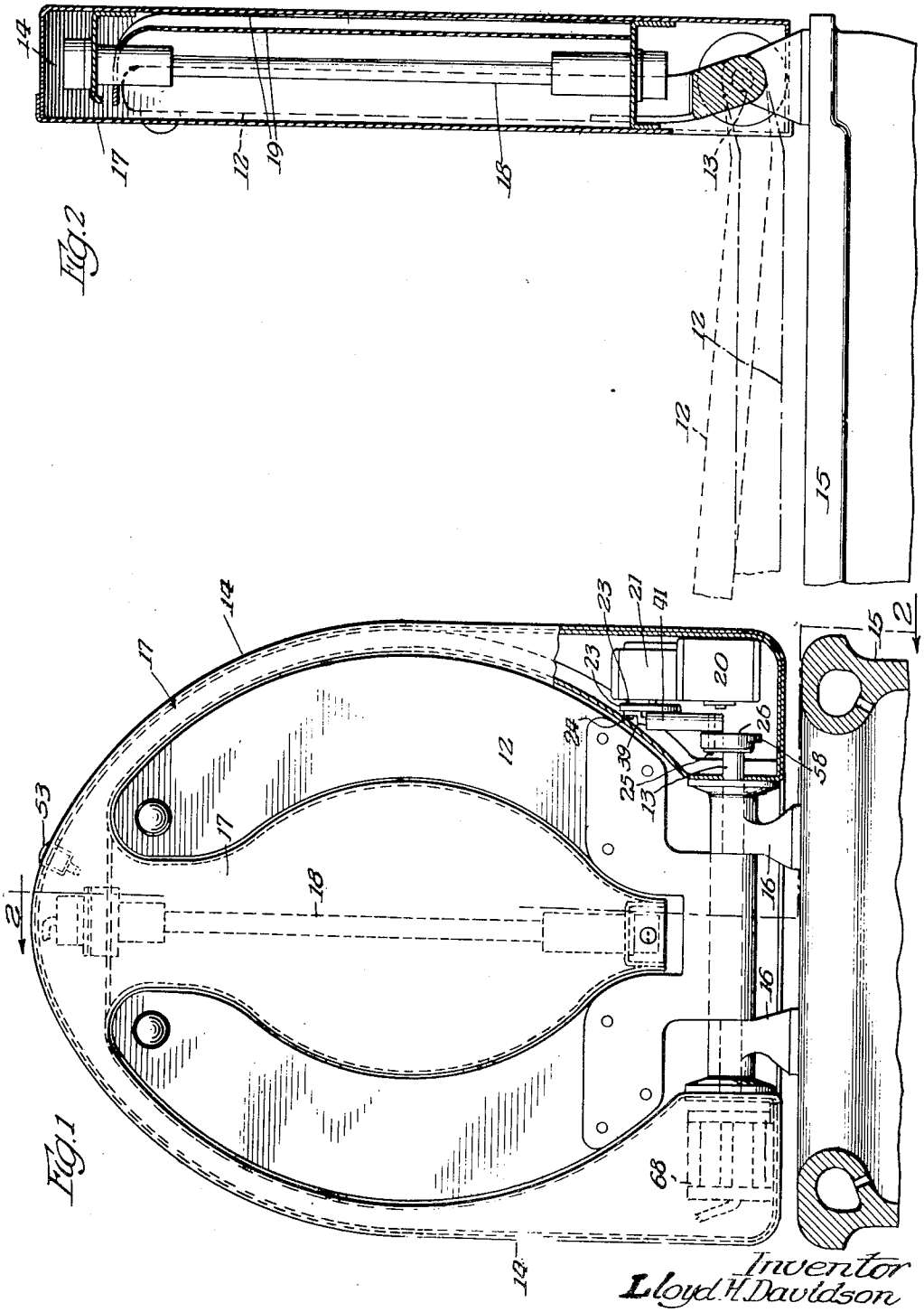
April 20, 1948. L. H. DAVIDSON 2,440,231

STERILIZED TOILET SEAT

Filed Oct. 5, 1944 3 Sheets-Sheet 1



Inventor
Lloyd H. Davidson
By Fred Gerlach
his Atty.

