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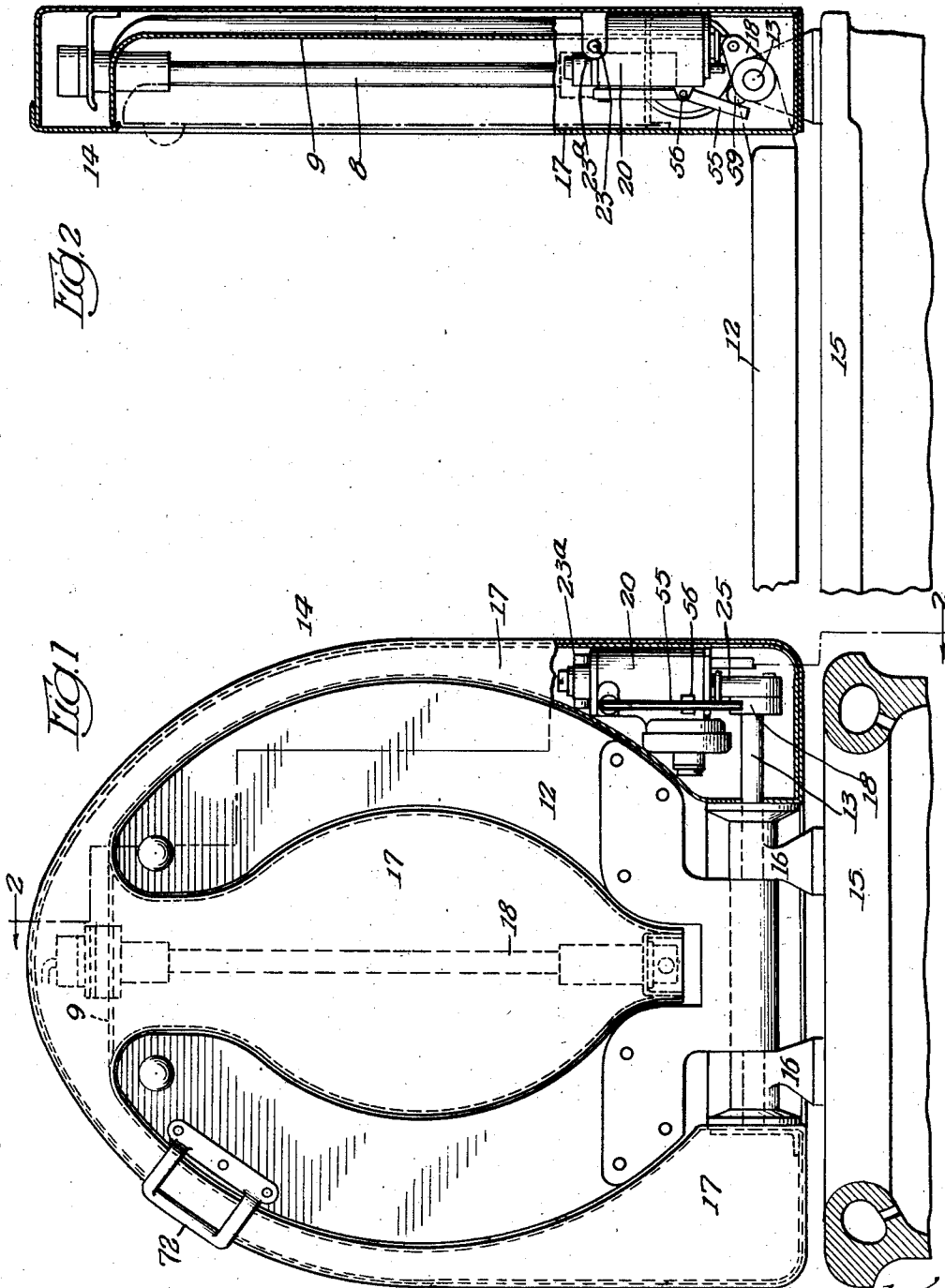
L. H. DAVIDSON

