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ELECTRIC EYE FOR AUTOMATICALLY OPERATING FLUSHING VALVE

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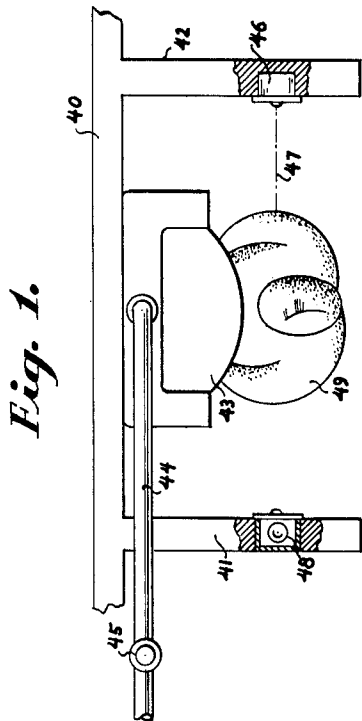


Fig. 1.

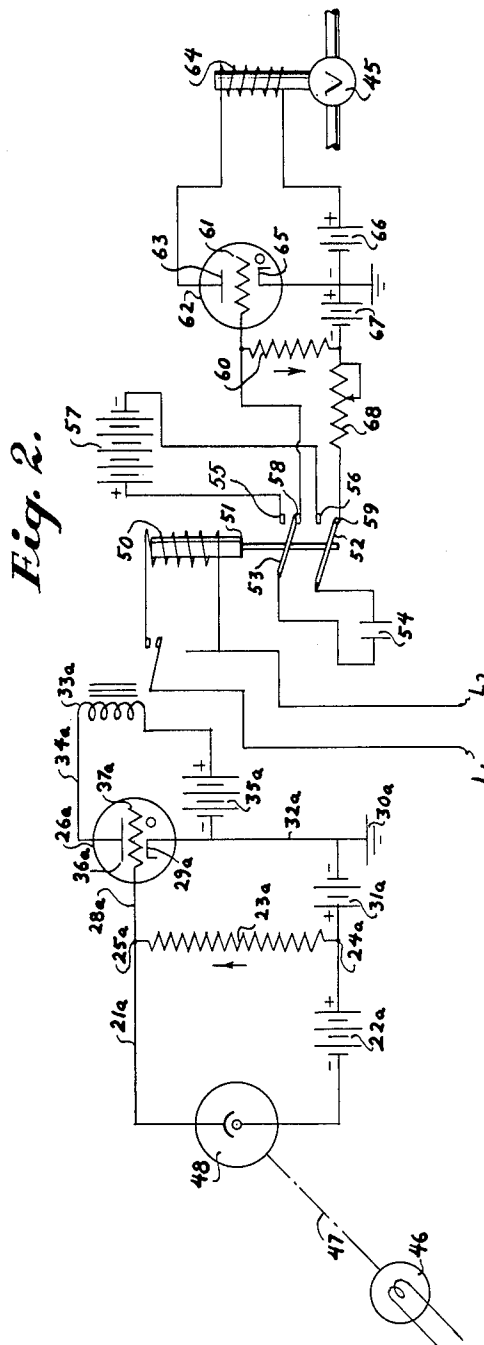


Fig. 2.

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ELECTRIC EYE FOR AUTOMATICALLY OPERATING FLUSHING VALVE

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Original application January 21, 1949, Serial No. 71,913, now Patent No. 2,603,794, dated July 22, 1952. Divided and this application September 27, 1951, Serial No. 248,487

6 Claims. (Cl. 317—130)

The present invention has to do with the automatic operation of a flushing valve and is concerned primarily with an electric eye for causing such automatic operation.

This application is a division of the copending application of Lewis Bokser, Serial Number 71,913, filed January 21, 1949, and entitled "Electric Eye for Automatically Operating Flushing Valve," now Patent No. 2,603,794.

At the present time, hand basins, urinals and toilets are installed in various public places for use by the public. A hand basin ordinarily includes a valve which is manually operable to either turn the water on or off. Urinals and toilets generally include a flushing valve which must be manually operated to cause the flushing thereof.

