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McTighe et al.

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[54] **SELF-CLEANING RESTROOM, AND METHOD FOR CLEANING A RESTROOM**

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[21] Appl. No.: **140,227**

[52] **U.S. Cl.** ..... **4/1,** 4/145, 134/167 R, 134/168 R

[51] **Int. Cl.** **A47k 17/00,** E03d 11/12

[58] **Field of Search** ..... 4/1, 145, 146, 173, 233; 134/167 R, 168 R, 169 R; 137/625, 47

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[57] **ABSTRACT**

A restroom including an enclosure, and bathroom fixtures mounted centrally within said enclosure on a pedestal. The restroom is automatically cleaned by moving a vertical spray boom around the inner periphery of the enclosure to spray both the sidewall of the enclosure and the fixtures mounted therewithin with cleansing fluid, the fluid then being drained from the enclosure, after which any accumulated vapors are exhausted. Heated drying air is then passed through the enclosure to complete the cleaning cycle.

13 Claims, 6 Drawing Figures

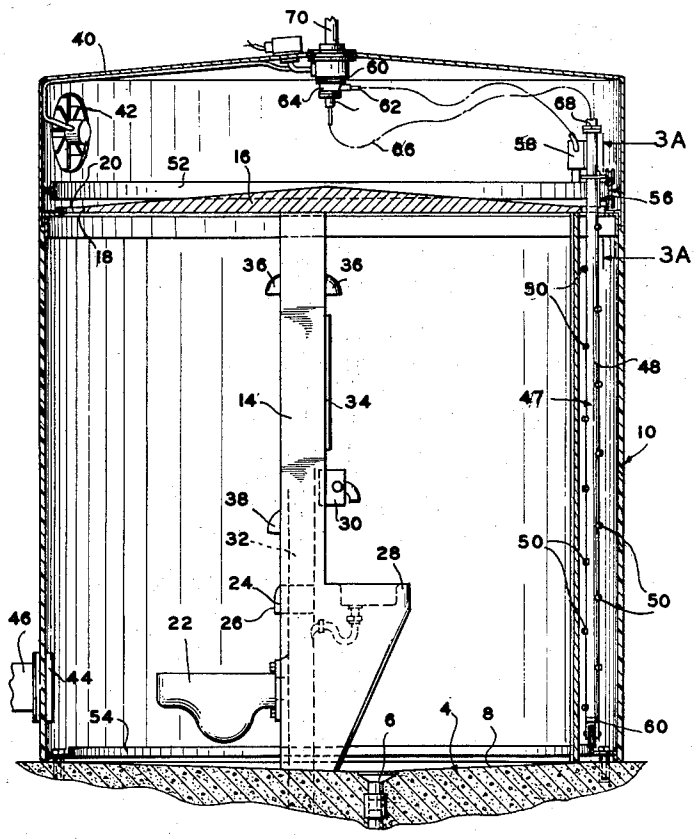


FIG. 1.

