

Sept. 18, 1962

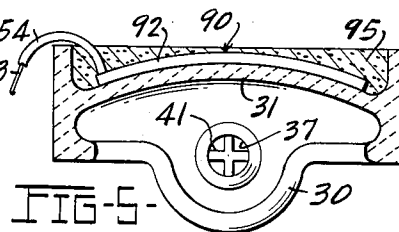
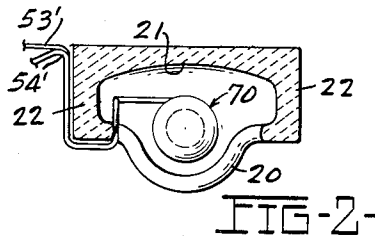
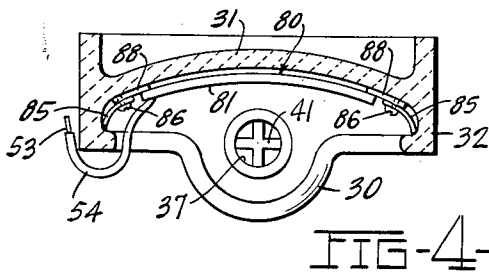
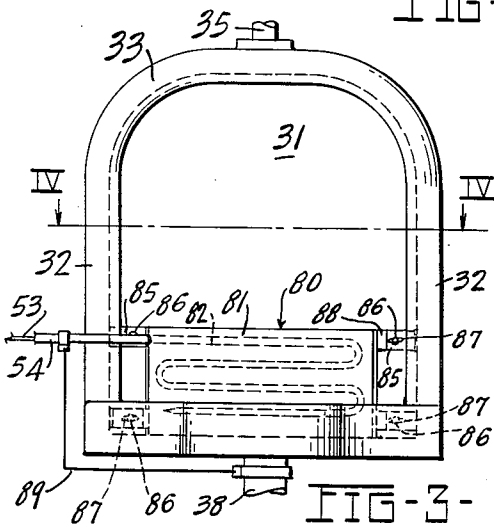
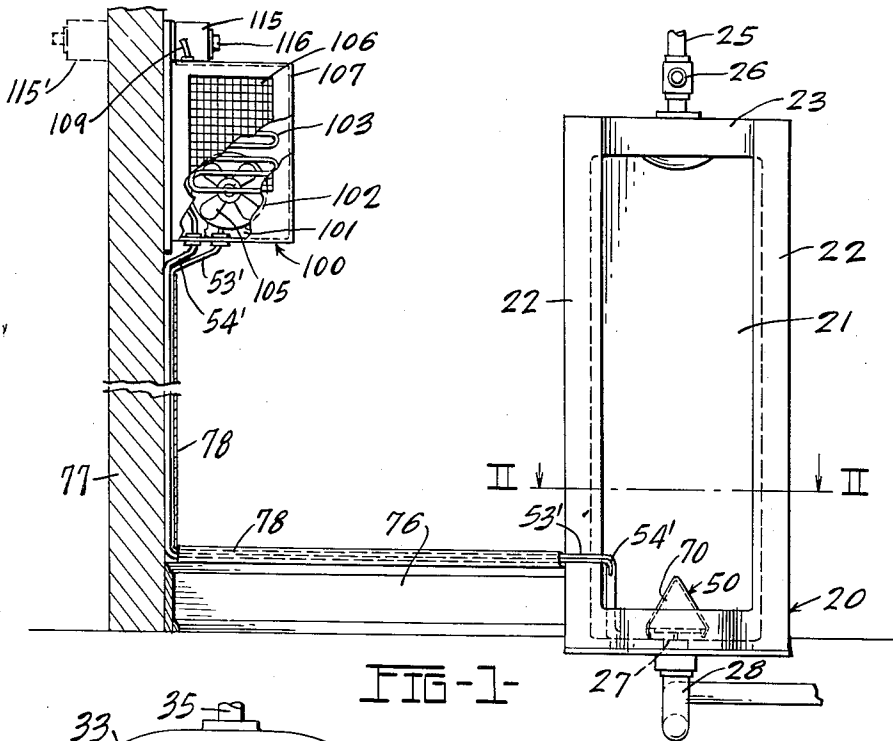
R. W. BLAIN ETAL

3,054,116

METHOD OF REFRIGERATING URINALS AND APPARATUS THEREFOR

Filed Dec. 10, 1959

2 Sheets-Sheet 1



INVENTORS:
RALPH W. BLAIN AND
BY ANTHONY S. KRIENER.