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STERILIZED TOILET SEAT

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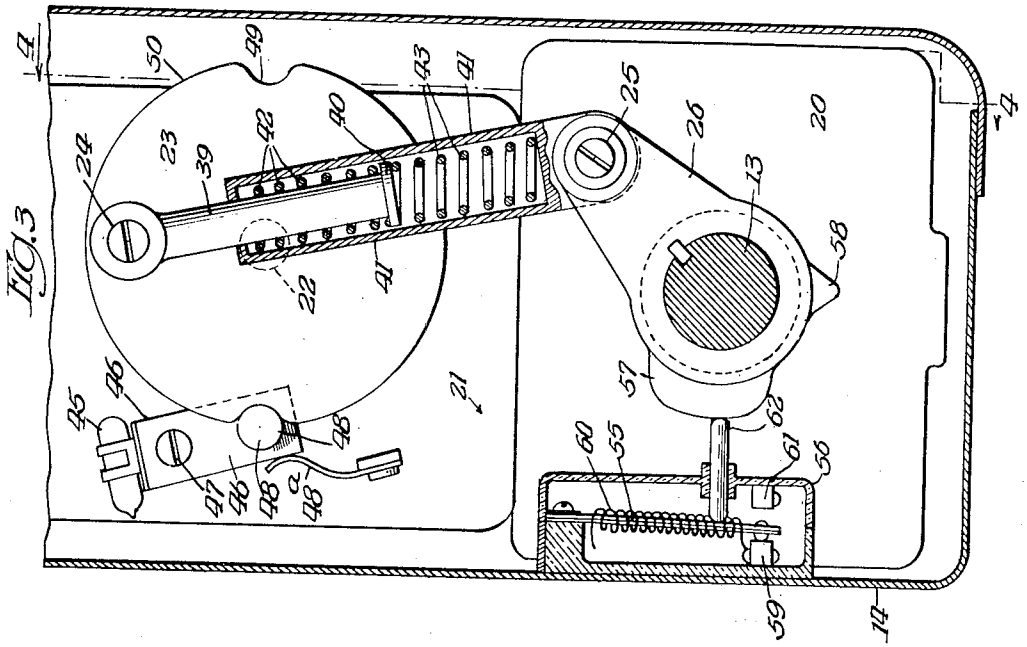


FIG. 3

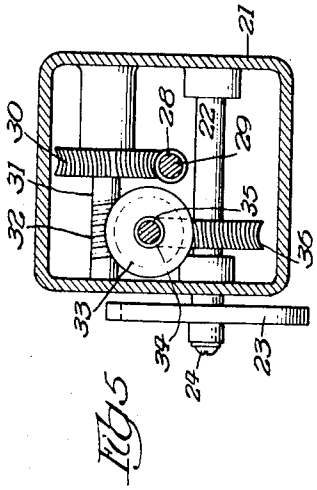


FIG. 5

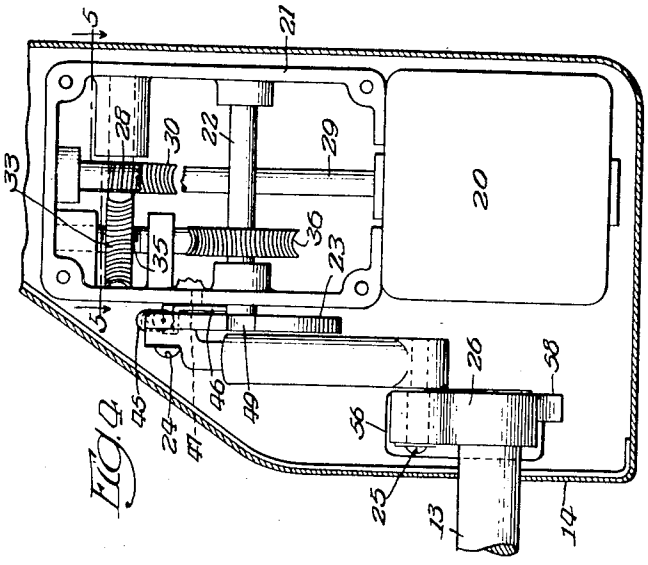


FIG. 4

Inventor
Lloyd H. Davidson
By Ford Gerlach
his Atty.

