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AUTOMATIC FLUSHING SYSTEM

2,507,966

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Fig. 1

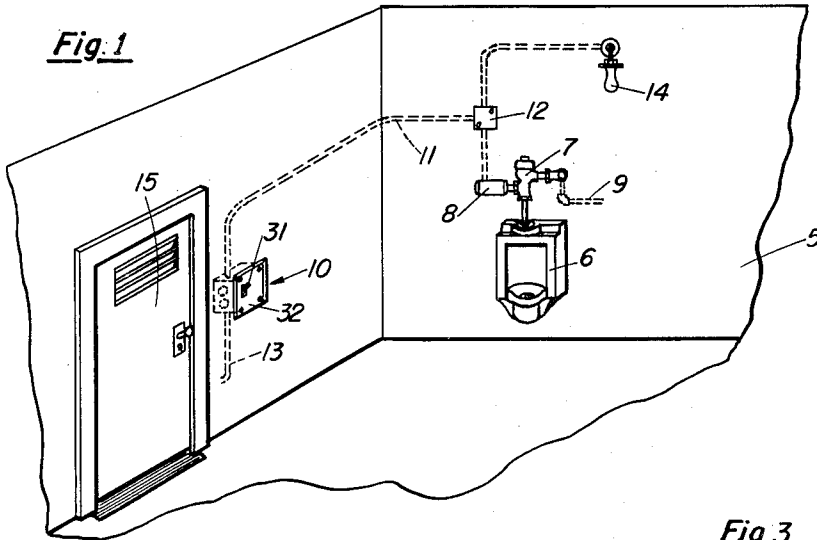


Fig. 2

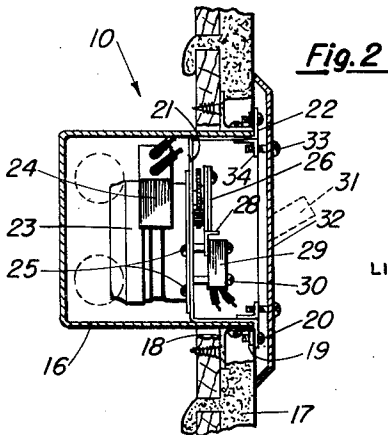


Fig. 3

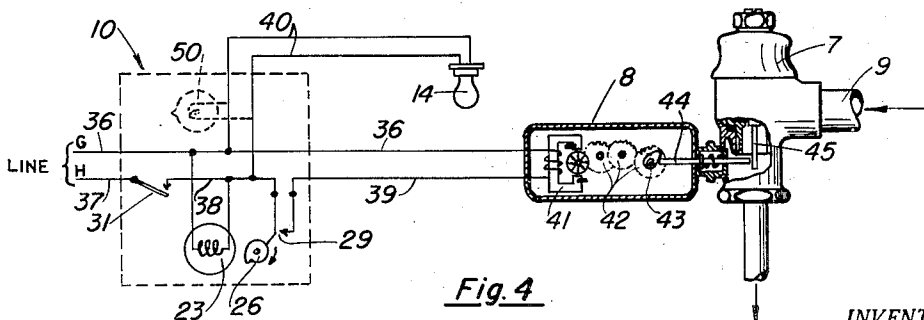
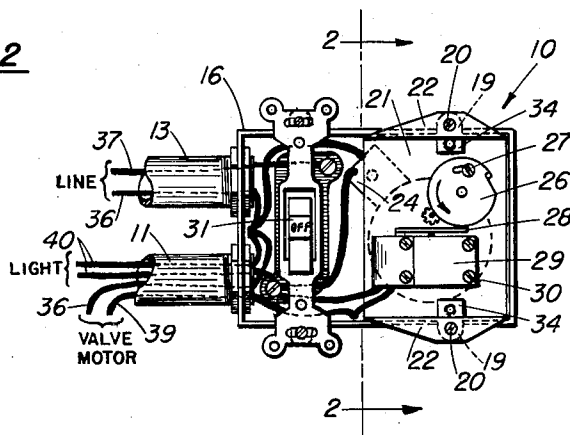


Fig. 4

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AUTOMATIC FLUSHING SYSTEM

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8 Claims. (Cl. 4-101)

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This invention relates in general to plumbing systems, but more particularly to a system for automatically controlling the operation of flush valves in a toilet room, and the principal object of the invention is to provide a new and improved arrangement and system for electrically operating urinal flush valves at recurring time intervals.

Another object of the invention is to provide an automatic flushing system for relatively small plumbing installations in which all of the flush valve operating equipment is located in the toilet room.

