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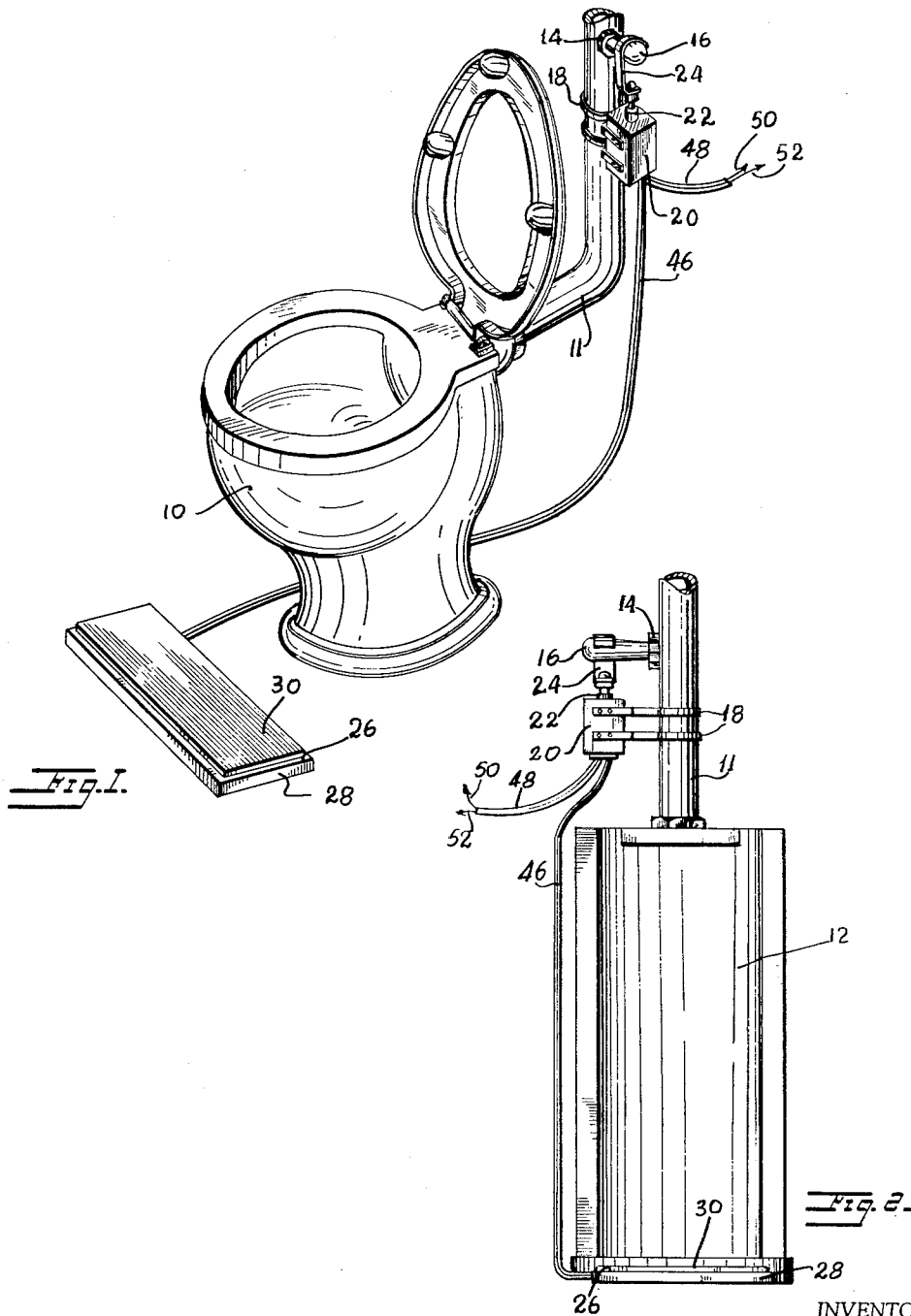
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AUTOMATIC FLUSHING DEVICE FOR TOILET FACILITIES