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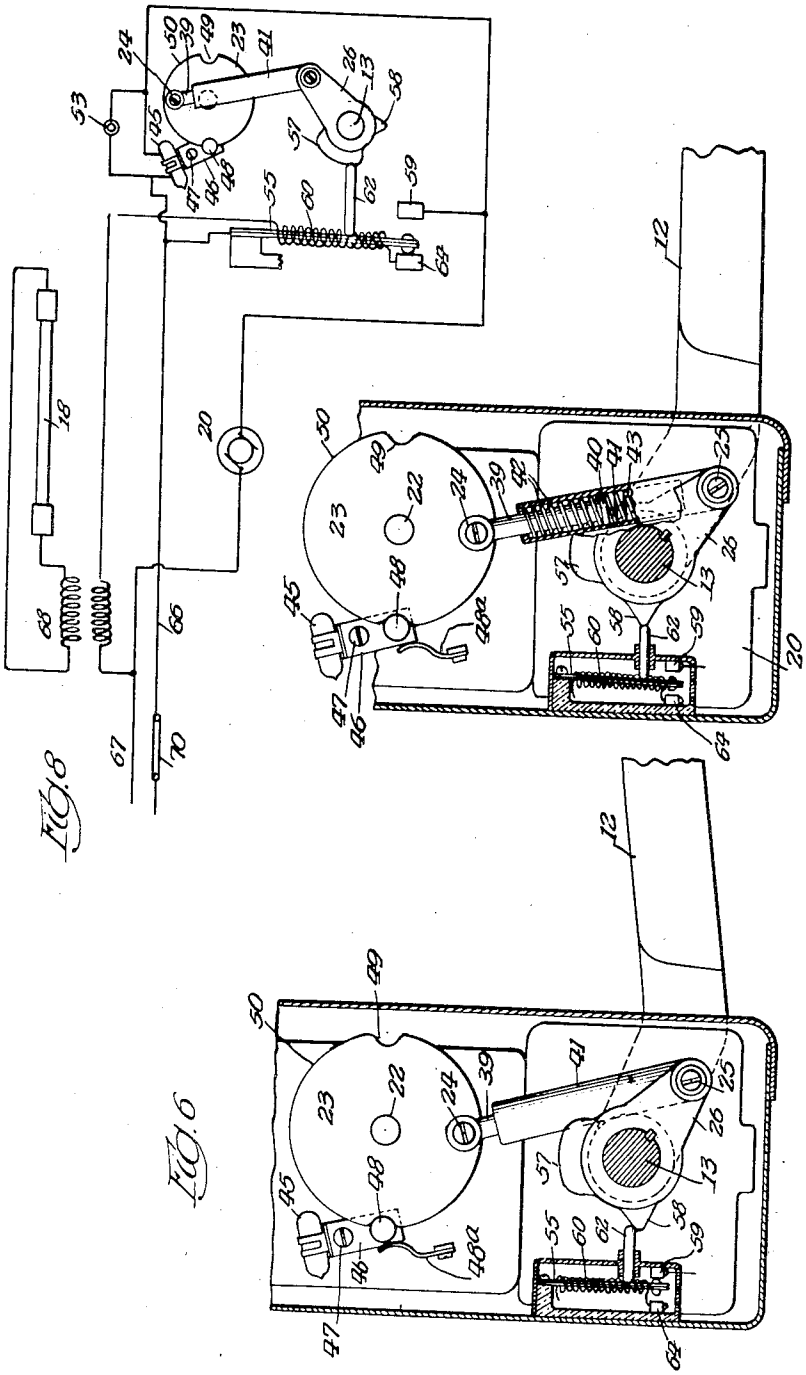


FIG. 8

FIG. 7

FIG. 6

Inventor
Lloyd H. Davidson
By Fred Gerlach his Atty.