Hugh A. Kriener
ATTY.

Sept. 18, 1962

R. W. BLAIN ET AL

3,054,116

METHOD OF REFRIGERATING URINALS AND APPARATUS THEREFOR

Filed Dec. 10, 1959

2 Sheets-Sheet 2

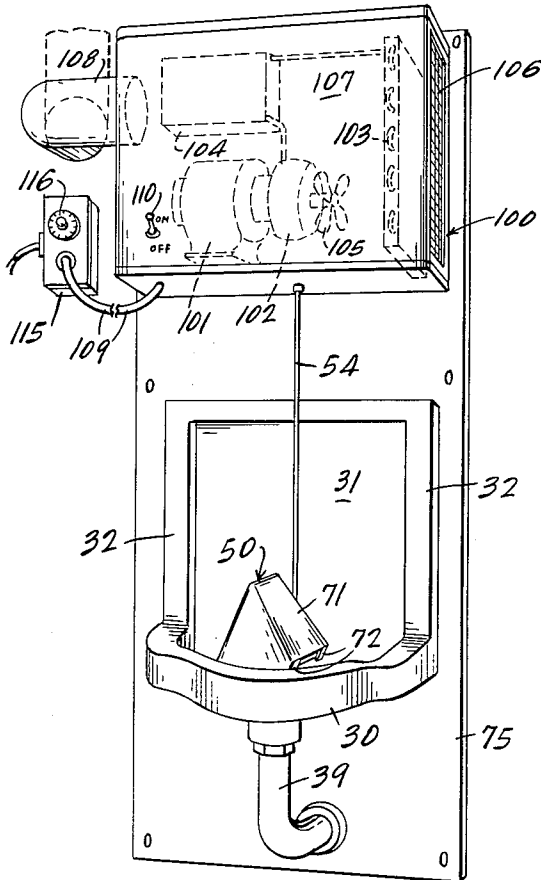


FIG-6-

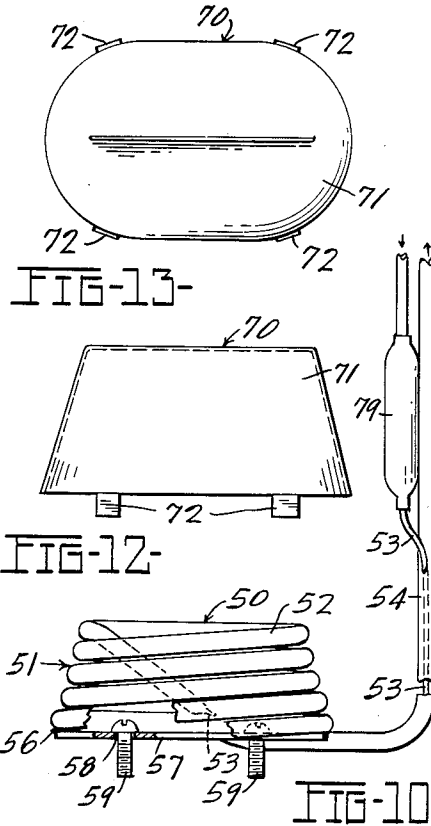


FIG-13-

FIG-12-

FIG-10-

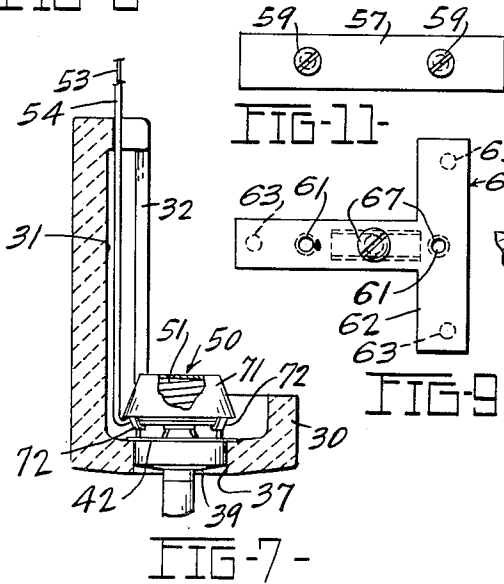


FIG-7-

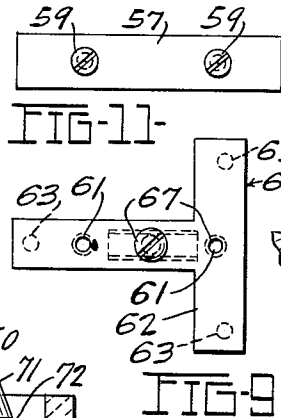


FIG-9-

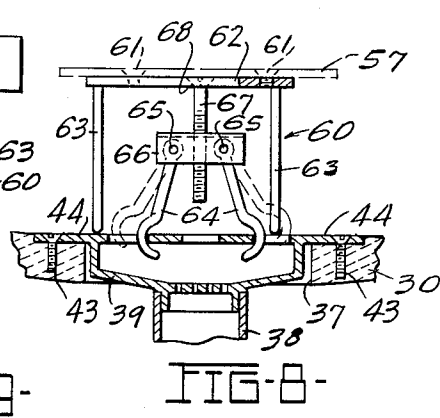


FIG-8-

INVENTOR.
RALPH W. BLAIN AND
BY ANTHONY S. KRIENER.

Hugh A. Kirk
ATTY.

1

3,054,116

METHOD OF REFRIGERATING URINALS AND APPARATUS THEREFOR

Ralph W. Blain, 39 W. Alexis Road, Toledo 12, Ohio, and
Anthony S. Kriener, 3546 145th St., Toledo 11, Ohio
Filed Dec. 10, 1959, Ser. No. 858,769
13 Claims. (Cl. 4—99)

This invention relates to a method of eliminating offensive odors and retarding bacteria development in urinals and to an apparatus for carrying out this method. More particularly, it deals with a cooling element of a refrigerating system located adjacent the drain of a urinal to maintain the atmosphere in the region of the drain at a sufficiently low temperature for condensing vapors, retarding bacterial development, preventing updrafts and eliminating or at least reducing unpleasant odors.

This invention has particular advantage in frequently used men's toilets such as are located in offices, factories, taverns, restaurants, schools, clubs, churches, public halls, hotels, hospitals, stadiums, military posts, public institutions and parks, and the like where offensive odors of toilets most frequently occur.

Accordingly it is an object of this invention to produce an efficient, effective, simple, reliable and economic method and refrigerating apparatus for eliminating obnoxious odors from urinals, particularly those urinals that are not being continuously flushed with water or having pools of water in them.

Another object is to provide such a refrigerating apparatus which is adapted to be installed in existing urinals, or built into new urinal installations.

Another object is to produce a cooling apparatus for refrigerating urinals which is sanitary, easy to clean, safe, non-corrosive, does not interfere with the normal drainage of urinals, eliminates the use of disinfectants, and de-odorizers, and is easy to install and service.

Another object is to provide such a refrigeration apparatus which may be adjusted for continuous or intermittent operation and is automatically defrosting, and also is sufficiently protected to prevent tampering therewith by unauthorized persons.

Generally speaking, the method of this invention comprises cooling the atmosphere adjacent the drain in the lower part of the bowl of a urinal to produce a down draft of air so as to prevent odors therefrom from rising, to cool the region sufficiently to retard the growth of bacteria which produce odor emanating products, and to cool adjacent bowl surfaces to condense any vapor which might cause obnoxious odors, all without interfering with the normal use, flushing and/or flow of liquids through the bowl and its drain.