2,440,232

STERILIZED TOILET SEAT

Filed Nov. 11, 1944

3 Sheets-Sheet 1



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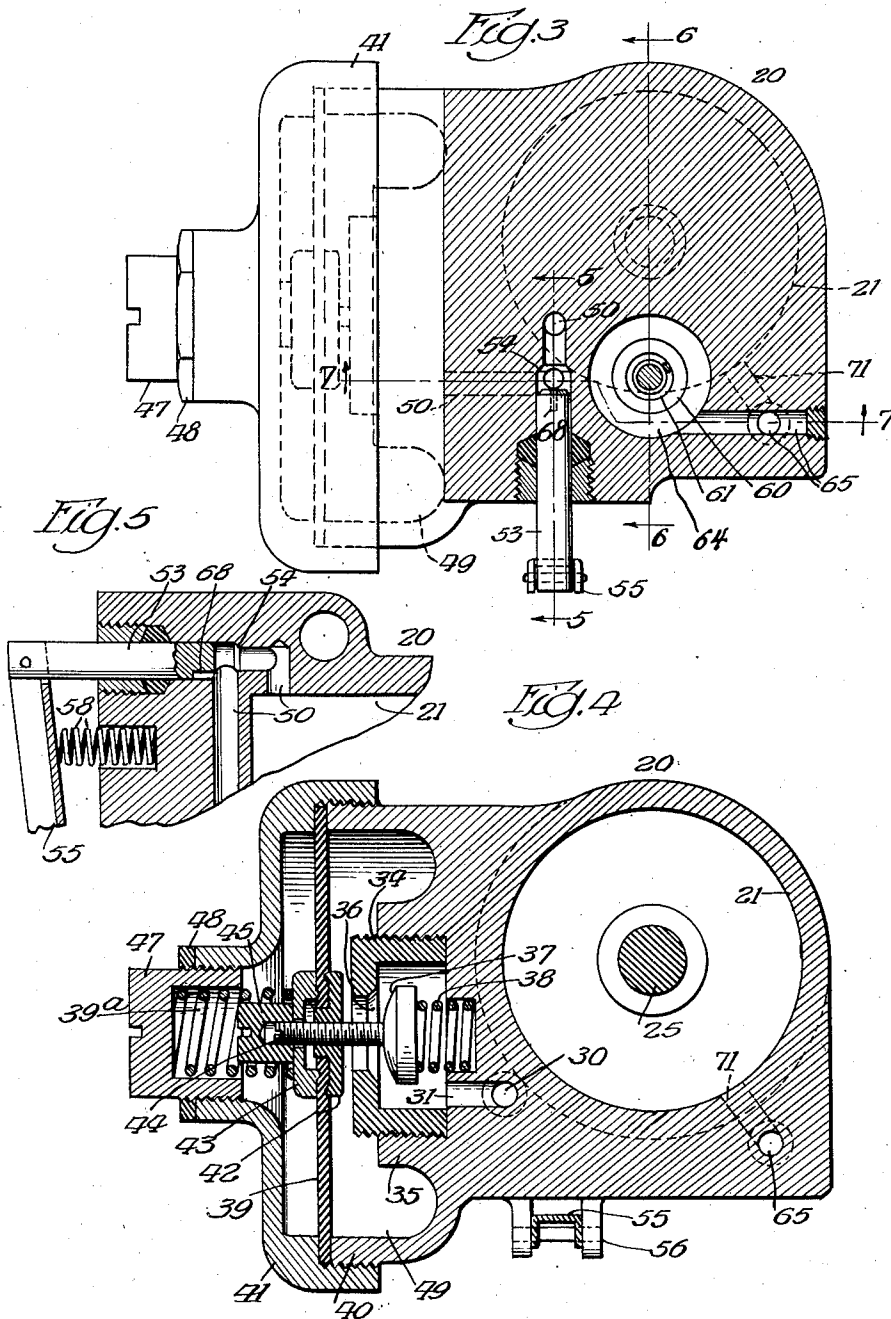
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3 Sheets-Sheet 2