A further object is to provide an automatic control device for a flush valve which can be mounted on the toilet room wall as a unit and be accessible for manual starting and stopping of the automatic flushing arrangement.

An additional object is to provide a control device for automatically controlling the periodic operation of a flush valve and in which a manual switch is also provided for simultaneously initiating the operation of the control device and for illuminating the toilet room.

It is a further object of the invention to design a circuit arrangement for an automatic flushing system in which a manual switch is arranged to control the connection of a source of electric current with a flush valve control device and also with the light for illuminating the toilet room.

With the foregoing and other objects in view, the invention consists in certain novel features of construction and arrangement of parts which will be hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which:

Fig. 1 is a perspective view of a section of a toilet room showing the invention;

Fig. 2 is a cross-sectional view of the control device;

Fig. 3 is a plan view of the control device together with the wiring; while

Fig. 4 is a schematic circuit diagram of the automatic flushing installation.

In many plumbing installations it is customary to provide flush valves for the urinal fixtures, which are equipped with handles for operating the same to flush the urinal fixture after its use. However, for hygienic reasons, persons using the urinal are reluctant to manually operate the flush valve or neglect to do so and as a result, the urinal becomes fouled and obnoxious, and constitutes a health hazard. It is therefore desirable that some means be provided for eliminating the human element from operating the flush valve and instead provide means for automatically flushing the urinal at periodic intervals. In accordance with applicant's invention, the manually operated handle on the flush valve is replaced with an automatic means such as an electric device in the form of a synchronous motor

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which is arranged to operate the flush valve to flush the urinal fixture. The flush valve motor is controlled by a timing device which at periodical intervals energizes the flush valve motor. Preferably the timing device is mounted at the usual height for a wall switch adjacent the entrance door to the toilet room and an electric wall switch in the timing device is adapted to be operated by a person entering the washroom to start the automatic timing device into operation. The switch is also connected in parallel with the light for illuminating the toilet room so that the first person entering the toilet room in the morning, for example, will operate the wall switch to start the automatic flushing and at the same time illuminate the room. The last person using the room in the evening would disconnect the system by operating the wall switch to its "off" position. This could be done by a janitor or watchman making the rounds of a building. By combining the control of the toilet room light and the timer into a single switch, an important object of the invention is obtained, in that separate control switches are not required and the simple act of operating one switch, which is naturally done by a person entering the toilet room to illuminate the same, will also start the automatic flushing system into operation.

It is preferable and desirable that the timing device be arranged so that it can be readily mounted and supported within a standard conduit box customarily used for enclosing wall switches, thereby rendering the timing device inconspicuous, compact, and requiring no special mounting space in the toilet room.

Referring to Fig. 1 of the drawing, the toilet room is indicated in fragmentary perspective at 5, against the wall of which a urinal fixture 6 of any well-known construction may be supported. A hydraulic flush valve 7 also of known construction, has its outlet connected directly to the top of the urinal 6 and in place of the usual manually operated handle, the valve is provided with an electric operating device 8, preferably in the form of a synchronous motor, such as is disclosed in patent application Serial Number 653,507, filed March 11, 1946. A water supply header or pipe 9, controlled by the customary shut-off valve, connects to the inlet side of the flush valve 7.

The electric timer indicated generally at 10, is mounted on the wall of the toilet room 5, as shown. Suitable electrical conduit or pipe, indicated at 11, connects the timing device 10 with a junction box 12 located in the vicinity of the flush valve motor 8 and an electrical supply conduit 13 is connected to the timer 10. The junction box 12 has another conduit connected to it which extends to an electric illuminating light 14 which serves to illuminate the toilet room when required. The electric timer 10 is prefer-

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ably located on the wall adjacent the entrance door 15 of the toilet room.

The electric timer 10 is preferably mounted in a standard electric conduit box or housing indicated at 16 in Fig. 2, which box is recessed in the plastered wall 17 of the toilet room. The usual mounting brackets 18 support the box 16 on the wall. After the conduit box 16 is mounted into position, the conduits 13 and 11 are secured in the well-known manner by the nuts to the side wall of the box 16, as shown in Fig. 3. The wires are then fed through the conduit and the ends left free in the conduit box 16.