Many members of the public are reluctant to place their hands on the water valves of a hand basin or the flush valves of a toilet or urinal because of the very nature of the place wherein they are installed and the fact that other people have touched them previously. They are simply afraid of becoming contaminated or picking up almost any kind of germ.

There is another class of people who are very careless. They will walk away from a hand basin leaving the water running or they will walk away from a urinal or toilet without flushing it. In either case, the ultimate result is highly unsatisfactory.

In the case of urinals and toilets, attempt has been made to overcome these difficulties by providing either foot operated flush valves or automatic intermittent flushing which takes place at periodic intervals. The foot valves have not been proven to be satisfactory because it makes no provision for the careless and lazy person and even emphasizes the tendency to walk away without flushing the urinal or toilet. In the case of the automatic flushing at periodic intervals, considerable water is wasted as there is a large amount of unnecessary flushing and there is of course unnecessary wear.

With the foregoing conditions in mind, the present invention has in view as its foremost objective the provision of a valve for controlling the flow of water which is automatically operated by an electric eye or light beam.

Still another more detailed object of the invention is the provision of a flush valve that is particularly adapted for use with a urinal and the operation of which is controlled by an electric eye or light beam. In a preferred embodiment interruption or breaking of the beam has no effect on the valve, but when the beam is completed after the interruption the flush valve is turned on for a predetermined time interval.

Particular objects and advantages of the invention are associated with the provision of an electric circuit which is controlled by a light beam to achieve this operation.

Various other more detailed objects and advantages of the invention such as arise in connection with carrying out the above noted ideas in a practical embodiment will, in part become apparent, and in part be hereinafter stated as the description of the invention proceeds.

The invention therefore comprises a flush valve that is

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intended to flush a urinal, together with mechanism for causing operation of the flush valve upon completion of a light beam after an interruption thereof.

For a full and more complete understanding of the invention, reference may be had to the following description and accompanying drawings wherein:

Figure 1 is a top plan view of a urinal and the accompanying installation, and which is automatically flushed when a light beam is completed after interruption; and

Figure 2 is a wiring diagram of the electric circuit employed in conjunction with the installation of Figure 1.

Referring now more particularly to Figures 1 and 2, a wall 40 of a public room which includes urinals is therein illustrated. Outstanding from the wall 40 are a pair of partitions 41 and 42. These partitions define a stall or booth in which is located a urinal 43. Water is conducted to the urinal for flushing purposes by a conduit 44 and controlled by a flush valve represented at 45. A light source is represented at 46 and is mounted in the partition 42 so that it emits a beam of light depicted by the broken line 47 across the front of the urinal in spaced relation thereto. Under normal conditions this light beam 47 impinges on a photoelectric cell 48 mounted in the partition 41.

It is intended that when a user of the urinal 43, such as represented by the figure at 49, approaches the urinal, the light beam 47 be interrupted. On this interruption nothing happens but when the light beam is again completed the flush valve 45 is turned on for a predetermined period of time. This is accomplished by the electrical circuit represented in Figure 2.

Referring now more particularly to Figure 2, the electric circuit for achieving this result is therein illustrated and will now be described. It will be noted that the photoelectric cell 48 is included in a closed circuit 21a in which is also included a battery 22a and a resistor 23a. The battery 22a is arranged with its terminals in the position represented by the plus and minus signs. The resistor 23a is located between a junction point 24a and a second junction point 25a.

A relay vacuum tube is represented at 26a. This tube 26a includes a grid 37a which is connected to the junction point 25a by a line 28a. The tube 26a also includes a cathode 29a which is grounded as represented at 30a.

A battery 31a is connected between the junction 24a and a line 32a which connects the cathode 29a with the ground 30a. The battery 31a has its terminals arranged in the manner depicted by the plus and minus signs.

A solenoid is represented at 33a and is included in a circuit 34a which also includes another battery 35a having its terminals arranged in the manner indicated by the plus minus signs. This circuit 34a is connected to the cathode 29a of the tube 26a on one side and the anode of the tube 26a which is represented at 36a on the other side.

A pair of power lines are represented at L1 and L2 respectively.

A solenoid 50 actuates a plunger 51 which is operatively connected to a pair of knife blades 52 and 53. These blades are pivotally mounted and connected across the terminals of a condenser 54. When the solenoid 50 is energized it raises the plunger 51, whereby the blades 52 and 53 move upwardly and their free ends engage contacts 55 and 56, whereby the condenser 54 is connected across the terminals of a source of charging potential, such as the battery represented at 57.

