May 7, 1968 D. K. WHITLA 3,381,312

CLEANING SYSTEM

Filed Nov. 29, 1965 2 Sheets-Sheet 1

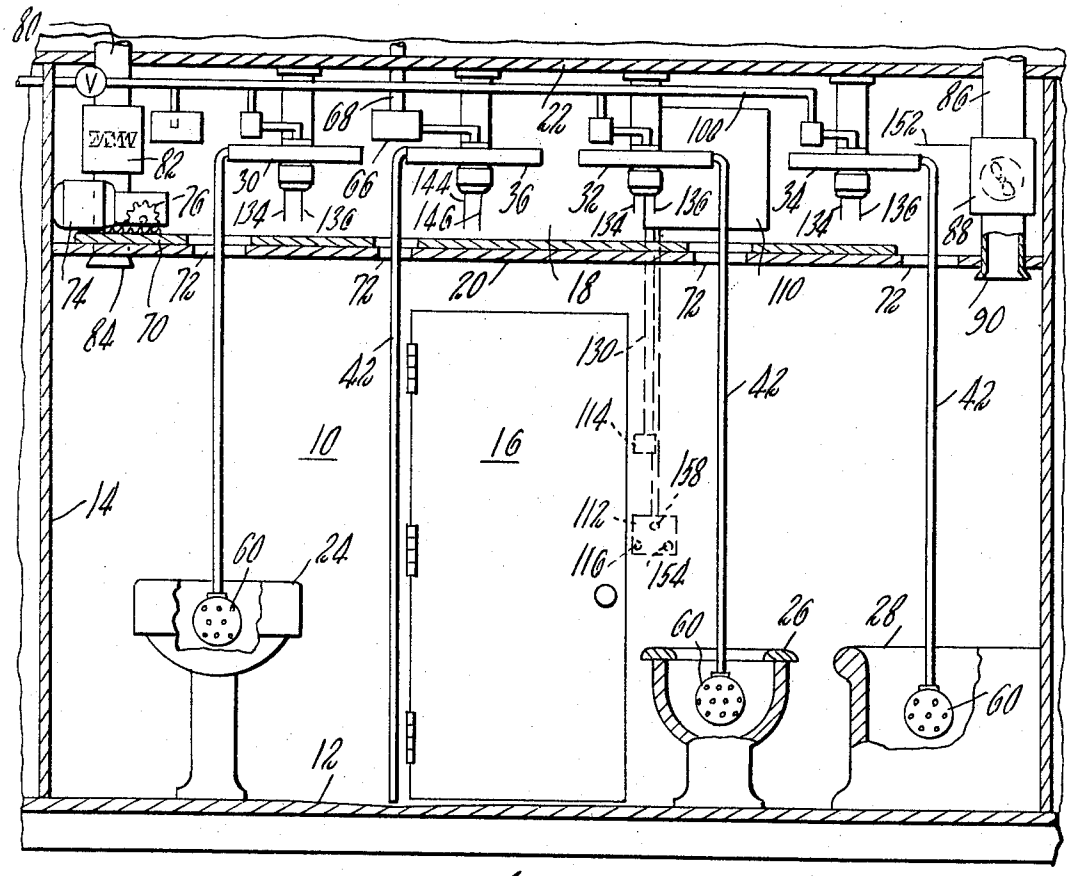


Fig. 1.