The timing device 10 as a unit is supported by a U-shaped mounting plate 21, the sides of which fit snugly within the conduit box 16, while the ends 22 are bent outward so that they overlap the ears 19 of the conduit box. Screws 20 are then passed through the coinciding screw holes in the ears 19 and the bracket end 22. In this manner, the timing device is supported as a unit in the conduit box. The timing device includes a small synchronous motor 23 of any well-known construction having a terminal block 24 on the side thereof, through which the incoming wires for the motor are attached. The motor is mounted on the rear side of mounting plate 21 by a series of screws 25. Suitable gearing is incorporated in the motor 23, one of which gears extends through the mounting plate 21 through the front side thereof for rotating a cam 26. This cam consists preferably of two overlapping discs adjustably held together by the screw 27 so that the cam notch in the disc can be adjusted to any desired width. The notch in cam 26 upon rotating is adapted to actuate a switch lever arm 28 pivoted to snap action switch 29 of any well-known construction. The snap acting switch 29 is supported as by screws 30 on the front side of mounting plate 21.

A toggle switch 31 of any desired well-known form is mounted on the left-hand side of the timer unit 10 in the conduit box 16, as shown in Fig. 3, and is held to the conduit box by screws on opposite ends of the switch as shown. A cover or wall plate 32 fitting flush with the wall surface of the toilet room and of usual construction covers the equipment in the conduit box 16. It is held in place by screws 33 threading into ears 34 of the bracket 21 and similar screw openings in the face of the toggle switch 31.

Referring now to Fig. 4, this shows the schematic wiring diagram of the arrangement for operating the system, the actual wiring of the timing device being shown in Fig. 3. The alternating current supply line 36 and 37 preferably of 115 volt, 60 cycle, extends through the conduit 13 to the conduit box 16 and the timing device. The supply line 37 extends in series through the toggle switch 31, wire 38, cam switch contact 29, wire 39 to the winding of the flush valve motor 8, and back over the return lead 36. A branch circuit 40 extends in parallel with the electric light 14 and the timer motor winding 23 is also connected across the foregoing circuit.

The flush valve motor 8 consists of the motor 41 and its associated winding, a set of gears 42, and a cam 43 which is adapted when rotated to actuate the plunger 44. Plunger 44 in well-known operation of flush valves actuates the auxiliary valve stem 45 and thereby causes the hydraulic operation of the flush valve 7, flushing the urinal fixture 6. Further details of the flush valve motor operation may be had from the aforementioned application.

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The operation and use of the device and system is as follows:

Assuming the toggle switch 31 is in the "off" position, a person entering the toilet room through door 15 will find the same usually dark and therefore operates the toggle switch 31 which is immediately accessible as the door is opened. This action completes a circuit over the now closed contacts of toggle switch 31, the current supply line wires 36 and 37, and the wires 40 leading to the lamp 14, thereby illuminating the same. A branch of this circuit also extends to the timing motor 23 starting the operation of the timing device. At predetermined intervals, for example, every five minutes, the cam 26 is rotated by the timer motor 23 to a position where the cam notch operates the switch lever arm 28 causing the closure of the snap switch contacts 29. This action completes an energizing circuit for the flush valve motor 8 over a circuit path extending from the electric supply line 37, closed toggle switch 31, wire 38, snap switch contacts 29, wire 39, winding of flush valve motor 41, return lead 36 to the supply line. As a result, the flush valve motor 8 is caused to actuate its cam 43, resulting in a flushing action of the flush valve 7 upon the urinal fixture 6. The engagement of the cam notch with the snap switch lever 28 is of such a duration, for example, five seconds, that contacts 29 are closed for that length of time, which enables the flush valve motor 41 to rotate its cam 43 at least one full revolution. After the contacts 29 are opened, the flush valve motor 8 stops rotating and the flush valve 7 completes its cycle of operation. Thereafter, at the stated five-minute intervals, the timer motor 23 will cause the preceding action to take place, and cause the periodic flushing of the urinal fixture 6.

The electric light 14 in the room continues to remain illuminated and is not affected by the operation of the timer device or the flush valve motor 8. The automatic flushing action will preferably take place throughout the duration of the daytime period for example, when the use of the urinal fixture is most frequent. After working hours, or when less frequent use of the urinal is desired, the toggle switch 31 is snapped to its "off" position completely de-energizing the system and disconnecting the timer motor 23 and the lamp 14 from the supply line 36 and 37. The system remains dormant until the toggle switch 31 is again actuated.

In certain cases it may not be desirable or advantageous to provide a combination switch 31 for both the electric lamp 14 and the flush valve motor 8. In that event a separate small indicating lamp 50 may be mounted in the conduit box 16 as shown in Fig. 4, to indicate whether the automatic flushing system is in its operating position or has been disconnected.

Preferably the synchronous motor will have a speed of ten R. P. M. and the timing device will be set to operate the motor at five-minute intervals, and at each interval will operate the motor for a period of from three to five seconds.