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2,440,231

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2,440,231

STERILIZED TOILET SEAT

Lloyd H. Davidson, Connersville, Ind., assignor, by mesne assignments, to Avco Manufacturing Corporation, a corporation of Delaware

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11 Claims. (Cl. 4—233)

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The invention relates to sterilized toilet seats.

One object of the invention is to provide improved mechanism for shifting the toilet between a position in a sterilizing cabinet and its usable position.

Another object of the invention is to provide simple mechanism operable by an electric motor for shifting the toilet seat between its sterilizing position in a cabinet and its usable position.

Another object of the invention is to provide improved automatic means for operating the shifting mechanism to return the seat to its sterilizing position from its lowered position after a predetermined interval in the event that the seat is not used.

Another object of the invention is to provide operating mechanism for a sterilized toilet seat which includs a motor operable resilient link connection which permits completion of the seat-lowering movement by the user and which dispenses with dash-pots and shock absorbing devices which are necessary when the seat is raised by a spring or weights.

Another object of the invention is to provide seat raising and lowering mechanism which is simple in construction and efficient in operation.

Other objects of the invention will appear from the detailed description.

The invention consists in the several novel features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings:

Figure 1 is a front elevation, parts being shown in section, of the sterilizing cabinet and seat, the seat being positioned in the cabinet.

Figure 2 is a section taken on line 2—2 of Figure 1.

Figure 3 is a section illustrating the seat raising and lowering mechanism.

Figure 4 is a section taken on line 4—4 of Fig. 3.

Figure 5 is a section taken on line 5—5 of Fig. 4.

Figure 6 is a section illustrating the motor operable seat-shifting mechanism in position for holding the seat lowered in a predetermined position over the bowl and from which it is automatically raised after a predetermined interval.

Figure 7 is a section illustrating the seat raising and lowering mechanism with the seat depressed by the user beyond the position into which it is shifted by the motor operated mechanism.

Figure 8 is a diagram of the electrical circuits and connections for controlling the operation of the electric motor for raising and lowering the seat and the actuation of the sterilizing lamp.

The invention is exemplified as applied to a toilet seat 12 which has a divided front portion and is adapted to pass through a correspondingly shaped opening in the front plate 17 of a sterilizing cabinet 14. Seat 12 is adapted to swing with a shaft 13 which is journaled in brackets 16 which are supported on the upper rear portion of the bowl 15. A sterilizing lamp 18 is mounted in the cabinet so that its rays will be directed by a reflector 19 mounted in the cabinet 14 onto the upper face of the toilet seat 12, while the seat is vertically positioned in the cabinet. Shaft 13 pivotally supports the seat 12 for swinging movement from its vertical position in the sterilizing cabinet 14 to a horizontal position for use. Shaft 13 is also operable to swing the seat between its sterilizing position in the cabinet 14 and its lowered positions.

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The invention provides mechanism which comprises a unidirectional electric motor 20, mechanism operable by the motor for oscillating shaft 13 to swing the seat from its position in the sterilizing cabinet to a predetermined lowered position above the toilet bowl 14 and from said position into the cabinet, a manual control switch for starting the operation of the motor to lower the seat to said predetermined position, means permitting the seat to be lowered by the user from said predetermined position onto the toilet bowl, and automatic means for controlling the operation of the motor for returning the seat into the sterilizing cabinet from its lowered position either after use or in the event it is not used within a predetermined period.