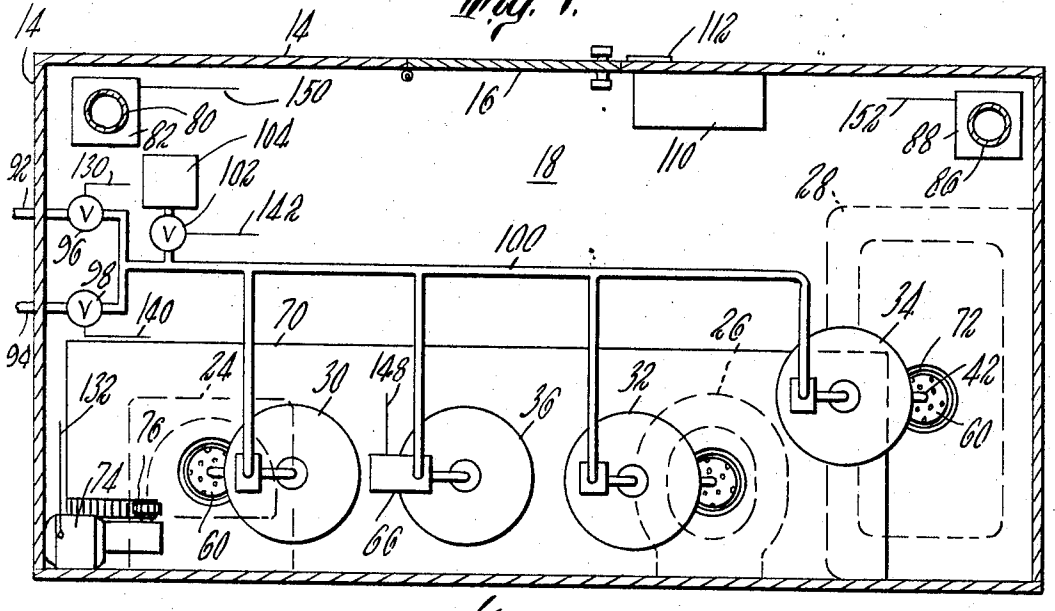


Fig. 2.

May 7, 1968 D. K. WHITLA 3,381,312

CLEANING SYSTEM

Filed Nov. 29, 1965 2 Sheets-Sheet 2

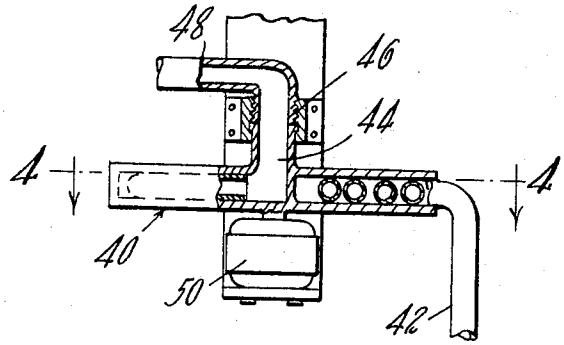


Fig. 3.

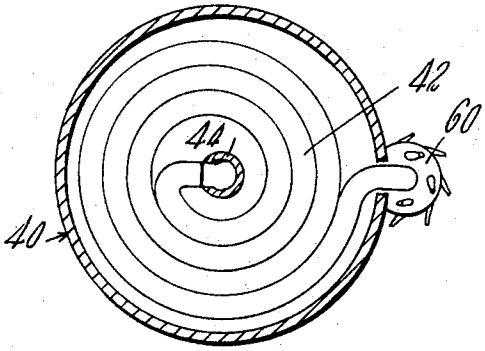


Fig. 4.

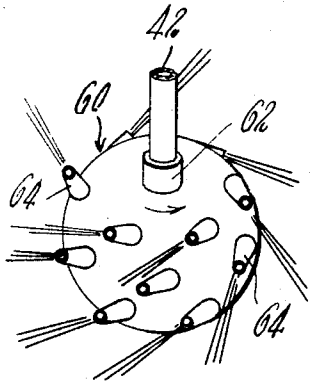


Fig. 5.

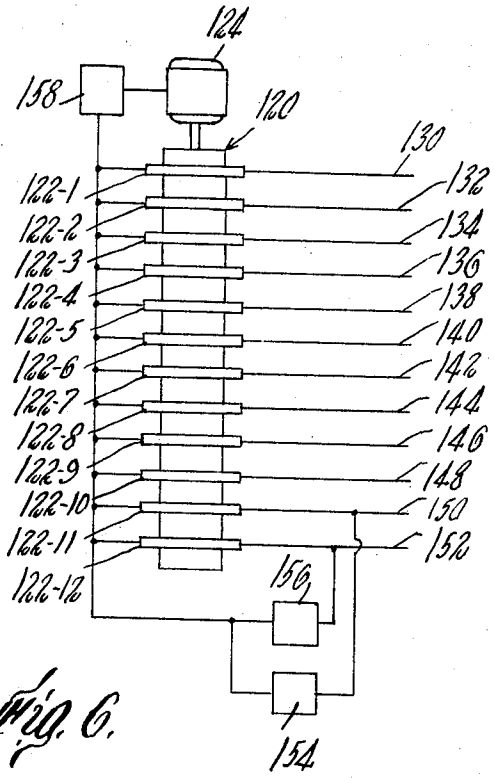


Fig. 6.