Filed June 26, 1959

3 Sheets-Sheet 1



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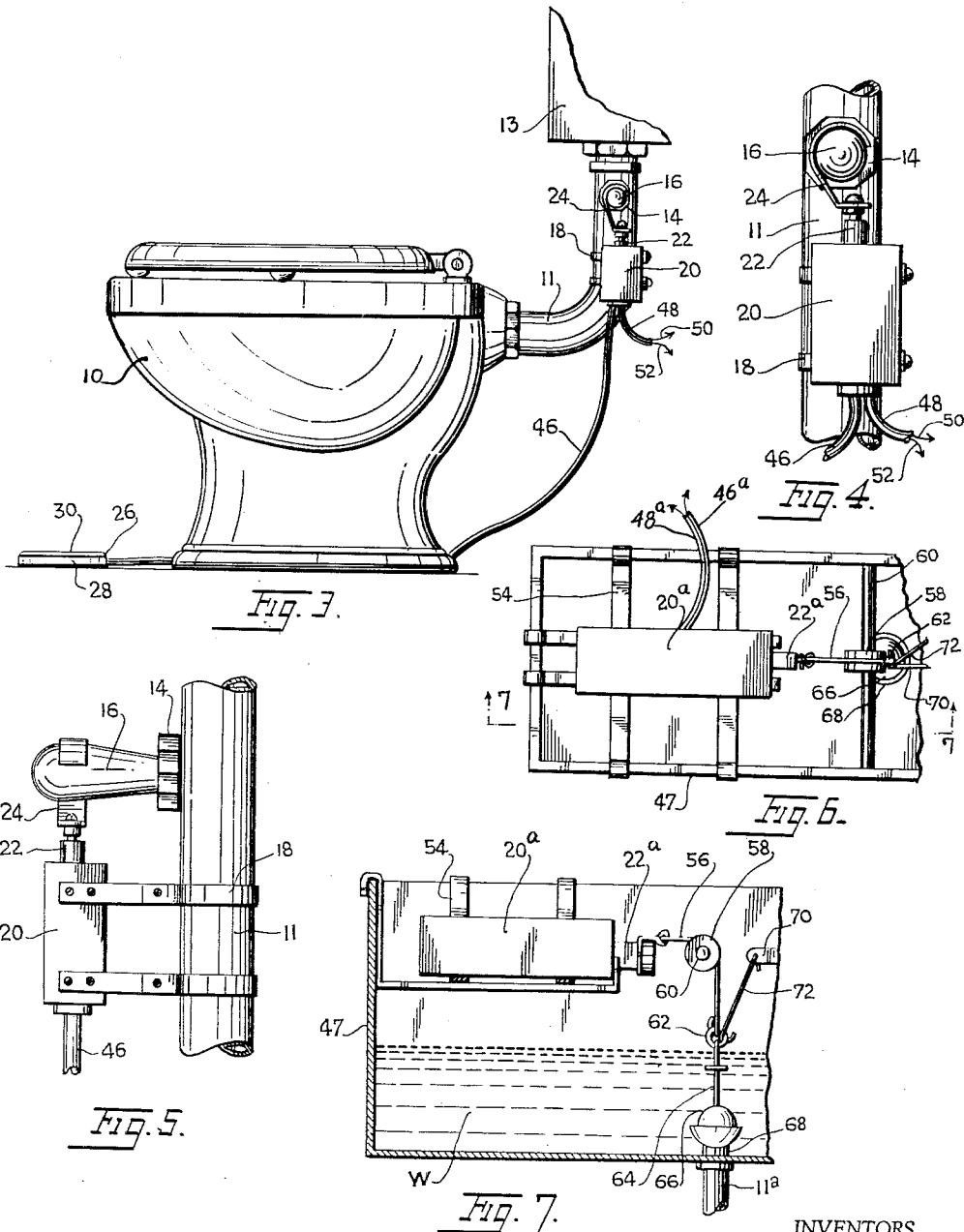
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AUTOMATIC FLUSHING DEVICE FOR TOILET FACILITIES