When the solenoid 50 is deenergized, the armature 51 is moved downwardly causing a corresponding movement of the blades 52 and 53, whereby the free ends thereof disengage the contacts 55 and 56 and become engaged with contacts 58 and 59. This connects the condenser

54 across a biasing resistor 60 which has one end connected with the grid 61 of a vacuum tube 62. This tube 62 also includes a plate 63 which is connected in circuit with a solenoid 64.

The tube 62 also includes a cathode 65 which is connected with the solenoid 64 through a battery 66 which has its terminals arranged in a manner represented by the plus and minus signs.

A biasing battery is represented at 67 and is effective to bias the tube 62. This battery 67 is in the circuit in the opposite direction to the biasing battery 22a. With this arrangement when the condenser 54 is in discharged condition the tube 62 will normally be biased to cut off and will not discharge.

However, when the condenser 54 is charged and is then connected across the resistor 60, it will cause a current to flow through the resistor in the direction of the arrow and this will offset the negative bias of the battery 67 and cause the tube 62 to discharge.

The particular length of time that the tube 62 will remain discharging after the condenser 54 is connected across its terminals will be determined by the size of the condenser 54, the size of the charging battery 57, and the size of the biasing resistor 60. This time period may be further regulated by the addition of an adjustable resistor shown at 68.

What is accomplished by the circuit of Figure 2 is that when the beam 47 is broken nothing happens. However, when the beam is reestablished after breaking, the flush valve 45 is held open for a predetermined period.

While a preferred specific embodiment of the invention is hereinbefore set forth, it is to be clearly understood that the invention is not to be limited to the exact devices, circuits, and electrical instrumentalities illustrated and described because various modifications of these details may be provided in putting the invention into practice within the purview of the appended claims.

I claim:

1. Electrical means for energizing an operating solenoid for a predetermined period, said means comprising: a closed circuit including a light-sensitive cell, a battery, and a resistor; a relay vacuum tube having a grid connected to one end of said resistor, a grounded cathode, and an anode; a first solenoid having one end connected to said anode and the other end to the ground connection of said cathode; a second battery interposed between the other end of said resistor and said ground connection; a pair of power lines; a normally open switch included in one of said lines and adapted to be closed by said first solenoid; a second solenoid in the circuit of said power lines and adapted to be energized by the closing of said switch; a normally open circuit including a condenser, a battery, and a normally open switch operatively connected to said second solenoid; and a circuit including the solenoid to be energized and adapted to be connected to said condenser by the switch that is operatively connected to said second solenoid.

2. Electrical means for energizing an operating solenoid for a predetermined period, said means comprising: a closed circuit including a light-sensitive cell, a battery, and a resistor; a relay vacuum tube having a grid connected to one end of said resistor, a grounded cathode, and an anode; a first solenoid having one end connected to said anode and the other end to the ground connection of said cathode; a second battery interposed between the other end of said resistor and said ground connection; a pair of power lines; a normally open switch included in one of said lines and adapted to be closed by said first solenoid; a second solenoid in the circuit of said power lines and adapted to be energized by the closing of said switch; a normally open circuit including a condenser, a battery, and a normally open switch operatively connected to said second solenoid; and a circuit including the solenoid to be energized and adapted to be connected to said condenser by the switch that is operatively con-

nected to said second solenoid, said last-mentioned circuit including a vacuum tube having a grid connected to one side of said last-mentioned switch, a grounded cathode, and a plate connected to one end of the solenoid to be energized, the other end of the solenoid to be energized being connected to the other side of said last mentioned switch.