United States Patent Office 3,381,312 Patented May 7, 1968

3,381,312

CLEANING SYSTEM

Dean K. Whitla, Liberty Road,
Marblehead, Mass. 01945

Filed Nov. 29, 1965, Ser. No. 510,235
8 Claims. (Cl. 4—1)

ABSTRACT OF THE DISCLOSURE

A bathroom cleaning system includes a storage area formed above the ceiling of the bathroom. Housed in the storage area are three cleaning implements each of which includes a reel structure for receiving a hose in coil form, and at the end of the hose is a cleaning implement. Each cleaning implement is rotatably mounted and has projecting therefrom a series of nozzles which are set at generally tangential directions with respect to the surface of the implement and generally perpendicular to its axis of rotation. In addition, a liquid suction hose connected to a suction pump is also housed in storage area on a reel; and a heater unit and exhaust duct are mounted in the storage space. A control unit opens doors in the ceiling and rotates the reels to lower the cleaning implements to positions in a washstand, a toilet and a bathtub. Water and detergent, applied under pressure through the hoses to the cleaning implements rotates the cleaning heads in a cleaning operation. Then, excess water is withdrawn by the suction pump; the cleaning implements and suction hose are retracted into the storage space and the heater and fan are energized to circulate air through the bathroom to complete the cleaning operation.

This invention relates to cleaning systems and, more particularly, to a system for cleaning predetermined areas or particular portions thereof in an automatic manner.

A principal object of the invention is to provide a cleaning system which substantially completely eliminates the manual labor involved in cleaning portions of rooms such as bathrooms.

Another object of the invention is to provide an automatic cleaning system for a room in which the cleaning implements are unobtrusively housed from view when not in use and which are subject to automatic control.

In accordance with the invention, there is provided a system for cleaning portions of a room automatically in a coordinated manner. The system incorporates a plurality of implements each adapted to clean a particular portion of a room. The system further includes a storage space preferably adjacent a wall of the room for housing the implements when they are not in use, and control means for operating the implements in sequence to : (1) position the implements in cleaning relation to their respective predetermined portions of the room; (2) actuate the implements to clean those predetermined portions; and (3) return the implements to the storage space upon completion of the cleaning operations, all in an automatic and coordinated manner. This invention is particularly useful in cleaning a bathroom as the components thereof can be conveniently housed in an area immediately adjacent the room, such as in the ceiling and operated automatically to complete the cleaning operation at daily intervals or as frequently as desired without human intervention. Additionally, the system may include control for actuating one or more of the cleaning implements to perform the cleaning function independently of the other controlled implements in the cleaning system.

Other objects, features, and advantages of the invention will be seen as the following description of a particular embodiment thereof progresses in conjunction with the drawings, in which:

FIG. 1 is a sectional diagrammatic view of a bathroom showing the components of the cleaning system of the invention in operative position;

FIG. 2 is a top diagrammatic view of the cleaning system and components shown in FIG. 1;

FIG. 3 is a view, in partial section, of an implement positioning unit employed in the system shown in FIG. 1;

FIG. 4 is a top view of the positioning unit taken along the line 4—4 of FIG. 3;

FIG. 5 is a detail view of a cleaning implement employed in the embodiment shown in FIG. 1; and

FIG. 6 is a diagrammatic view of a control unit suitable for use in the system shown in FIG. 1.

With reference to FIGS. 1 and 2, there is shown in section view a bathroom **10** having a floor **12**, wall structures **14**, in one of which an access door **16** is positioned, and a storage area **18** formed between a ceiling **20** of the room and structural members **22** which may form a support for a floor above the bathroom **10**. In the bathroom are facilities that need to be cleaned at frequent intervals, such as a wash stand **24**, a toilet **26**, a bathtub **28**, and a urinal (not illustrated).

Housed within this storage area **18** are four implement control units **30, 32, 34,** and **36**. Additional details of these control units may be seen with reference to FIGS. 3 and 4. Each control unit includes a reel structure **40** having a channel for receiving in coil form a hose **42** that is connected to a fitting **44** that rotates with the reel. The fitting **44** is connected through coupling **46** to supply line **48**. The reel and coupling unit is rotated as a unit by motor **50** to extend or retract the hose **42** from the reel **40**.

Mounted on each hose **42** of units **30, 32,** and **34** at the end thereof is a cleaning implement **60** of the type shown in FIG. 5. There is a rotatable coupling **62** connecting the hose **42** to the spherical implement head **60**. Each cleaning implement head **60** has projecting therefrom a series of nozzles **64** which are set at generally tangential directions with respect to the surface of the implement and generally perpendicular to its axis of rotation so that fluid emitted from the nozzles **64** impart a rotational force to the head **60**. Supplementary cleaning elements such as brushes for providing mechanical abrasion of a surface to be cleaned (not shown) may be mounted on the head **60** if desired. Also, it is obvious that the cleaning head may take configurations other than the particular illustrated spherical configuration.