Generally speaking, the apparatus for carrying out this method comprises a cooling element for installation in the lower portion of the bowl of a urinal adjacent but spaced from the drain in the bowl including means for anchoring the element in such a location, a refrigeration unit preferably outside the urinal and connected by ducts to the cooling element for the circulation of a fluid through the cooling element, and preferably also a control means for the refrigeration unit to maintain a temperature in the atmosphere adjacent the drain of the urinal below about 40° F. and usually not lower than 10° F. Although the method and apparatus of this invention is applicable to both floor and wall type urinals, it is particularly adapted for those urinals which do not normally maintain pools of water in the bottom of their bowls, but have normally open drains and which may or may not be periodically flushed by water. However, if the apparatus of this invention is employed in a urinal which has a pool of water in the bowl thereof, it is important that the cooling element is spaced sufficiently above or away from the water

2

so as not to cause it to freeze, stop the normal operation and flow liquids through the urinal, and/or damage to the urinal.

The cooling element may comprise a coiled tube mounted on a support connected to and directly over and spaced above the drain, or it may comprise a circuitous path along or in at least a portion of surface of the lower or bowl part of the urinal such as at the lower end of the back or splash wall of the urinal, and still be positioned as close to the drain as possible without obstructing the normal flow of liquids through the drain. The closer the cooling element is to the drain or the atmosphere around the drain the more effective will be its results. The cooling element may preferably also be protected by being electrically grounded and/or by a non-corrosive shield or cover, such as of stainless steel which may be welded, clamped or otherwise fixedly secured to the outer surface of the cooling element so that it will be easy to clean and to maintain and present a sanitary appearance. The cooling element is preferably an evaporator and is connected to two ducts, tubes or pipes with a normal recycling volatile.

The fluid refrigeration unit may be similar to those employed in normal household refrigerators and air conditioners, and may comprise a fluid reservoir, a compressor, an electric motor for driving the compressor, a condensor for cooling compressed fluid, and preferably also a circulating fan connected to the motor for drawing air over the condenser to improve the efficiency of the unit. This refrigeration unit is preferably mounted sufficiently high above the urinal or in another room so as to be out of the normal reach of persons unauthorized to tamper therewith. The refrigeration unit is connected to the cooling element by two ducts which may be parallel or one inside the other so as to require as little space as possible as well as to be as inconspicuous as possible and may also be shielded to protect them from tampering by unauthorized persons. Furthermore, if desired the fan in the refrigeration unit may act to circulate and/or exhaust the air in and/or from the toilet or room of the urinal. The control means for the refrigeration unit may comprise a timer in the electric circuit to the motor so that the compressor will only operate so many minutes out of every hour, which may be varied depending upon the amount of use which the urinal is to receive.

The above mentioned and other features and objects of the invention and the manner of attaining them will become more apparent and the invention itself will be best understood by reference to the following description of embodiments of the invention taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a side elevation of one embodiment of this invention installed over the drain of a conventional floor urinal showing the refrigeration unit and control timer therefor spaced therefrom and connected thereto through a shielded duct;

FIG. 2 is a sectional view along line II—II of the urinal in FIG. 1 in the direction of the arrows, showing a plan view of the cooling element over the drain in the urinal;

FIG. 3 is a side elevation of an embodiment of a flat or surface type of cooling element installed in a wall type urinal;

FIG. 4 is a sectional view taken along line IV—IV of FIG. 3 in the direction of the arrows, showing one means for anchoring a cooling element against the splash wall of a urinal;

FIG. 5 is a sectional view similar to FIG. 4 showing an embodiment of imbedding the cooling element in the lower back or splash wall and bowl of a urinal;

FIG. 6 is a perspective view of an embodiment of a wall type of refrigerated urinal and its refrigeration unit,

3

similar to that shown in FIG. 1, in which the unit above the urinal is also adapted for ventilating the room;

FIG. 7 is a vertical sectional view through the center of the urinal shown in FIG. 6, showing the cooling element mounted to and spaced above the drain strainer plate in the bottom of the bowl of the urinal;