3. Electrical means for energizing an operating solenoid for a predetermined period, said means comprising: a closed circuit including a light-sensitive cell, a battery, and a resistor; a relay vacuum tube having a grid connected to one end of said resistor, a grounded cathode, and an anode; a first solenoid having one end connected to said anode and the other end to the ground connection of said cathode; a second battery interposed between the other end of said resistor and said ground connection; a pair of power lines; a normally open switch included in one of said lines and adapted to be closed by said first solenoid; a second solenoid in the circuit of said power lines and adapted to be energized by the closing of said switch; a normally open circuit including a condenser, a battery, and a normally open switch operatively connected to said second solenoid; and a circuit including the solenoid to be energized and adapted to be connected to said condenser by the switch that is operatively connected to said second solenoid, said last-mentioned circuit including a vacuum tube having a grid connected to one side of said last-mentioned switch, a grounded cathode, and a plate connected to one end of the solenoid to be energized, the other end of the solenoid to be energized being connected to the other side of said last-mentioned switch by a line including a variable resistor and a pair of batteries, and a biasing resistor between said last-mentioned grid and said line.

4. In an automatically controlled urinal; a water conduit; a flush valve connected to said water conduit; a light-sensitive cell; a light source constantly emitting a beam of light on said cell; an operating solenoid for said flush valve; and electrical means for energizing said operating solenoid for a predetermined fixed period upon the light beam hitting said cell after an interruption thereof, said electrical means comprising: a closed circuit including said cell, a battery, and a resistor; a relay vacuum tube having a grid connected to one end of said resistor, a grounded cathode, and an anode; a first solenoid having one end connected to said anode and the other end to the ground connection of said cathode; a second battery interposed between the other end of said resistor and said ground connection; a pair of power lines; a normally open switch included in one of said lines and adapted to be closed by said first solenoid; a second solenoid in the circuit of said power lines and adapted to be energized by the closing of said switch; a normally open circuit including a condenser, a battery, and a normally open switch operatively connected to said second solenoid; and a circuit including said operating solenoid and adapted to be connected to said condenser by the switch that is operatively connected to said second solenoid.

5. In an automatically controlled urinal; a water conduit; a flush valve connected to said water conduit; a light-sensitive cell; a light source constantly emitting a beam of light on said cell; an operating solenoid for said flush valve; and electrical means for energizing said operating solenoid for a predetermined fixed period upon the light beam hitting said cell after an interruption thereof, said electrical means comprising: a closed circuit including said cell, a battery, and a resistor; a relay vacuum tube having a grid connected to one end of said resistor, a grounded cathode, and an anode; a first solenoid having one end connected to said anode and the other end to the ground connection of said cathode; a second battery interposed between the other end of said resistor and said ground connection; a pair of power lines; a normally open switch included in one of said lines and adapted to be closed by said first solenoid; a second solenoid in the

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circuit of said power lines and adapted to be energized by the closing of said switch; a normally open circuit including a condenser, a battery, and a normally open switch operatively connected to said second solenoid; and a circuit including said operating solenoid and adapted to be connected to said condenser by the switch that is operatively connected to said second solenoid, said last-mentioned circuit including a vacuum tube having a grid connected to one side of said last-mentioned switch, a grounded cathode, and a plate connected to one end of said operating solenoid, the other end of said operating solenoid being connected to the other side of said last-mentioned switch.

6. In an automatically controlled urinal; a water conduit; a flush valve connected to said water conduit; a light-sensitive cell; a light source constantly emitting a beam of light on said cell; an operating solenoid for said flush valve; and electrical means for energizing said operating solenoid for a predetermined fixed period upon the light beam hitting said cell after an interruption thereof, said electrical means comprising: a closed circuit including said cell, a battery, and a resistor; a relay vacuum tube having a grid connected to one end of said resistor, a grounded cathode, and an anode; a first solenoid having one end connected to said anode and the other end to the ground connection of said cathode; a second battery interposed between the other end of said resistor and said ground connection; a pair of power lines; a normally open switch included in one of said lines and adapted

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to be closed by said first solenoid; a second solenoid in the circuit of said power lines and adapted to be energized by the closing of said switch; a normally open circuit including a condenser, a battery, and a normally open switch operatively connected to said second solenoid; and a circuit including said operating solenoid and adapted to be connected to said condenser by the switch that is operatively connected to said second solenoid, said last-mentioned circuit including a vacuum tube having a grid connected to one side of said last-mentioned switch, a grounded cathode, and a plate connected to one end of said operating solenoid, the other end of said operating solenoid being connected to the other side of said last-mentioned switch by a line including a variable resistor and a pair of batteries, and a biasing resistor between said grid and said line.

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