The fourth reel unit **36** disposed in the storage space is arranged to position the end of its hose **42** on the floor **12**. That hose is connected through its coupling **46** and line **48** to a suction pump unit **66** and the output of the suction pump **68** to the bathroom disposal system (sewer) in conventional manner.

Hatches **70** in the ceiling **20** are coupled together for movement as a unit to open and close the ports **72** through which the hoses **42** and implements **60** pass. This hatch unit is slid back and forth by motor **74** and drive gear **76**.

The system further includes in the storage space an inlet duct **80** which may have a heater unit **82** in it and which extends through the bathroom ceiling **20** at port **84**; and exhaust duct **86** having a fan **88** mounted in it for exhausting air through port **90** from the bathroom. This air circulation system may be used for heating purposes desired or for removing objectionable odors from the bathroom independently of the cleaning system or in conjunction therewith as desired.

The system further includes supply for the cleaning implements best indicated in FIG. 2. This supply includes a hot water inlet line **92**, cold water inlet line **94**, together with control valves **96, 98**, respectively, which are connected to a distribution line **100** connected to the cleaning units **30, 32, 34**. Also connected to the distribu-

tion line 100 by means of a control valve unit 102 is a cleaning agent storage chamber 104 which may hold a detergent or other suitable cleaning material for introduction into the cleaning distribution duct 100 as desired when valve 102 is opened.

Finally, the system includes a control unit 110 which preferably is also mounted in the storage unit 18 so that it is not visible in the bathroom. Control 112 for this unit is preferably mounted as indicated diagrammatically in FIGS. 1 and 2 outside the door 16. (An automatic door latch unit 114 is located in wall 14 near the door). This control unit 110 includes a sequencing device such as a stepping switch 116 which controls the operation of the components of the cleaning system. The stepping switch unit energizes the valves 94, 96, and 102, the motors 50 which are reversing motors and which may be jogged in either direction to control the height of the cleaning implements 60, for example, motor 74, heater 82, and blower 88. As indicated above, the control for this sequencing device normally is set to operate through a predetermined sequence, but individual components of this cleaning system may be operated separately where such individual functions are desired as, for example, in the case of the hot air heater 82 or the exhaust fan 86.

With reference to FIG. 6, this sequencing device includes a drum or cam shaft 120 bearing a plurality of contact controlling cams 122 on it as rotated by motor 124. Contacts 122–1 energize line 130 which operates the door latch 114; contacts 122–2 energize line 132 to operate the access hatch unit 70 in ceiling 20 via motor 74; contacts 122–3 energize line 134 to operate motors 50 in one direction and contacts 122–4 energize line 136 to operate motors 50 in the opposite direction, (Gearing may be employed in the motors to vary the extent of lowering of the cleaning implements 60, or the motors may be individually controlled by additional circuits to operate for the desired length of time to position the cleaning implements 60 at the proper height); contacts 122–5 and 122–6 energize lines 130 and 140 to open valves 96, 98, respectively, to supply water to the distribution line 100; contacts 122–7 energize line 142 to operate valve 102 to supply the cleaning agent to the distribution line 100; contacts 122–8 and 122–9 energize lines 144 and 146 to operate the motor of unit 36, while contacts 122–10 energize line 148 to operate pump 66; contacts 122–11 energize line 150 to energize heater 82; and contacts 122–12 energize line 152 to energize blower 88. There are further provided separate control switches in parallel with the portions of sequencing unit: switch 154 energizing line 150 to supply heat to the bathroom, and switch 156 energizing line 152 to operate the blower and circulate air within the bathroom.