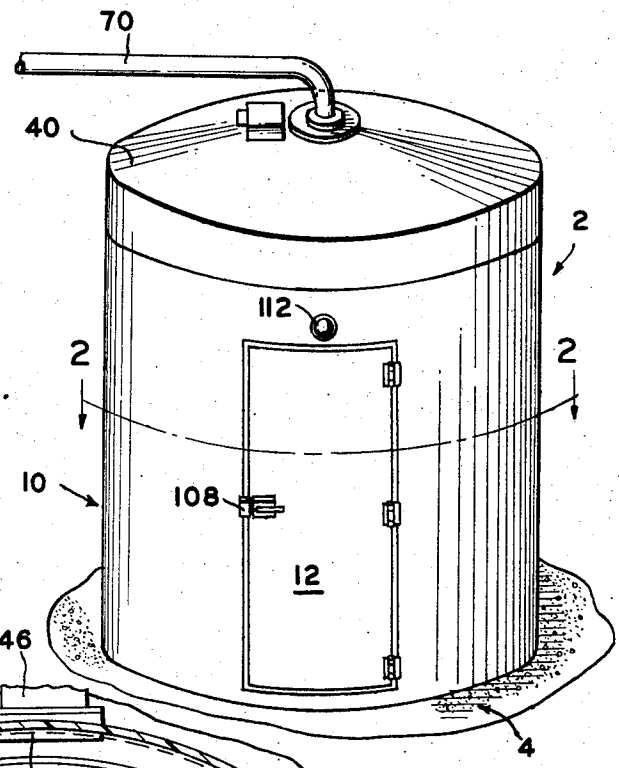
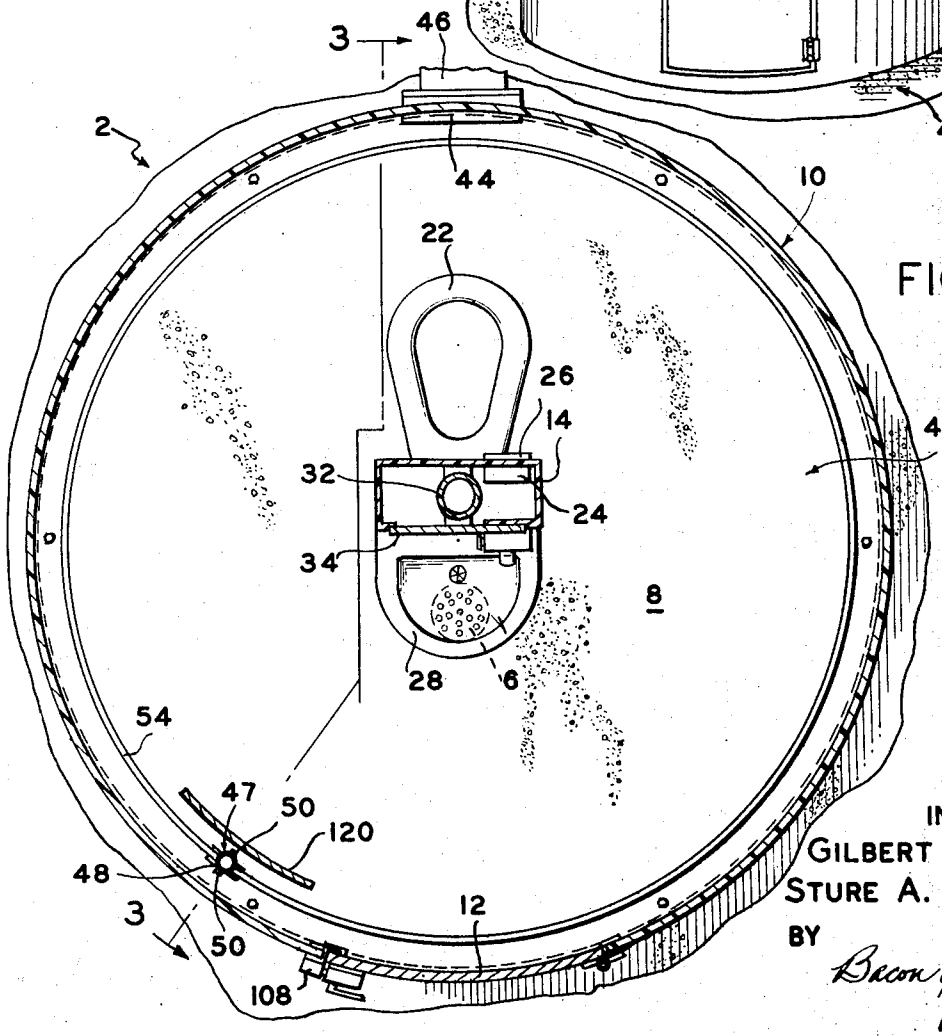


FIG. 2.