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3 Sheets-Sheet 3

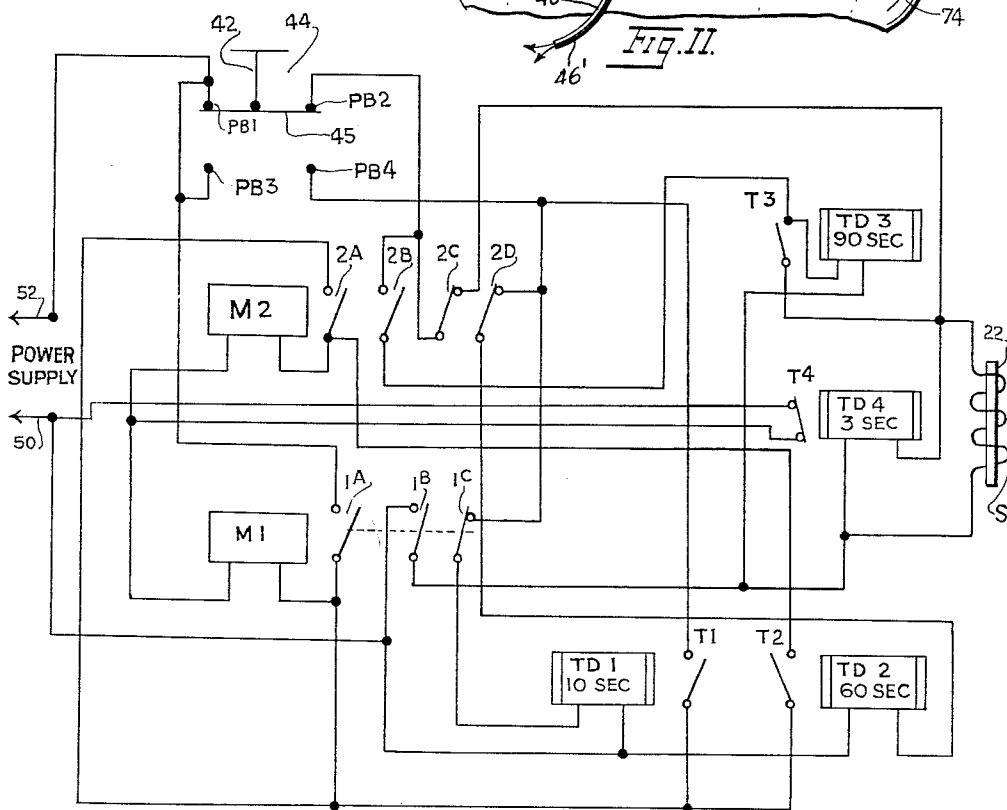
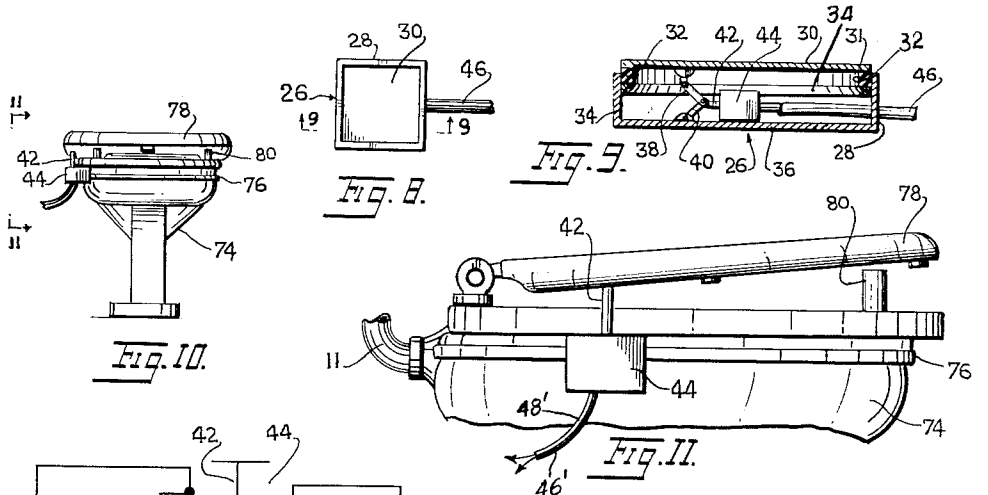


Fig. 12.

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2,999,191

AUTOMATIC FLUSHING DEVICE FOR TOILET FACILITIES

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This invention concerns an automatic flushing system for sanitary facilities such as toilets, urinals, and the like.