The power operable mechanism for oscillating shaft 13 to effect the raising and lowering movements of the seat between the sterilizing cabinet and the predetermined lowered position above the toilet bowl comprises an electric motor 20 which is mounted in the lower portion and at one side of the cabinet 14; reduction gearing contained in a box 21 driven by the shaft 29 of the motor and comprising an output shaft 22 which is journaled in the box 21; a disk 23 fixed to the output shaft 22 of the reduction gearing; a crank or wrist pin 24 on the disk 23; a crank-arm 26 fixed to the shaft 13 and carrying the seat 12; and a yieldable or spring link-connection between a pin 25 on the distal end of arm 26 and the wrist-pin 24 on disk 23.

The link connection between disk 23 and crank arm 26 is adapted during successive half revolutions in one direction of wrist pin 24 and disk 23 to operate arm 26 to lower the seat 12 out of and raise it into the sterilizing cabinet 14. This makes it possible to raise and lower the seat by

a uni-directional operating and controlled electric motor 20.

The speed reduction gearing comprises a worm 28 on the shaft 29 of the motor 20; a worm gear 30 meshing with worm 28; a shaft 31 fixed to worm gear 30; a worm 32 on shaft 31; a worm gear 33 engaged by worm 32; a shaft 34 driven by worm 33 and provided with a worm 35 and a worm gear 36 fixed to shaft 32.

The yielding or spring connection between wrist pin 24 and arm 26 functions to rock arm 26 to shift the seat 12 by the electric motor 20 and the reduction gearing from its raised position in the sterilizing cabinet 14 to a predetermined lowered position slightly above the toilet bowl 15 as indicated by full lines in Fig. 2, and to raise the seat from said predetermined lowered position by said motor and reduction gearing to its sterilizing position in the cabinet 14 and also to permit the seat to be lowered by the user from said predetermined position onto the bowl. This yieldable link connection is also utilized to control electric motor 20 to prevent its operation to raise the seat while it is occupied.

The resilient link connection comprises a cylinder 41, the lower end of which is pivoted to crank pin 25, a rod 39 which is slidable in cylinder 41 and has its upper end pivoted to the wrist pin 24, and coil springs 42 and 43 between the upper and lower ends of the cylinder, respectively, and a head 40 on the inner end of rod 39.

These springs shift the seat during the motor operated cycles of the disk 23 between its sterilizing position in cabinet 14 and its predetermined position somewhat above the toilet bowl 15, so that the motor will not shift the seat into its fully lowered position on the bowl, and the springs permit the seat to be lowered onto the bowl by the weight of the occupant while the motor and disk 23 remain stationary. This additional movement of the seat permitted by the resilient link connection is utilized to automatically control the operation of the motor to cause it to remain idle during the occupancy of the seat and to return the seat to its sterilizing position in the event it is not lowered from its intermediate position after a predetermined period.

The means for controlling the operation of the motor 20 for raising and lowering the seat comprises a manually operable starting switch, such as a push button 53, which is normally open and connected to close a circuit across and through motor 20, a mercury cycling switch 45, and means for holding the motor-circuit closed between one-half revolution cycles of the disk 23. The mercury switch 45 is mounted on a lever 46 which is fulcrumed at 47 on the casing 21 and provided at its lower end with a stud 48 which is adapted to be pressed by a spring 48a into diametrically opposite notches 49 in the rim 50 of disk 23 for opening the switch 45 and cutting off current to the motor at the end of one-half cycles of disk 23. The semi-circular rim-portions 50 between the disk hold stud 48 to position rock lever 46 to hold the mercury switch closed. This exemplifies automatic means for controlling the operations of motor 20 to produce successive one-half revolutions or cycles of disk 23 for raising and lowering the seat after the motor has been manually started by the switch 53. Switch 45 is connected to close and open a circuit across conductors 66, 67 and through motor 20.