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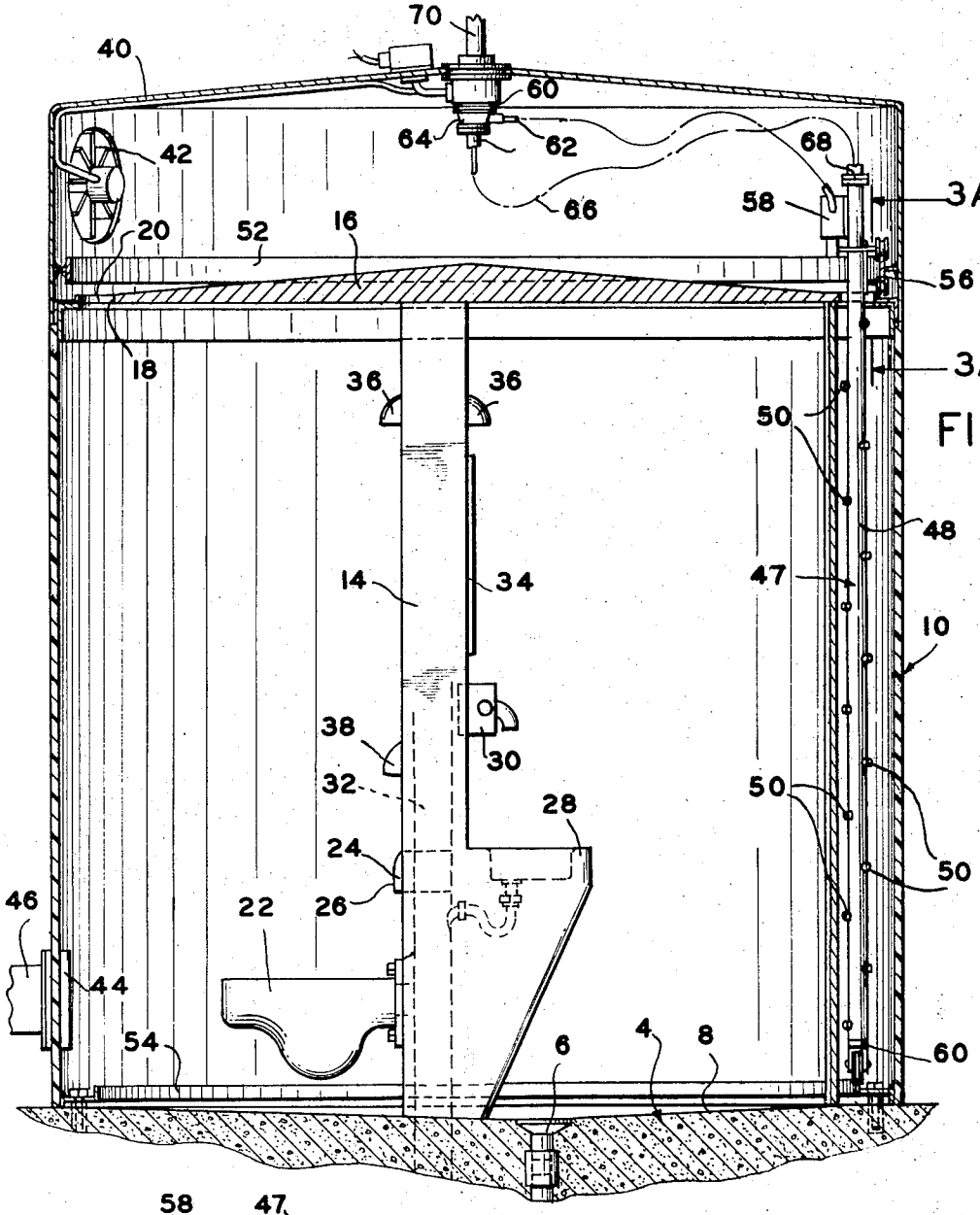


FIG. 3.

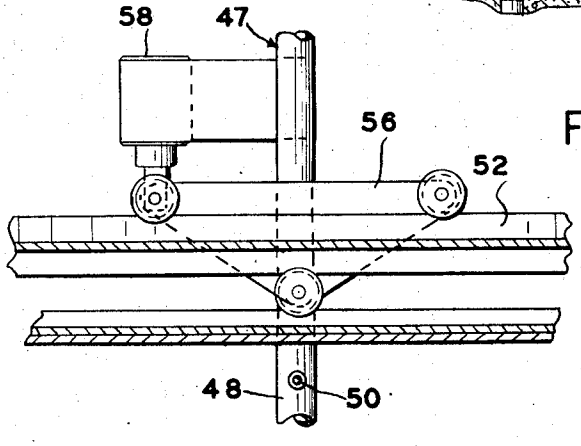


FIG. 3A.