Sanitary facilities of the types mentioned are conventionally provided with mechanically operated means for flushing with water after use. Various mechanisms have been proposed for operating the flushing means either automatically or semi-automatically after the facilities are used. The prior proposed mechanisms have failed to satisfy the conditions generally encountered in practical operation of sanitary facilities because no provision has been made for automatic control of the flushing apparatus at predetermined timed intervals.

According to the present invention there is provided a means whereby flushing apparatus can be automatically operated in a manner dependent on the extent of prior use of the facilities. The usual manual operation of the flushing apparatus is not interfered with so that the facilities can be flushed independently of the automatically operated system described herein. In the present invention there is provided switch means associated with a toilet seat, or located for foot operation by the user of a toilet or urinal. In circuit with the switch means is a relay controlled solenoid operatively connected to the mechanical flushing apparatus of the facilities. The circuit operates according to various predetermined timing cycles to be described.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIG. 1 is a perspective view of a toilet bowl having a manual and electrical flushing control, in accordance with the invention.

FIG. 2 is a front elevational view of a stand up type urinal, embodying the invention.

FIG. 3 is a side elevational view of a toilet having associated therewith a relay controlled solenoid and foot switch.

FIG. 4 is a side elevational view on an enlarged scale of the relay controlled solenoid associated with the flushing apparatus of the toilet.

FIG. 5 is a front elevational view of the relay controlled solenoid of FIG. 4.

FIG. 6 is a top plan view of a water closet showing another arrangement for controlling the flushing apparatus according to the invention.

FIG. 7 is a sectional view taken on line 7-7 of FIG. 6.

FIG. 8 is a top plan view of the foot switch employed as shown in FIG. 1.

FIG. 9 is an enlarged sectional view taken on line 9-9 of FIG. 8.

FIG. 10 is a front elevational view of another toilet bowl showing a switch associated with the toilet seat according to the invention.

FIG. 11 is a side elevational view on an enlarged scale taken on line 11-11 of FIG. 10, showing details of the switch associated with the toilet seat.

FIG. 12 is a diagram of an electric circuit employed in the system according to the invention.

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Referring in detail to the drawings, in FIG. 1 a toilet bowl 10 is shown and in FIG. 2 a stand-up urinal 12 is shown, both embodying the invention. The bowl 10 is adapted to be flushed manually and has a flush pipe 11 connected thereto, which pipe terminates at a water closet 13. The toilet bowl is provided with a flush valve 14 having a handle 16. The handle is manually operable to release water for flushing the toilet.

Both the toilet bowl 10 and urinal 12 are adapted to be flushed by electrically actuated mechanism. For this purpose, each is provided with a control box 20. Box 20 is secured to the pipe 11 of the toilet bowl 10 by means of bands or clamps 18, and extending upwardly from this box is a plunger 22 of a solenoid contained within the control box. Attached to the plunger is a hook 24 engaged over the handle 16 so that when the solenoid is actuated the plunger is retracted to cause the hook to pull the handle down thereby releasing the water for flushing the toilet bowl.

Associated with the components in the control box 20 of the toilet bowl 10 and of the urinal 12 is a foot operated switch box 26. This switch box includes a rectangular body 28 having a cover 30. The cover is unattached to the body and seats on a rubber ring 32 that is seated on a bracket 34 secured to the inner surface of the side wall of the body. This mounting of the cover permits uniform downward movement thereof at all points upon the slightest pressure thereon. Pivotaly secured between the cover and the bottom 36 of the base are two links 38, 40, respectively, arranged to depress a button 42 of a push button switch 44. The switch is connected via a cable 46 to the control box 20. A power supply cable 48 having wires 50, 52 is also connected to the box 20.

When the toilet bowl 10 or urinal 12 is being used, the user will normally place one foot on the cover 30 of the switch box depressing the cover and actuating switch 44. When the user is through using the facilities, and removes his foot from the switch box, then the cover is retracted and the automatic operation of the flushing apparatus is effected after ten seconds as will be described in connection with FIG. 10.