The operation of motor 20 to effect the raising movements of the seat into the sterilizing cabinet is automatically controlled to insure the restoration of the seat to the sterilizing cabinet after each lowering movement or use of the seat. This automatic control means is adapted to prevent the operation of motor 20 as long as the seat 12 is occupied and also to cause the operation of the motor 20 to automatically raise the seat into the sterilizing cabinet to insure the sterilization of the seat between uses or lowering movements of the seat whether or not it is used. This means comprises a thermostatic switch which, through a delayed action, causes the motor 20 to start the lifting movement of the seat from its intermediate position adjacent and above the bowl 15. This thermostatic switch is mechanically controlled by the movements of arm 26 and electrically controlled to delay its action in closing a circuit for operating the motor 20 to raise the seat. The thermostatic switch comprises a bimetallic member 55 connected to line conductor 66, and adapted to engage a contact 64 for closing a circuit through the primary of the transformer 68 for actuating the sterilizing lamp 18 or a contact 59 for closing a circuit for starting the motor 20, and a resistance coil 60 wound around member 55 for heating said member to delay its closing against contact 59. Resistance coil 60 is in series with the contact 64 between switch member 55, the conductor 67 to which the primary of the transformer 68 is connected.

The means for mechanically shifting the switch-member 55 comprises a cam 57 on arm 26 for holding, through a slidable pin 62, member 55 engaged with contact 64 while the seat is in the sterilizing cabinet and a cam 58, also on arm 26, which is adapted to hold pin 62 to keep switch-member 55 disengaged from contact 59 and prevent the motor 20 from being started while the seat is in its fully lowered or occupied position.

A switch 70 is included in the conductor 66 for controlling the operation of the sterilizing lamp and seat shifting mechanism.

The operation will be as follows: When the seat 12 is in its raised position in the cabinet 14, the thermostatic switch member 55 will be held by cam 57 on arm 26 into engagement with the contact 64 and current will flow via conductor 66, switch member 55, contact 64, resistance coil 60, and transformer 68 to line conductor 67, as shown in Fig. 3. The transformer will actuate the lamp 18 for sterilizing the seat in the cabinet. Resistance coil 60 will heat the switch-member 55 to flex it toward the contact 64. The motor circuits will be open at switch button 53, at the cycling switch 45, and at contact 59 and the motor will remain idle.

When the seat is to be used, switch button 53 will be pressed to close the following circuit for starting the motor 20, viz: conductor 66, switch button 53, motor 20, and line conductor 67. The motor, through the reduction gearing, will rotate disk 20 in one direction and the rim 50 of said disk will shift the cycling switch 45 to close the circuit from conductor 66 through mercury switch 45, motor 20 to line conductor 66 to continue the operation of the motor for a one-half revolution of disk 50 and until the stud 48 enters one of the notches 49 in disk 23. During this operation of the motor the resilient link connection between disk 23 and arm 26 will lower the seat 12 to the predetermined position above the bowl 15, as illustrated by the upper dotted lines in Fig. 2, and by full lines in Fig. 6, and cam 57 will mechanically release switch-member 55 to interrupt the circuit through transformer 68 and heating coil 60.

When the user occupies the seat, the latter will rock arm 26 to lower the seat to the position shown in Fig. 7, the resilient link connection permitting the seat to be lowered onto the bowl while disk 29 and motor 20 remain stationary. Simultaneously, cam 58 will shift pin 62 to mechanically hold switch member 55 to prevent engagement of switch member 55 and contact 59 so that while the seat remains occupied, the motor 20 will not be operated to raise the seat. When the seat is vacated the spring 22 of the resilient connection between disk 23 and crank arm 26 will shift the seat and arm 26 to its predetermined position above the bowl as illustrated in Fig. 6. Cam 58 will release pin 62 to permit the switch member 55, as a result of its cooling, to engage contact 59. The switch member 55 when it has cooled sufficiently to engage contact 59, will close the circuit from line conductor 67 through switch member 55, contact 59, motor 20, to line conductor 66. The motor will then, by continued rotation in the same direction, operate disk 23 and arm 26 to swing the seat into its raised position into the cabinet 14, the cycling switch 45 keeping said circuit closed until the seat is in its fully raised position in the cabinet 14. During this operation cam 57 will shift switch member 55 to close the circuit at contact 64 for energizing the primary of the transformer and the sterilizing lamp 18 while the seat remains in its raised position in the cabinet 14.