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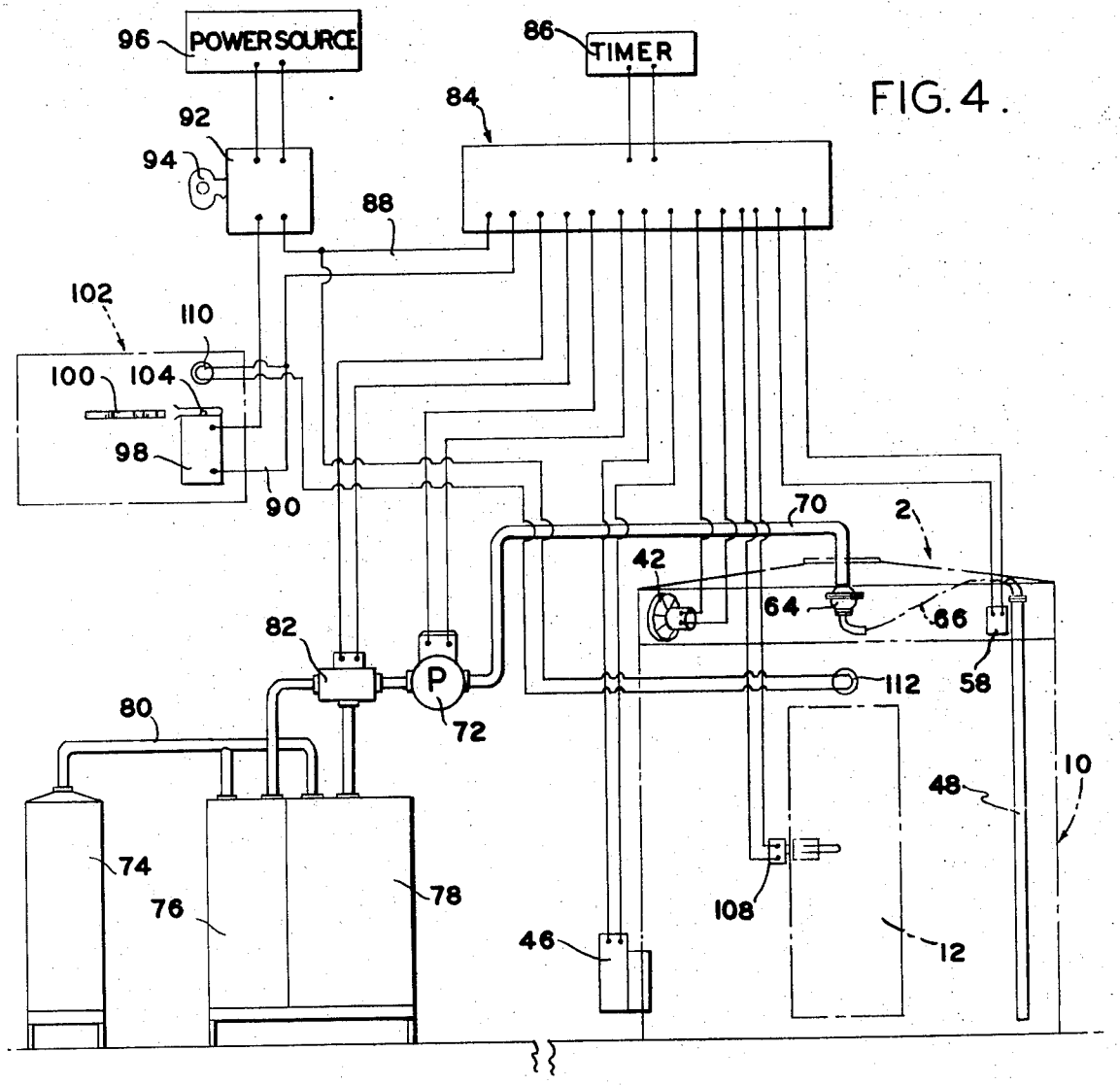


FIG. 4.

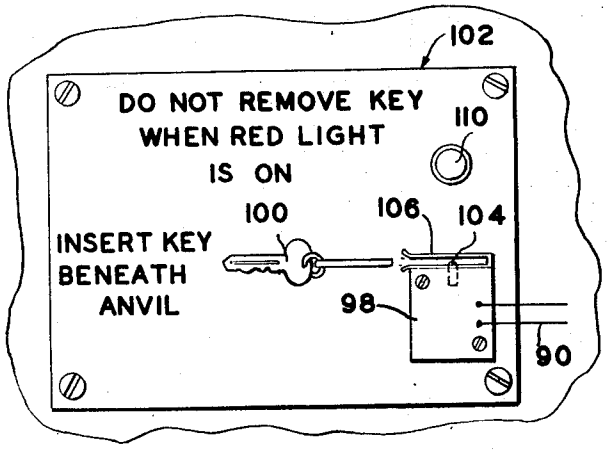


FIG. 5.

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SELF-CLEANING RESTROOM, AND METHOD FOR CLEANING A RESTROOM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to restrooms of the type utilized in gasoline filling stations and the like, and more particularly to a modular self-cleaning restroom, and a method for automatically cleaning such restrooms.

2. Description of the Prior Art

Gasoline filling stations and other similar structures are commonly provided with restrooms for the convenience of the general public, such restrooms commonly including a water closet and a lavatory or wash basin, and possibly other fixtures. Because of the continuous use by transients such facilities need frequent cleaning, the accommodation of which need places considerable and unwelcome demands on otherwise busy operating personnel.

There is thus a need for an easily cleaned restroom, preferably one that can be cleaned automatically so that minimum demands are placed on busy employees. The present invention is directed to satisfying that need.

