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI & JAPIO