FIGS. 6 and 7 show an electrical control box 20^a mounted in a water closet 47 and connected by cables 46^a or 48^a to the switch 26. The box is supported by bracket arms 54 engaged on the vertical walls of the closet. Plunger 22^a of the box 20^a extends forwardly. Tied to the end of the plunger is a cord 56 which passes over an idler pulley 58 carried on a shaft 60 between opposite side walls of the closet. The cord 56 terminates in a ring 62 to which the cord is tied. Ring 62 is formed at the upper end of a stem 64 secured to a ball valve 66 normally seated on a valve seat 68 closing pipe 11^a. When the plunger 22^a is retracted electrically upon operation of the automatic control system by stepping upon switch 26, the ball valve is raised to effect release of water W and flushing of the toilet or urinal associated with the water closet. A manually operable lever 70 is also connected to ring 62 by a wire link 72 so that the flushing apparatus of the facilities can be operated selectively by the usual manually controlled lever 70 or by the automatic means, the automatic flushing taking place approximately one minute after actuation of the plunger as hereinafter described.

In FIGS. 10 and 11, a switch 44 is secured to the toilet bowl 74 by a clamp 76, and the switch is connected to control box 20 shown in FIGS. 3 to 5, by conductors 46' and 48'. The switch plunger or button 42 is in contact with the underside of seat 78 which is normally supported in a pivoted, elevated position by rubber lugs 80. When the user of the toilet bowl sits on the seat, the button 42 is depressed. When the user rises from the seat

the button is spring pressed upwardly along with the seat to the elevated position shown in the drawing, and the automatic control of the plunger 22 shown in FIGS. 3 to 5 is effected.

The automatic control system has three basic timing cycles or periods.

Period I

If the switch 44 is closed instantaneously or for just a few seconds and then released, the solenoid plunger 22 will not be actuated. This momentary actuation of the switch 44 may be caused by someone's accidentally stepping on the switch box 26 or accidentally pushing down on the seat 78. The system is timed so that any such momentary actuation of switch 44 less than a maximum of about ten seconds will not operate the automatic flushing apparatus.

Period II

This timing cycle is set to last between ten and sixty seconds. It may if desired be set for a longer or shorter time. If switch 44 is actuated by depressing button 42 for more than approximately ten seconds and is held depressed for less than approximately sixty seconds, then upon release of the switch button, the plunger 22 will be retracted immediately at the control box 20 for approximately three seconds or long enough to operate the valve which controls flushing of the particular sanitary facility.

Period III

If button 42 is depressed continuously for any period of more than sixty seconds corresponding to a prolonged use of the sanitary facility, then upon release of button 42 a waiting period of about ninety seconds ensues. At the end of the ninety second waiting period, the solenoid plunger 22 will be actuated for about three seconds to operate the flush valve of the sanitary facility. The waiting period is provided to prevent premature and immediate flushing of the toilet or other sanitary facility, to provide time for inspection of the contents of the bowl, or for other necessary sanitary purposes.

The three timing periods are accomplished by the control circuit shown in FIG. 12 to which reference is now made. This circuit shows all the components which are contained in the control box 20 with the exception of the push button switch 44. The switch is mounted in the switch box 26 or attached to the bowl under the elevated seat 78 as above described. The push button switch has its conductive bar 45 normally shorting or connecting switch terminals PB1 and PB2. When the switch button 42 is depressed the two other contacts PB3 and PB4 are shorted by bar 45. A power supply providing alternating or direct current is provided via wires 50, 52. Wire 52 is connected to switch contact PB1.

The circuit employs two instantly acting relays M1 and M2. Relay M1 has two normally open pairs of contacts 1A and 1B and a third pair of normally closed contacts 1C. Relay M2 has two pairs of normally open contacts 2A, 2B and two pairs of normally closed contacts 2C, 2D. Four time delay thermal relays TD1-TD4 are employed in the circuit. Each of the time delay relays has a single pair of contacts. Contacts T1, T2 and T3 of relays TD1, TD2 and TD3 are normally open, and the contacts T4 of relay TD4 are normally closed. The relays TD1-TD4 are set to close or open their contacts about ten seconds, sixty seconds, ninety seconds, and three seconds respectively after the relays are energized.