SUMMARY OF THE INVENTION

The present restroom includes an upright enclosure having a sidewall and a bottom wall, the sidewall having an access door mounted thereon. The bottom wall has a drain therein, and supports a pedestal that extends centrally upwardly through the enclosure. The upper end of the pedestal supports a top wall, the periphery of which is spaced from the enclosure sidewall to provide an annular flow space therebetween.

The pedestal also serves as the support for a water closet, a lavatory or sink, a fixture for holding tissue, a dryer for the hands, and necessary lighting fixtures. Thus, none of these items need be mounted on the container sidewall, a feature that contributes to the self-cleaning ease of the restroom. The pedestal and all of the bathroom fixtures and other items carried thereby are spaced from the enclosure sidewall.

A vertical spray boom is mounted by upper and lower tracks on the interior of the enclosure sidewall, and is arranged to travel around the periphery of the sidewall. It is in order to provide for this movement that the pedestal and the items supported thereon are spaced from the sidewall. The boom includes both inwardly and outwardly directed nozzles, and the upper end thereof extends through the annular flow space into the region above the enclosure top wall, where it is mounted on a carrier that runs on the upper support track and which is driven by a motor. The upper end of the spray boom is connected, through solenoid valves, to a source of cleansing fluid.

In order to provide for the movement of air through the restroom, the enclosure sidewall has a vent therein, and an exhaust fan is mounted in the enclosed region above the top wall. When the exhaust fan is operated, air is pulled into the enclosure through the vent, passes upwardly through the annular flow space that also serves to accommodate the upper end of the spray boom, and exits through the exhaust fan. The positions of the vent and the exhaust fan can be reversed, if desired.

A device for supplying heated, dry air to the enclosure is also provided, which device can for convenience be incorporated with the vent. The spray boom motor, the cleansing liquid supply apparatus, the exhaust fan, and the device for supplying heated air are all connected with a control unit, which when actuated will automatically operate each of these components in proper sequence to clean the restroom of the invention.

The present method of cleaning a restroom includes the sequential steps of spraying the interior of the restroom with cleansing fluid, draining away the resultant liquid, exhausting from the enclosure any accumulated vapors, and finally passing through the enclosure heated drying air. These steps are carried out in the present method in the following way.

When it is desired to clean the present restroom, the operator first picks up any scrap paper or the like, and applies any necessary detergent to loosen lipstick marks or the like. The door of the restroom is then closed, and the control unit is actuated.

Upon actuation of the control unit the restroom door is first automatically locked, to prevent anyone being injured by accidental opening thereof during a cleaning cycle. The spray boom is then placed in operation, and repeatedly moves around the inner periphery of the enclosure in alternating wash and rinse modes. The control unit then terminates operation of the boom and actuates the exhaust fan, which removes steam and other vapors from the enclosure while the used cleansing liquids are drained away. Finally, heated dry air is supplied to the enclosure, after which the control unit completes a cleaning cycle and unlocks the access door.

The restroom is then ready for further use, thorough cleaning thereof having been accomplished with minimum demands of time and effort on the operator or attendant. Because cleaning is an easy matter with the present method and apparatus, the chore is likely to be performed whenever needed, which contributes to the sanitary and aesthetic comfort of customers or others using the facility.

It is a principal object of the present invention to provide a method for automatically cleaning a restroom.

Another principal object is to provide a self-cleaning modular restroom, designed for easy operation and maximum sanitation and aesthetic appeal.

It is also an object to provide a restroom uniquely designed to be cleaned by spraying the same with cleansing liquids.

A further object is to provide apparatus for automatically cleaning a restroom.

Other objects and many of the attendant advantages of the invention will become readily apparent from the following Description of the Preferred Embodiment, when taken together with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of the modular restroom of the invention;

FIG. **2** is a horizontal sectional view taken along the line **2—2** of FIG. **1**, showing the interior of the restroom;

FIG. **3** is a vertical sectional view taken on the line **3—3** of FIG. **2**, showing in detail the spray boom and other features of the invention;

FIG. 3A is an enlarged view taken on line 3*a*—3*a* of FIG. 3, showing the upper carrier and track arrangement;

FIG. 4 is a diagrammatic view showing the fluid and electrical circuits of the invention; and

FIG. 5 is a front view of a public display plaque for holding the restroom key.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, the modular restroom of the invention is shown at **2**, the module being designed for installation within a building such as a restaurant or gasoline filling station. With suitable modifications to withstand the elements, it is to be understood that the restroom **2** can also be erected out of doors as a free standing structure, if desired.

The restroom **2** includes a circular floor **4** having a drain **6** therein, the upper surface **8** of the floor sloping downwardly toward the drain. Mounted on the floor **4** is an upright cylindrical enclosure **10** having a self-closing access door **12** therein, which enclosure can be made of metal, plastic or some other suitable material.