While only a preferred embodiment of the invention has been illustrated and described, it will be appreciated that modifications of the same may be made by those skilled in the art. It is therefore desired that the invention be not limited to the precise disclosure, but by the scope of the appended claims. What is claimed is:

1. In an automatic flushing system for a toilet room, a flush valve having an electric device associated therewith for operating the same, an

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electric circuit including a current source, a timing device connected to said circuit and having a set of contacts for periodically connecting said electric circuit to said current source to operate said electric device, an electric light in said toilet room also connected to said circuit said electric light serving to illuminate the toilet room and indicate that the automatic flushing system is in operation, and a manually operated switch connected in said circuit in such a manner as to simultaneously connect and disconnect said electric light and said timing device with said current source.

2. In an automatic flushing system for a toilet room, a flush valve and an electric motor for operating said flush valve, a current source, a timing device normally connected to said current source and having a set of contacts closed at periodical intervals, a circuit including said set of contacts, said electric motor, and said current source for operating said electric motor when said set of contacts are closed by said timer, an electric light in said toilet room normally connected to said current source but independent of said set of contacts said electric light serving to illuminate the toilet room and also to indicate when the automatic flushing system is in operation, and an electric switch in said current source manually operated for simultaneously disconnecting said electric motor and said timing device to stop the operation of said timing device and to extinguish said light.

3. In an automatic flushing system, a flush valve having an electrical device for operating the same, and a timing device for controlling said electrical device at recurring time intervals, said electrical device including a synchronous motor and a valve operating cam driven by said motor having a rotational speed of 10 R. P. M., said timing device including a synchronous motor and a timing cam driven by said motor having a switch adapted to be closed by said timing cam for periods of approximately four seconds duration to cause the operation of said electrical device, and a manual switch in said timer for connecting and disconnecting said timing device from a source of operating current.

4. In an automatic flushing system for a toilet room, a flush valve, an electric motor mounted on said flush valve for operating the same, a timing device including a casing mounted in the wall of the toilet room, electrical connections between the timing device and said electric motor whereby said timing device controls said electric motor at periodic time intervals, said timing device comprising a synchronous motor, a cam driven by said motor, and electrical contacts operated by said motor cam, a mounting bracket for supporting said synchronous motor, said cam, and said electrical contacts as a unit, said mounting bracket being removably positioned on said timing casing whereby said timing device is insertable in said casing after said casing is mounted on the toilet room wall, and an electric switch for starting and stopping said timing device mounted in said casing adjacent said timing device and accessible to a person in said toilet room.

5. In an automatic flushing system for a toilet room, the combination of a motor operated flush valve and a timing device for periodically controlling the operation of said motor to operate said flush valve, electrical connections between said timing device and said motor, a casing for said timing device located in the wall of said toilet room at a point adjacent the entry door

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of said toilet room, said timing device comprising a synchronous motor having a cam driven thereby and a set of contacts controlled by said cam all arranged as a unit, a mounting bracket providing the sole support of said timing device unit, said bracket arranged to be removably mounted in said casing, an electric switch also removably mounted in said casing adjacent said timing device unit, said switch accessible for manual operation and arranged to control the off and on operation of said timing device, and a wall plate covering said casing to enclose said switch and said timing device.

6. A valve controlling system including a valve, electrically actuated means for operating the valve, an electrically actuated timer mechanism for periodically causing the valve operating means to function, an electric light, said light being provided for illuminating purposes and for indicating that the valve controlling system is in operation, a circuit including the light, the timer and valve operating means, a power source and a manually operable switch adapted to connect the circuit with the power source to simultaneously light the light and cause operation of the timer.

7. In a flushing system for toilets, a flush valve adapted to control the flow of water to a toilet, an operating motor therefor, a circuit for said motor, a timer for said motor including a normally open timer switch in said circuit, a timer motor in said circuit, an actuating connector between said timer motor and said timer switch, whereby said timer switch is intermittently and periodically closed by said timer motor, a light source in said circuit, positioned and adapted to illuminate said toilet, and a manually operable control switch in said circuit connected and adapted to control the flow of current in said circuit through said operating motor, timer motor, and timer switch, said light source being connected in said circuit as an indicator of the closure of said control switch.

8. In an automatic flushing system for toilets positioned in areas which are temporarily or permanently devoid of natural light, the combination of a flush valve and an electrical device for operating it, an electric light source adapted, when energized, to illuminate the area in which the flushing system is in use, a timing device adapted, when electrically energized, to control said electrical device at recurrent intervals, to operate said flush valve, and an electrical switch in circuit with said timing device and with said electric light source, said switch being adapted, when moved to circuit breaking position, to de-energize both the electric light source and the timing device, whereby the light source constitutes also an indicator for indicating whether or not the timing device is in operation.

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