A solenoid S having plunger 22 is provided for operating the flush valve of the sanitary facility as above mentioned. Solenoid S is connected at one end to contacts T3 and at the other end to the coils of relays TD3, TD4 and contacts 1B. The coil of relay TD2 is connected at one end to one of contacts 2D and push button terminal PB4, and at the other end to wire 50. The coil of relay TD1 is connected at one end to wire 50 and at the other

end to contact 1C. The coils of relays M1 and M2 are connected at one end to wire 50 through the normally closed contacts T4 of relay TD4. The other end of the coil of relay M1 is connected to one of contacts 1A, T1, T2. The other end of the coil of relay M2 is connected to one of contacts 2A and T2. Push button terminal PB2 is connected to one of contacts 2B and 2C. Push button terminal PB3 is connected to terminal PB1 and one of contacts 1A. Push button terminal PB4 is connected to one of contacts 1C, 2D and T1. One of contacts 2B is connected to one of contacts T3. One of contacts T2 is connected to one of contacts 2A.

To operate the circuit, push button 42 must be depressed to close contacts PB3 and PB4 through the shorting bar 45. This causes the energizing of relays TD1 and TD2 through the normally closed contacts 1C and 2D respectively. If the button 42 is depressed only momentarily or for less than about ten seconds the system falls in Period I described above and plunger 22 is not actuated because the solenoid S is open circuited at contacts 1B.

If the push button is held depressed for longer than ten seconds but less than sixty seconds the following action occurs to accomplish the operation cycle of timing Period II. Relays TD1 and TD2 are energized as above mentioned. Contacts T1 close after ten seconds causing relay M1 to be energized through the normally closed contacts T4. When the instant acting relay M1 is energized its contacts 1A and 1B close while contacts 1C open. The closing of contacts 1A short circuits the contacts T1 and the terminals or contacts PB3 and PB4 of the push button switch so that relay M1 is sealed and held energized via wires 50 and 52 even if the push button 42 were then released. The closing of contacts 1B partially closes an enabling power supply circuit for relays TD3 and TD4 and the solenoid S. The enabling power supply circuit for these components is completed through the closed contacts 1B and through the shorted contacts PB1, PB2 if the button 42 is now released. Meanwhile the relay M1 remains sealed and energized. Relay contacts 1C remain open so that relay TD1 becomes deenergized and its contacts T1 open.

The release of the push button 42 after the ten seconds or more depression thereof effects the energization of the solenoid as above mentioned along with relay TD4. Since relay TD4 is timed to operate in about three seconds, its contacts T4 open after three seconds causing relay M1 to become deenergized, opening contacts 1A and unsealing this relay. Also contacts 1B open so that relay TD4 and solenoid S become deenergized. However, since the solenoid has been energized for its required operating time of three seconds, it has time to operate the flush valve 14 or 66 of the sanitary facility to which plungers 22 and 22', respectively, are connected.

When relay M1 becomes deenergized its contacts 1C return to the normally closed position in series with the coil of relay TD1. The circuit will thus be in its original position as shown in FIG. 4 and ready for performance of another timing operation.

To accomplish the operation occurring during timing Period III in which a delay of approximately ninety seconds is imposed before actuation of the plunger 22, the switch button 42 is released only after sixty seconds of continued depression. The circuit then operates as follows. When the push button is depressed and held relay M1 becomes energized and sealed as above described; contacts 1A and 1B close and contacts 1C open. Relay TD1 is deenergized and contacts T1 are open. After push button 42 has been depressed for sixty seconds, the contacts T2 of the energized relay TD2 close. Relay TD2 became energized through normally closed contacts 2D when button 42 was depressed. Relay M2 becomes energized through the now closed contacts T2 and 1A and the normally closed contacts T4. When relay M2 is energized its normally open contacts 2A, 2B close

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and its normally closed contacts 2C, 2D open. Closing of contacts 2A seals relay M2 to the power supply through the closed contacts 1A, 2A and T4. The opening of contacts 2D, which are in series with relay TD2, deenergizes this relay and opens its contacts T2, while relay M2 remains sealed to the power supply.

This circuit condition continues until the push button is released, whereupon a ninety second delay in operation of the solenoid ensues. This occurs because contacts 2C of the sealed relay M2 are open so that the power supply circuit to the parallel combination of relay TD4 and the solenoid is open. However, when the push button is released the ninety second relay TD3 becomes energized through the now closed contacts 2B of sealed relay M2. After ninety seconds, contacts T3 of relay TD3 close and both relay TD4 and the solenoid become energized and the plunger 22 is actuated, through the fully closed enabling circuit including contacts 1B, T3, 2B, PB2 and PB1. The relay TD4 opens its contacts T4 after three seconds, causing both relays M1 and M2 to become deenergized. When relay M1 becomes deenergized, contacts 1B open deenergizing the solenoid S and relay TD4. Relays TD1 and TD2 were previously deenergized. The circuit is now restored to the condition of FIG. 12.