Positioned centrally within the cylindrical enclosure **10** and extending upwardly from the floor **4** is a hollow rectangular pedestal **14**, the floor drain **6** being offset from the pedestal, and the pedestal being spaced from the enclosure sidewall **10**. The pedestal **14** is utilized for mounting all bathroom fixtures, and supports at its upper end a circular roof **16**. The peripheral edge **18** of the roof **16** is spaced from the cylindrical enclosure sidewall **10** completely therearound, to provide an annular flow space **20**.

Mounted on the side of the pedestal **14** facing away from the door **12** is a one-piece watercloset **22** of the type that is easily washed down by spraying with cleansing liquid, a toilet tissue dispenser **24** being recessed into the pedestal **14** nearby and having a watertight lid **26** thereon that is normally held closed by magnets or some other suitable latch device. The side of the pedestal **14** facing the door **12** has a one-piece wash basin or lavatory **28** mounted thereon, again of a design that can be easily spray cleaned. Recessed in the pedestal above the lavatory **28** is an electric hand drier **30**, designed and mounted to be unaffected by water sprayed thereon. The standpipe **32** for the fixtures **22** and **28** is contained within the pedestal **14**, as is all electrical wiring, the pedestal being of a size so that a person can easily walk from one side to the other thereof.

Typically, the pedestal **14** will measure about 8 inches thick by about 18 inches wide, and the enclosure **10** will have a diameter of about 8 feet. A waterproof and unbreakable mirror **34** is mounted on the pedestal **14** above the lavatory **28**, and a waterproof lighting fixtures **36** are mounted at an elevated position on both sides of the pedestal. An ultraviolet ray sanitation device **38** is mounted in a waterproof manner on the pedestal **14** above the watercloset **22** for sanitizing the same after each use, and can be automatically controlled by a time switch (not shown) operated each time the door **12** is opened.

The cylindrical enclosure sidewall **10** extends above the pedestal-supported roof **16**, and is closed by a ceiling structure **40** of suitable design. The wall of the enclosure **10** above the roof **16** has an exhaust fan unit **42** mounted therein, it being understood that said unit could also be mounted elsewhere. A vent **44** is mounted on the lower portion of the enclosure sidewall **10**, and has a hot air blower **46** associated therewith. When the exhaust fan **42** is running, air is drawn in through the vent **44**, passes through the annular flow space **20**, and is exhausted.

The restroom **2** as described is specifically designed for being spray cleaned, all of the fixtures being suited to this purpose, and all electrical units and the tissue dispenser **24** being waterproof. Such spray cleaning is accomplished with spray apparatus **47** mounted within the enclosure **10**, said apparatus including a vertically disposed spray boom **48** having spaced, inwardly and outwardly directed spray nozzles **50** mounted thereon.

The spray boom **48** is mounted on upper and lower continuous circular rails or tracks **52** and **54**, respectively, secured to the interior of the cylindrical enclosure sidewall **10**. The upper track **52** is disposed above the pedestal-supported roof **16**, and the upper end of the boom **48** extends through the annular flow space **20** and is connected to a carrier unit **56** that rides on the track **52**, and which includes an electric drive motor **58**. The lower end of the boom **48** is connected to a carrier unit **60** that rides on the lower track **54**. When the motor **58** is energized, therefore, the vertical boom will travel completely around the interior of the cylindrical enclosure **10**.

An armature-type electrical swivel joint **60** is suspended from the ceiling structure **40**, and electrical cables **62** extend therefrom to the motor **58**. Similarly, a fluid swivel joint **64** is also suspended from the ceiling structure **40**, the outlet thereof being connected by a hose **66** to an inlet **68** on the upper end of the spray boom **48**. Cleansing liquid is supplied to the inlet of the fluid swivel joint **64** by a conduit **70** connected to the outlet of an electric pump **72**.

The preferable operating cycle for the spray boom **46** includes an initial pre-rinse with hot water, followed by a detergent-spraying period, and another rinse period. Hot water is supplied from a hot water heater **74** to a hot detergent reservoir **76** and a reservoir **78** for hot rinse water, through a conduit **80** and suitable valve mechanisms (not shown). A two-way solenoid valve **82** is connected to the inlet of the pump **72**, one inlet of the valve **82** being connected to the reservoir **76**, and the other inlet to the reservoir **78**. The solenoid valve **82**, the pump **72**, the exhaust fan **42**, the hot air blower **46** and the spray boom motor **58** are all connected to a control unit **84**, for automatic operation.