If the seat is lowered to its intermediate position above the bowl and is not used, arm 26 and cam 58 will be in the position illustrated in Fig. 6. Switch member 55, after a period during which it cools, will engage contact 59 and close the circuit for starting the motor to raise the seat and disk 23 and mercury switch 45 will continue the circuit through the motor to complete the raising movement of the seat. This insures the raising of the seat into the sterilizing cabinet after each seat lowering operation even when it is lowered without being occupied.

In the operation of the seat from the motor, the resilient link connection causes the shifting mechanism to operate smoothly and without shock in starting and stopping.

The invention exemplifies motor operating mechanism for raising and lowering the toilet seat which is automatically controlled to effect the raising and lowering cycles of the seat, is simple in construction and efficient in operation. The invention also exemplifies improved means for controlling the operation of the motor and seat shifting mechanism to prevent operation of the seat while it is occupied, and for automatically lifting the seat when it is vacated or the seat is lowered and not used within a predetermined period to prevent the seat from being left lowered where it will not be sterilized between uses. The invention also exemplifies mechanism for raising and lowering the seat which dispenses with the shock preventing or absorbing devices heretofore used to prevent damage to the sterilizing lamp and other mechanism.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a toilet comprising a bowl, a seat-receiving sterilizing cabinet and a seat movable from a raised sterilizing position in the cabinet and to a lowered position over the bowl, of an electric motor, mechanism operable by the motor for successively lowering and raising the seat, and means for controlling the operation of the motor for lowering the seat comprising a starting switch, a cycling switch for controlling the operation of the motor in lowering and raising the seat, and automatic means comprising a thermostatic switch for starting the motor to raise the seat after it has been lowered.

2. The combination with a toilet comprising a bowl, a seat-receiving sterilizing cabinet and a seat movable from a raised sterilizing position in the cabinet and to a lowered position over the bowl, of an electric motor, mechanism operable by the motor for successively lowering and raising the seat, and means for controlling the operation of the motor for lowering the seat comprising a starting switch, a cycling switch for controlling the operation of the motor in lowering and raising the seat, and automatic means comprising a thermostatic switch for starting the motor to raise the seat after it has been lowered, and mechanical means for controlling the thermostatic switch when the seat is raised.

3. The combination with a toilet comprising a bowl, a seat-receiving sterilizing cabinet and a seat movable from a raised sterilizing position in the cabinet and to a lowered position over the bowl, of an electric motor, mechanism operable by the motor for successively lowering to a predetermined position above the bowl and raising the seat, means permitting the seat to be additionally lowered by occupancy, means for controlling the operation of the motor for lowering the seat, and automatic means, comprising a thermostatic switch for starting the motor to raise the seat after lapse of an interval after it has been lowered to said predetermined position, and mechanical means for controlling the switch while the seat is raised and in its unoccupied position.

4. The combination with a toilet comprising a bowl, a seat-receiving cabinet, a sterilizing lamp in the cabinet and a seat movable between a raised sterilizing position in the cabinet and a lowered position over the bowl, of an electric motor, mechanism operable by the motor for successively lowering the seat to a predetermined position above the bowl and raising the seat into the cabinet, means for controlling the operation of the motor for lowering the seat, automatic means for starting the motor to raise the seat after lapse of an interval after it has been lowered to said predetermined position, comprising a thermostatic switch and mechanical means controlled by said mechanism, and means controlled by said thermostatic switch for controlling the operation of the sterilizing lamp in the cabinet.

5. The combination with a toilet comprising a bowl, a seat-receiving cabinet, a sterilizing lamp in the cabinet and a seat movable between a raised sterilizing position in the cabinet and a lowered position over the bowl, of an electric motor, mechanism operable by the motor for successively lowering the seat to a predetermined position above the bowl and raising the seat into the cabinet, means for controlling the operation of the motor for lowering the seat, automatic means for starting the motor to raise the seat after lapse of an interval after it has been lowered to said predetermined position, comprising a thermostatic switch, and means controlled by said switch for controlling the operation of the sterilizing lamp in the cabinet.