FIG. 8 is an enlarged vertical section of one embodiment of a device for anchoring, spacing, and supporting a cooling element of the type shown in FIG. 1 or 7 to the strainer plate in the drain outlet of a urinal;

FIG. 9 is a plan view of the spacing and supporting device shown in FIG. 8;

FIG. 10 is an enlarged view of an oblong frusto-conical coil adapted for attachment to the pedestal or support shown in FIG. 8;

FIG. 11 is a plan view of the plate which may be attached or welded to the bottom of the coil shown in FIG. 10 for anchoring the coil to the supporting device shown in FIGS. 8 and 9;

FIG. 12 is a side view of a non-corrosive elongated conical hood for covering the coil shown in FIG. 10; and

FIG. 13 is a plan view of the hood shown in FIG. 12.

I. The Urinal

Referring first to the floor type urinal shown in FIGS. 1 and 2, there is shown a lower bowl portion 20 with a back splash wall 21 bordered by side inwardly flanged walls 22 which may be bridged by a top end or roof portion 23. Flushing water may be introduced at the top 23 through a pipe or duct 25, the flow of water in which may be controlled by a manual valve 26, or by a remote intermittent urinal flushing apparatus. The bottom of the bowl portion 20 of this urinal is provided with a drain aperture 27 at its inner lowermost region, to which aperture is connected a drain or sewer pipe 28 for removal of the liquids which pass through the urinal.

In FIGS. 3 through 7 there is disclosed another or wall type of urinal having a lower bowl portion 30 and a back splash wall portion 31 which may have inwardly flanged side walls 32. This wall type of urinal may have a top wall 33 as shown in FIG. 3 and a water flushing duct 35. At the lowermost region or bottom of the bowl portion 30 is provided a drain aperture 37 into which a drain pipe 38 may be connected by means of a suitable fitting 39 as shown in FIGS. 7 and 8 which may include or contain a strainer means such as crossed bars 41 shown in FIGS. 4 and 5, and/or which may be covered by or incorporate a foraminous or an apertured strainer plate 42 as shown in FIGS. 7 and 8, which also may have a peripheral flange 43 anchored to the edge of the aperture 37 by means of screws 44.

II. The Cooling Elements and Connections

Several different embodiments of cooling elements are disclosed in the different figures, with that shown in FIGS. 1 and 2 being similar to that shown in more detail in FIGS. 6 through 13, namely, an element 50 which may be mounted on and spaced above the strainer means 41 or 42 of the drain 27 or 37 at the bottom of the bowl 20 or 30 of the urinal. The parts of this cooling element 50 and its mounting or supporting means are shown in more detail in FIGS. 7 through 13.

The volatile refrigerant evaporating part 51 of the cooling element 50 may comprise a frusto-conical coil of tubing 52 (see FIGS. 7 and 10), one end of which is connected to a smaller internal volatile liquid refrigerant introducing tube 53 which may be inside a larger and outer gaseous refrigerant returning tube 54, which tubes or ducts 52 and 53 connect the evaporator or cooler 51 with a refrigerating unit 100 to be described later. This coil 51 of tubing 52 may have adjacent coils thereof soldered or welded together at intervals such as at spots 55, and the whole coil 51 as a unit may be mounted, such as by welds 56 to a mounting plate 57 (also shown in FIG. 11) provided with a pair of apertures 58 through which

4

screws 59 extend to attach the coil or cooler 51 supporting and drain spacing pedestal 60 provided with corresponding threaded apertures 61 for the screws 59 in a top plate portion 62 thereof. This plate portion 62 may be of a T-shaped configuration as shown in FIG. 9, at the free ends of which may depend three legs 63 to form a stable tripod type of spacing support 60 to maintain the cooling element 50 spaced sufficiently above the drain aperture 37 so as to prevent any hindrance with the normal flow of liquid through the drain or freeze solid any water which may remain in the bottom of the bowl.