The control unit **84** is a conventional cyclic switching unit, the duration of each step in the cycle being set on a time clock mechanism **86** included as a part of said unit. Electricity is supplied to the unit **84** through a pair of leads **88** and **90** connected to the output terminals of a master switch **92** operable by a key **94**, the input terminals of the master switch **92** being connected to a power supply **96**. Inserted in the power lead **88** is a key-operated micro safety switch **98**.

The master switch **92** can be mounted on the enclosure **10** adjacent the door **12**, or at some remote point. The safety switch **98** is intended to be mounted in a prominent location, where a user of the facility will come to pick up a key **100** to open the normally locked door **12**. The switch **98** is mounted on a display plaque **102**, and includes a pushbutton **104** having an anvil **106** mounted in confronting relationship. When the rest-

room 2 is not in use the key 100 is inserted under the anvil 106, depressing the pushbutton 104, and closing the switch 98. When the key 100 is removed, the switch 98 opens, thereby rendering the controller unit 84 inoperative. This arrangement is designed to help prevent accidental operation of the cleaning system while a person is in the restroom 2.

The present method for cleaning a restroom includes as a first step spraying the interior of the restroom with cleansing fluid, first with water, then with water containing a suitable detergent or cleaning agent, and finally with rinse water. The cleansing fluids are then drained away, any accumulated vapors are exhausted, and finally heated dry air is passed through the enclosure. Before beginning a cleaning cycle, the operator ascertains that the restroom 2 is empty, picks up any loose trash, and removes with detergents, stains, lipstick marks and the like.

The method is carried out with the apparatus shown in the drawing by first placing the key 100 beneath the anvil 106 to close the safety switch 98, after which the key 94 is inserted into the master switch 92 for operating the same. When electricity flows through the leads 88 and 90, a solenoid lock 108 is energized to secure the access door 12, and warning lights 110 on the plaque 102 and 112 on the exterior of the enclosure 10 are illuminated. The control unit 84 is also energized, and the conventional switching circuits thereof operate the system in accordance with cycle times preset on the timer 86.

The control unit 84 first energizes the motor 58 and actuates the solenoid valve 82 to connect the pump 72 to the hot water rinse tank 78, whereupon the pump 72 is energized to begin the pre-rinse cycle. During the pre-rinse cycle the spray boom 48 travels around the interior of the cylindrical enclosure 10, and the nozzles 50 act to thoroughly wet substantially everything within the restroom. When the timer 86 terminates the pre-rinse cycle, the controller 84 actuates the solenoid valve 82 to connect it with the detergent reservoir 76, and the wash cycle commences. At the conclusion of the wash cycle, the valve 82 is again switched to the rinse water reservoir 78, and the spraying cycle is completed.

The controller unit 84 then deactivates the pump 72, the motor 58 and the solenoid valve 82, and starts the exhaust fan 42 to being the exhaust step. The enclosure 10 is usually filled with fumes by the spray cycle, which fumes can be unpleasant depending on the detergent or cleaning agent employed. The liquids themselves are, of course, drained from the enclosure through the drain 6.

When the fumes have been removed from the enclosure 10 and drawing of the fluids is essentially complete, the timer 86 causes the controller switch unit 84 to energize the hot air blower 46, thus flooding the restroom 2 with hot drying air. When this step is completed, the controlled unit 84 deactivates the system, the key 94 is removed to turn off the warning lights 110 and 112 and to release the safety lock 108, and the facility is again ready for use. The spray boom 48 is moved behind a panel 120 mounted within the enclosure 10, to conceal the same when not in use.

It is readily seen that the present system and method make it possible for a filling station or other business to consistently offer clean restroom facilities, the act of thorough cleaning being such an easy matter to accomplish. Thus, both management and consumers are benefited.

Obviously, many modifications and variations of the invention are possible, without departing from the teachings hereof.

We claim:

1. A self-cleaning restroom, comprising; an upright enclosure, including a sidewall having an entrance door therein, and a bottom wall; a pedestal mounted on said bottom wall centrally of said enclosure and having at least one bathroom fixture thereon, said pedestal and said fixture being spaced from said sidewall; a vertically disposed spray boom; means for mounting said vertically disposed spray boom within said enclosure for movement substantially completely around the inner periphery of said sidewall on a fixed path, said vertically disposed spray boom extending for a substantial height within said enclosure and having nozzle means spaced vertically therealong; means for supplying cleansing liquid to said spray boom; and control means connected with said spray boom mounting means and said cleansing liquid supply means for selectively operating the same to effect a cleaning cycle for said restroom.