6. The combination with a toilet comprising a bowl, a seat-receiving cabinet, a sterilizing lamp in the cabinet and a seat movable between a raised sterilizing position in the cabinet and a lowered position over the bowl, of an electric motor, mechanism operable by the motor for successively lowering the seat to a predetermined position above the bowl and raising the seat into the cabinet, means permitting the seat to be additionally lowered by occupancy, means for controlling the operation of the motor for lowering the seat, automatic means for starting the motor to raise the seat after lapse of an interval after it has been lowered to said predetermined position, comprising a thermostatic switch, and means controlled by said switch for controlling the operation of the sterilizing lamp in the cabinet, and means for preventing operation of the motor when the seat is additionally lowered by occupancy.

7. The combination with a toilet seat comprising, a bowl, a seat-receiving sterilizing cabinet, a seat provided with a pivotally supported shaft for swinging movement from a raised sterilizing position in the cabinet to a lowered position over the bowl, of a uni-directional crank, an arm fixedly secured to the shaft for the seat, a direct link-connection extending directly between the crank and the arm, said link-connection including slidably connected telescopic members pivotally connected to the crank and arm, respectively, spring means between said members, and power means for imparting pivotal movement to the crank for raising and lowering the seat.

8. The combination with a toilet seat comprising, a seat-receiving sterilizing cabinet, a seat provided with a pivotally supported shaft for swinging movement from a raised sterilizing position in the cabinet to a lowered position over the bowl, of a uni-directional crank, an arm fixedly secured to the shaft for the seat and a direct link-connection extending directly between the crank and the arm, said link-connection including slidably connected telescopic members, pivotally connected to the crank and arm, respectively, spring-means within one of and between said members, and power-means for imparting pivotal movement to the crank for raising and lowering the seat.

9. The combination with a toilet seat comprising, a bowl, a seat-receiving sterilizing cabinet, a seat having affixed thereto a pivotally supported shaft for swinging the seat from a raised sterilizing position in the cabinet to a lowered position over the bowl, of power operated means, including an electric motor and a crank for shifting the shaft to swing the seat between the cabinet and its partially lowered position, an arm fixedly secured to the shaft, a direct link-connection between the crank and the arm, and means for controlling the operation of the motor, including a switch, and a cam rotatable with said shaft for releasing the switch when the seat is in a partially lowered position and for opening the switch when the seat is in its fully lowered position.

10. The combination with a toilet seat comprising, a bowl, a seat-receiving sterilizing cabinet, a seat having affixed thereto a pivotally supported shaft for swinging the seat from a raised sterilizing position in the cabinet to a lowered position over the bowl, of power operated means, including an electric motor and a crank for shifting the shaft to swing the seat between the cabinet and its partially lowered position, an arm fixedly secured to the shaft, a direct link-connection between the crank and the arm, and means for controlling the operation of the motor, including a switch, a cam rotatable with said shaft for engaging the switch when the seat is raised, and a cam rotatable with said shaft for releasing the switch to close when the seat is in a partially lowered position and for opening the switch when the seat is in its fully lowered position.

11. The combination with a toilet seat comprising, a bowl, a seat-receiving cabinet including a sterilizing element, a seat having affixed thereto a pivotally supported shaft for swinging the seat from a raised sterilizing position in the cabinet to a lowered position over the bowl, of power operated means, including an electric motor and a crank for shifting the shaft to swing the seat between its raised and partially lowered positions, an arm fixedly secured to the shaft, a direct link-connection between the crank and the arm, and means for controlling the operation of the motor, including a thermostatic switch, a cam rotatable with said shaft for engaging the switch when the seat is raised, and a cam rotatable with said shaft for releasing the switch to close when the seat is in a partially lowered position and for opening the switch when the seat is in its fully lowered position, the switch being adapted to close a circuit for said element when the seat is raised.

LLOYD H. DAVIDSON.

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