This pedestal or support 60 may be anchored securely to the drain plate 41 by means of a pair of depending hooks 64 as shown in FIG. 8, pivoted at 65 to a threaded cross member 66 which may cooperate with a depending screw 67 which may be countersunk in an aperture 68 in the center of a T-shaped plate 62. Thus, as the screw 67 is tightened to draw up the cross member 66, the hooks 64, which have been engaged under the cross bars 41 or through apertures or perforations of strainer members across the drain aperture 37, are drawn upwardly to hold the legs 63 of the pedestal 60 securely against the top surface or flange 44 of the drain plate 42. Such a connection enables easy installation and removal of the apparatus of this invention, as well as providing an electrical contact for grounding the cooling element 50 to the drain pipe 38. Once this pedestal 60 is installed, the cooling element 50 and its coil 51 shown in FIG. 10 may be mounted on the top thereof by the screws 59 threaded into the tapped apertures 61.

Both to improve the appearance and to protect the coil 52, there may be provided a hood or cover 70 of stainless steel or other non-corrosive metal, such as the oblong cone 71 as shown in FIGS. 12 and 13, which fits snugly over the top of the coils 52 of the cooler 51, and which may be provided with bendable lower tabs or ears 72 at spaced positions around its lower peripheral edge to be bent underneath the edges of the lowest coil 52 as shown in FIG. 7, to securely maintain the hood 70 or cone 71 in place.

Thus the type of cooling element 50 as shown in FIGS. 1, 2, 6 through 13 may be installed adjacent and spaced above the drain in a urinal to sufficiently and adequately cool the atmosphere surrounding the drain without materially hindering the normal flow of liquids through the drain (which as can be seen in FIGS. 7 and 8) can flow around and between the leg 63 of the pedestal 60 and about the hooks 64 to the normal apertures in the top of the strainer members 41 or 42 into the drain pipe 28 or 38.

The concentric ducts 53 and 54 from the wall type urinal shown in FIGS. 6 and 7 may extend vertically upwardly along its back splash wall 31 to the refrigeration unit 100 located above the urinal and may be mounted therewith on a single panel 75. However, if the urinal is of the floor type and/or already installed as shown in FIG. 1, the separate ducts 53' and 54' (or concentric ducts like 53 and 54) may be bent around the lower corner of the urinal and extended along the wall, such as above the baseboard 76 shown in FIG. 1 and then upwardly along a wall 77 to the refrigerating unit 100. In FIG. 1, however, the ducts or tubes 53' and 54' are shown covered by a shield or molding 78 to insulate the tubes and/or to prevent unauthorized tampering therewith.

In the refrigerant liquid ducts 53 or 53' to the cooling element 50, and preferably near the refrigerating unit 100, there may be provided a filter 79 as shown in FIG. 10 for filtering the volatile refrigerant liquid as it circulates through the system. This also prevents the small tube 53 inside the tube 54 from becoming clogged by any dirt or contaminants which may have gotten into the system while it was being installed.

In FIGS. 3 and 4 another embodiment of a cooling element 80 installed in the bowl 30 against the splash wall 31 of a urinal, which element may comprise a curved

5

plate like member covered by a flat non-corrosive plate 81, such as stainless steel, and including behind said cover plate a circuitous path of an evaporator tube 82 connected at one end to smaller or volatile refrigerant liquid duct 53 (or 53') from the refrigerating unit 100 and at the other end to the larger return, or suction duct 54 (or 54'). Since the bowl 30 does not maintain a pool of water, it is desirable to place the cooling element 80 as close to the bottom of the bowl 30 and to the drain aperture 37 as possible.

This plate-like cooling element 80 may be maintained and installed in an existing urinal by means of adjustable projections 85 which may be attached by screws 86 through slots 87 into threaded apertures in ears 88 which may be welded or otherwise attached to the side edges of the plate-like cooling element 80, or to its tubes 82 and/or its cover plate 81. This cooling element 80 also may be curved slightly to fit snugly against the corresponding curved surface of the back splash wall 31 and the adjacent bowl 30. Thus, the element 80 may be held in this position by adjusting the extensions 85 to anchor behind the inwardly flanged edges of the side walls 32 as shown in FIG. 4, and then clamping the projections 85 against the ears 88 by means of the screw 86. Since this unit 80 is not connected to the drain, it is desirable, for safety reasons, to provide an electrical grounded connection, such as a wire 89 shown in FIG. 3, to electrically connect the cooling element or duct 54 connected thereto to the drain or sewer pipe 38 from the bottom of the bowl 30 of the urinal.