2. A self-cleaning restroom as recited in claim 1, wherein said sidewall is cylindrical.

3. A self-cleaning restroom as recited in claim 1, wherein said enclosure further includes a top wall, the periphery of said top wall being spaced from said sidewall to provide an annular space for the flow of air; vent air means on one side of said annular space arranged to admit outside air to the interior of said enclosure; and an exhaust fan mounted on the other side of said annular space, said exhaust fan being connected with said control means to be operable thereby after operation of said spray boom for exhausting steam from said enclosure.

4. A self-cleaning restroom as recited in claim 3, further including means for supplying heated drying air to said enclosure, said heated air supply means being connected with said control means to be operable thereby after operation of said spray boom for effecting drying of the interior of said restroom.

5. A self-cleaning restroom as recited in claim 4, including additionally lock means for said door, said lock means being connected with said control means and being operable thereby to lock said door closed during a cleaning cycle.

6. A self-cleaning restroom as recited in claim 1, wherein said spray boom includes both nozzles directed toward said sidewall, and nozzles directed toward said pedestal.

7. A self-cleaning restroom, comprising: an upright enclosure, including a sidewall having an entrance door therein, and a bottom wall; a pedestal mounted on said bottom wall centrally of said enclosure and having at least one bathroom fixture thereon, said pedestal and said fixture being spaced from said sidewall; a vertically disposed spray boom, including both nozzles directed toward said sidewall and nozzles directed toward said pedestal; means for mounting said spray boom within said enclosure for movement around the inner periphery of said sidewall, said spray boom mounting means including: a lower track mounted to extend around the periphery of the lower end of said sidewall; an upper track mounted to extend around the periphery of the upper end of said sidewall; upper and lower carriage

means on said spray boom, adapted to ride on said upper and lower tracks, respectively; and motor means associated with one of said carriage means for propelling said spray boom; means for supplying cleansing liquid to said spray boom; and control means connected with said spray boom mounting means and said cleansing liquid supply means for selectively operating the same to effect a cleaning cycle for said restroom.

8. A self-cleaning restroom as recited in claim **1**, wherein said pedestal has mounted thereon: a water closet; a lavatory; illumination means; a bracket for holding tissue paper, and including a waterproof closure; and means for drying the hands after washing.

9. A self-cleaning restroom as recited in claim **1**, wherein said enclosure includes a vent means, and an exhaust fan spaced from said vent means.

10. A self-cleaning restroom as recited in claim **9**, including additionally means for supplying heated drying air to said enclosure.

11. A self-cleaning restroom, comprising: an upright enclosure, including a sidewall having an entrance door therein, a bottom wall having a drain therein, and a top wall mounted with the periphery thereof spaced from said sidewall to provide an annular flow space therebetween; a pedestal mounted on said bottom wall centrally of said enclosure and having at least one bathroom fixture thereon, said pedestal and said fixture being spaced from said sidewall; a vertically disposed spray boom, including nozzles directed toward said sidewall, and nozzles directed toward said pedestal; means for mounting said spray boom within said enclosure for movement around the inner periphery of said sidewall; means for supplying cleansing liquid to said spray boom; vent means on one side of said annular flow space; an exhaust fan mounted on the other side of said annular flow space; means for supplying heated drying air to said enclosure; and control means connected with said spray boom mounting means, said liquid supply means, said exhaust fan, and said heated drying air supply means for operating the same to effect a cleaning cycle for said restroom, said cycle including the steps of: operating said spray boom and said cleansing liquid supply means to spray cleansing liquids on said sidewall, and on said pedestal and all fixtures mounted thereon; operating said exhaust fan to remove from said enclosure vapors created by said spraying operation; and operating said heated air supply means to pass drying air through said enclosure.

12. A self-cleaning restroom, comprising: an upright enclosure, including a sidewall having an entrance door therein, and a bottom wall; bathroom fixture means mounted within said enclosure; a vertically disposed spray boom; means for mounting said vertically disposed spray boom within said enclosure for movement substantially completely around the inner periphery of said sidewall on a fixed path, said vertically disposed spray boom extending for a substantial height within said enclosure and having nozzle means spaced vertically therealong, and said bathroom fixture means being arranged whereby to provide an unobstructed path for the peripheral movement of said spray boom; means for supplying cleansing liquid to said spray boom; and control means connected with said spray boom mounting means and said cleansing liquid supply means for selectively operating the same to effect a cleaning cycle for said restroom.

13. A self-cleaning restroom as recited in claim **12**, wherein said nozzle means on said spray boom are arranged to direct spray both inwardly and outwardly, from substantially the level of said bottom wall to at least above the height of said fixture means.

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