The system thus provides an automatically controlled means for operating a flush valve immediately after a sixty second use of the sanitary facilities or following a ninety second delay after use of the facilities is completed. Of course, by employing relays having different actuation times it is possible to vary the required range of use time determined by relays TD1 and TD2, the delay in operation of the solenoid determined by relay TD3, and the length of time the solenoid is operated as determined by relay TD4. Other types of time delay relays than thermal relays may be used. Also other types of switch means than the double pole-double throw push button switch may be used.

While we have illustrated and described the preferred embodiments of our invention, it is to be understood that we do not limit ourselves to the precise construction herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

Having thus described our invention, what we claim as new, and desire to secure by United States Letters Patent is:

1. Control means for a flushing system of a sanitary facility having a flush valve, comprising a solenoid having a plunger adapted for operative connection to said valve for operating the same, a two position switch, two instantly acting relays, first, second and third time delay relays, a power supply in circuit with said solenoid, switch, instantly acting and time delay relays, the first and second time delay relays being energized when the switch is moved from one position to another position, one of the instantly acting relays being actuated a predetermined time after the first time delay relay is energized to close a part of an enabling circuit, the other instantly acting relay being actuated to close another part of the enabling circuit and energize the third time delay relay a second predetermined time after the second time delay relay is energized when the switch is restored to the one position thereof, said third time delay relay fully closing said enabling circuit a third predetermined time after energiza-

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tion thereof, said solenoid being energized through the fully closed enabling circuit, and a fourth time delay relay in circuit with said solenoid and enabling circuit and operative to open the enabling circuit and deenergize the solenoid a fourth predetermined time after the solenoid is energized.

2. A control means for a flushing system of a sanitary facility having a flush valve, comprising a solenoid having a plunger adapted for operative connection to said valve for operating the same, a two position switch, two instantly acting relays, first, second and third time delay relays, a power supply in circuit with said solenoid, switch, instantly acting and time delay relays, the first and second time delay relays being energized when the switch is moved from one position to another position, one of the instantly acting relays being actuated a predetermined time after the first time delay relay is energized to close a part of an enabling circuit, the other instantly acting relay being actuated to close another part of the enabling circuit and energize the third time delay relay a second predetermined time after the second time delay relay is energized when the switch is restored to the one position thereof, said third time delay relay fully closing said enabling circuit a third predetermined time after energization thereof, said solenoid being energized through the fully closed enabling circuit, the two instantly acting relays having contacts in circuit with the power supply to seal the instantly acting relays thereto when the switch is restored to the one position thereof.

3. A control means for a flushing system of a sanitary facility having a flush valve, comprising a solenoid having a plunger adapted for operative connection to said valve for operating the same, a two position switch, two instantly acting relays, first, second and third time delay relays, a power supply in circuit with said solenoid, switch, instantly acting and time delay relays, the first and second time delay relays being energized when the switch is moved from one position to another position, one of the instantly acting relays being actuated a predetermined time after the first time delay relay is energized to close a part of an enabling circuit, the other instantly acting relay being actuated to close another part of the enabling circuit and energize the third time delay relay a second predetermined time after the second time delay relay is energized when the switch is restored to the one position thereof, said third time delay relay fully closing said enabling circuit a third predetermined time after energization thereof, said solenoid being energized through the fully closed enabling circuit, the two instantly acting relays having contacts in circuit with the power supply to seal the instantly acting relays thereto when the switch is restored to the one position thereof, the instantly acting relays having other contacts operative to deenergize the first time delay relay when the one instantly acting relay is energized and to deenergize the second time delay relay when the other instantly acting time delay relay is energized.

References Cited in the file of this patent

UNITED STATES PATENTS

2,539,206	Robinson	Jan. 23, 1951
2,738,448	Bokser	Mar. 13, 1956
2,765,430	Graef	Oct. 2, 1956