In FIG. 5 still another embodiment of a cooling element 90 is disclosed, in which the circuitous evaporator 92 may be placed against or within the back splash wall 31 of the urinal adjacent the lower end or bowl 30 thereof and cemented or otherwise molded in place, by means of a plastic material 95. In this embodiment the ducts 53 and 54 to and from the cooling element 90 may extend directly through the wall behind the urinal, and thus there could be no visual indication that the urinal was refrigerated. Such an embodiment may be installed in new installations. Also in this embodiment of FIG. 5, it is not necessary to provide a safety grounded connection to the cooling element 90, in that it is impossible for any liquid or urine to contact this imbedded cooling element 90 and produce any sort of an electric circuit to the one using the urinal, as might be the case where the cooling element is inside the bowl and a short circuit occurs in the refrigerating unit 100 which may be connected by metal ducts 53 and 54 (or 53' and 54') thereto.

III. The Refrigeration Unit

In FIGS. 1 and 6 there are disclosed refrigeration units 100 connected to the cooling elements 50 for refrigerating the urinals of this invention, which units 100 may be of standard or conventional type embodying a power source or motor 101 (see FIG. 6) driving a compressor 102 which is connected through its suction or inlet to duct 54 or 54' from the cooling element, and a condenser 103 connected to the outlet from the compressor 102. The outlet of the condenser may be connected directly to the capillary tube 53 or 53' or to a reservoir 104 (as shown in FIG. 1) for accumulating the liquid from the condenser 103 for recirculation through the liquid duct 53 or 53' to the cooling element.

Also, either connected onto the shaft for driving the compressor 102 by the motor 101, or to a separate motor, may be an air circulating fan 105 which may increase the efficiency of the unit by sucking air into the open end or grille or grate 106 in the cover 107 over the unit 100 and through or across the condenser 103, and thence out through the other side or end of the unit 100, which other side also may be open and covered by a grille similar to 106 as shown for the embodiment of FIG. 1. However, if desired, this circulating air through the unit 100 may also be used for ventilating the room in which the urinal

6

is located, or the room in which the refrigerating unit 100 is located, and the opposite or air outlet end of the unit may be connected to a duct 108 as shown in FIG. 6, which duct may be connected to the outside or a chimney for removing any fumes which may be in the room, such as from the toilet or stool which may not be de-odorized by refrigerant in a cooling element of this invention.

In the circuit of the electrical conductors 109 for supplying power to the motor 101, there is preferably provided an "Off" and "On" switch 110, and also or instead of the switch 110, an electric timer 115. This timer 115 may have a manually adjustable dial 116 to vary the time that the motor 101 is operated, so as to control either continuous or variable intermittent operation of the refrigeration unit 100, such as operation every two or three minutes out of every ten minutes, or as may be required. This intermittent operation not only automatically defrosts the cooling element 50, 80 or 90, but also enables savings on energy when continued operation is not necessary to obtain the desired result of this invention. It is desirable that at least the timer 115 and its adjustment 116, and preferably the whole unit 100 also, be located out of the normal reach of people who use the urinal, to prevent unauthorized tampering therewith, such as being located in another or adjacent room or on the other side of the wall 77, as shown in dotted lines for the timer 115' in FIG. 1.

Furthermore, a single refrigeration unit 100 may be connected by a manifold or plurality of ducts 53 and 54 or 53' and 54' to a plurality of cooling elements 50, 80 and/or 90 in each one of a series of separate urinals, without departing from the scope of this invention.

Although only one embodiment was disclosed for attaching and spacing the cooling unit to the outlet or drain of a urinal it is to be understood that other means may be employed for mounting the unit and for effecting the purpose desired.

While there is described above the principles of this invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of this invention.