In operation of the system, the main control switch 158 is depressed, energizing sequencing device motor 124 to rotate the cam shaft 120. The cam shaft sequentially closes and opens contacts 122 to energize lines 130–148 in desired sequence depending on the nature and setting of the cams on the shaft 120. In a typical operation, line 130 would be first energized to operate latch 114 to lock door 16 thus preventing the use of the bathroom during the cleaning operation. (This latch can be interlocked with a lock on the door so that initiation of the cleaning operation is prevented whenever anyone in the bathroom has locked the door. Such an interlock could prevent energization of motor 124, for example.) After door 16 is locked, the line 132 is energized to operate motor 74 to open the ports 72 in the ceiling. The motors 50 are then energized to lower the cleaning implements 60 through the ports and properly position them relative to the toilet 26, wash basin 24, and bathtub 28. After the cleaning implements are in position, the sequencing switch operates valves 96, 98, and 102 in desired sequence and combination to distribute water and cleaning fluid to the implements and operate those implements under hydraulic pressure so that they clean the facilities. The timing of these switches may be such that detergent flow is terminated before the termination of water flow, thus affording a rinsing operation. Also, during the cleaning operation the lines 134 and 136 may be alternately energized to raise and lower the cleaning implements 60 relative to the facilities to be cleaned to effect a more thorough cleaning operation. If desired, during this period, the unit 36 may be energized to lower the suction hose 42 to the floor 12 so that excess water which may accumulate on the floor is removed by the suction pump 66 before the cleaning operation is completed. At the completion of the cleaning operation, the motors via lines 136 and 146 are energized to retract the cleaning implements 60 and the suction hose 42 into the storage space. Simultaneously, the heater 84 and the fan 88 may be energized to circulate heated air through the bathroom to remove any moisture remaining therein and to purify the air. Line 133 is energized to operate motor 74 to close the hatches and finally line 130 is de-energized to release the door latch 114 so that the cleaned bathroom is available for use.

Thus, it will be seen that the cleaning system provides a system for automatically and thoroughly cleaning a bathroom or similar space in a coordinated manner without manual intervention. While a particular embodiment of the invention has been shown and described, various modifications thereof will be apparent to those skilled in the art and, therefore, it is not intended that the invention be limited to the disclosed embodiment or to details thereof, and departures may be made therefrom within the spirit and scope of the invention as defined in the claims.

What is claimed is:

1. A cleaning system for cleaning predetermined portions of a room that includes toilet facilities automatically in a coordinated manner and without the need for any person being in said room during the cleaning operation, comprising a plurality of cleaning implements, each said implement adapted to clean a predetermined portion of said room, at least one implement being adapted to clean said toilet facility, a ceiling in said room, a storage space above said ceiling of said room for housing said implements when not in use, and control means for operating said implements in sequence to: (1) move said implements from said storage space above said ceiling, and position said implements in cleaning relation relative to said respective predetermined portions including positioning said one implement in said toilet facility; (2) actuate said implements to clean said respective predetermined portions including said toilet facility; and (3) return said implements to said storage space above said ceiling on completion of the cleaning operation.

2. The system as claimed in claim 1 and further including suction fluid removal means stored above said ceiling in said storage space and movable to a position adjacent the floor of said room for removing fluid from said room after completion of the cleaning operation, and wherein said control means includes means for controlling the operation of said fluid removal means.

3. The system as claimed in claim 1 wherein said implements are actuated to provide their cleaning function in response to hydraulic pressure, each said cleaning implement including a rotatable cleaning head having a series of nozzles directed generally tangentially to the surface of said cleaning head and perpendicular to the axis of rotation of said cleaning head so that fluid emitted from the nozzles under the influence of hydraulic pressure imparts a rotational force to the cleaning head.

4. The system as claimed in claim 1 wherein said control means includes an electrically actuated sequencing device.

5. The system as claimed in claim 1 wherein the implements are disposed in a bathroom, a second implement

being movable between said storage space and a wash stand, and a third implement being movable between said storage space and a third component in said bathroom.

6. The system as claimed in claim 5 wherein each said implement includes a rotatably mounted cleaning head and means to supply liquid to said head to rotate said head under hydraulic pressure in a cleaning operation, each said cleaning head having a series of nozzles directed generally tangentially to the surface of said cleaning head and perpendicular to the axis of rotation of said cleaning head so that fluid emitted from the nozzles under the influence of hydraulic pressure imparts a rotational force to the cleaning head, and said control means actuates valve means for controlling the flow of liquid to said implements.

7. The system as claimed in claim 6 and further including suction fluid removal means stored above said ceiling in said storage space and movable to a position adjacent the floor of said room for removing said liquid from said room after completion of the cleaning operation, and wherein said control means includes means for controlling the operation of said liquid removal means.

8. The system as claimed in claim 7 wherein said control means includes an electrically actuated sequencing device and further including means responsive to said control means for preventing access to said room during operation of said cleaning system.

References Cited

UNITED STATES PATENTS

1,687,711	10/1928	Boyle	4—146
1,958,940	5/1934	Cavanaugh et al.	70—281
2,605,478	8/1952	Lassiter	4—233
2,870,457	1/1959	Knight	4—173
3,035,293	5/1962	Larson.	
3,037,223	6/1962	Lovsey.	

HAROLD J. GROSS, *Primary Examiner.*