What is claimed is:

1. In a urinal having a bowl portion with an upstanding splash wall and a drain in the lower portion of said bowl portion, said drain comprising an aperture and having a strainer over said aperture, a device for refrigerating said urinal to retard bacterial development and increase vapor condensation to eliminate offensive odors, said device comprising: a refrigeration unit employing a fluid refrigerant and including a means for circulating said fluid, a cooling means located in said urinal remote from said refrigeration unit, a pedestal mounted on said strainer, means for anchoring said pedestal to said strainer, means for anchoring said cooling means on said pedestal whereby said cooling means is spaced from said drain sufficiently to prevent obstruction of normal liquid flow through said urinal and drain, and dual duct means connecting said cooling means with said refrigerating unit for circulation of said fluid through said cooling means to refrigerate said urinal.

2. A refrigerated urinal according to claim 1 including means to regulate the operation of said refrigeration unit to maintain the atmosphere adjacent said drain below about 40° F. and above a temperature that will cause the liquid in said drain to freeze.

3. A refrigerated urinal according to claim 1 wherein said cooling means comprises a tubular coil.

4. A refrigerated urinal according to claim 3 wherein said cooling means includes a non-corrosive shield over said coil spaced from said bowl portion and said drain.

5. In a urinal having a bowl, a splash wall associated integrally therewith, a drain in the lower portion of said bowl, and a flushing means therefor, the improvement comprising means for cooling the atmosphere in said

7

bowl adjacent said drain to retard bacterial growth, condense vapors and thereby reduce odors, said means comprising: a refrigeration unit spaced from said urinal, a cooling element in said urinal adjacent said drain, duct means connecting said element with said unit, means to attach said cooling means in said urinal and to space said cooling means from said drain sufficient to permit free flow of liquid through said drain, and means to regulate the operation of said refrigeration unit to maintain the atmosphere adjacent said drain below about 40° F. and to prevent the freezing of any liquid that may accumulate in said drain.

6. A refrigerated urinal according to claim 5 wherein said refrigeration unit comprises: a fluid refrigerant, a power source, a compressor driven by said power source, and a condenser for said refrigerant; and wherein said duct means includes a pair of ducts, one from said cooling element to said compressor and the other from said condenser to said cooling element.

7. A refrigerated urinal according to claim 6 including an air circulating fan connected to said power source moving air past said condenser.

8. A refrigerated urinal according to claim 7 wherein said refrigeration unit includes a passageway for air therethrough, and air duct means connected to said passageway, and said fan moves air through said passageway.

9. A refrigerated urinal according to claim 6 wherein said power source comprises an electric conductor connected to an electric motor, and said regulation means comprises an electric timer in said conductor to said motor.

10. A refrigerated urinal according to claim 9 wherein

8

said timer includes a manually adjustable switch for varying the time at which electric power is conducted to said motor so that said refrigeration unit is operated only at regular pre-determined intervals.

11. A refrigerated urinal according to claim 9 including means to electrically ground said refrigeration unit to said urinal drain.

12. A refrigerated urinal according to claim 5 wherein said cooling element comprises a plate having a circuitous duct therein and is located along a portion of the surface of said bowl portion.

13. A refrigerated urinal according to claim 12 wherein said urinal has inwardly extending side edges, and said attaching means for said cooling plate includes means for removably engaging said side edges.

References Cited in the file of this patent

UNITED STATES PATENTS

1,411,218	Markowsky	Mar. 28, 1922
1,916,357	Brownstein	July 4, 1933
1,963,698	Garre	June 19, 1934
2,159,907	Morris	May 23, 1939
2,257,801	Hull	Oct. 7, 1941
2,473,781	Brinkoeter	June 21, 1949
2,484,371	Bayston	Oct. 11, 1949

FOREIGN PATENTS

665,481	Germany	Sept. 26, 1938
---------	---------	----------------

OTHER REFERENCES

Todd et al.: Clinical Diagnosis by Laboratory Methods, ninth edition, published W. B. Saunders Co., 1941, pages 76-77 relied upon, copy in Div. 43.