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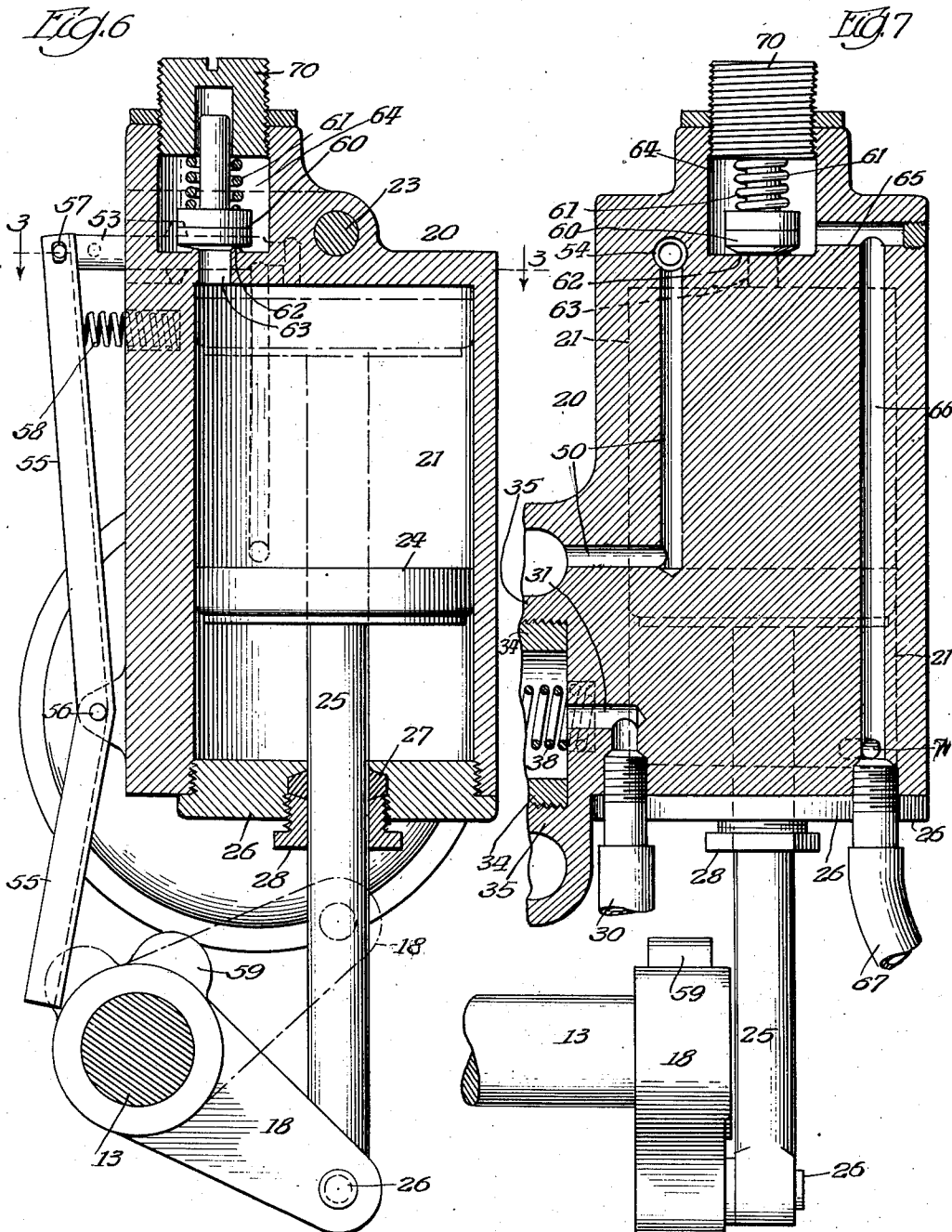
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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STERILIZED TOILET SEAT

Lloyd H. Davidson, Connorsville, Ind., assignor,
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Application November 11, 1944, Serial No. 562,937

10 Claims. (Cl. 4-233)

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The invention relates to sterilized toilet seats. One object of the invention is to provide simple and efficient hydraulic means for automatically raising the seat into sterilizing position after each use.

Another object of the invention is to provide improved hydraulic means, which permits the seat to be manually lowered to its usable position, and automatically raises the seat into sterilizing position after each use.

Another object of the invention is to provide an improved hydraulic unit for lifting the toilet seat which includes a pressure regulating valve for limiting the pressure of the water to the operating cylinder for lifting the seat.

Another object of the invention is to provide hydraulic means for automatically lifting the seat, which is operable to start the seat slowly and continue its lifting movement at a greater speed, without subjecting the seat to shock.

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

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

In the drawings:

Fig. 1 is a front illustration of a toilet seat in the cabinet and in its raised position.

Fig. 2 is a section of line 2-2 of Fig. 1, the seat being shown in its lowered or usable position.

Fig. 3 is a horizontal section taken on line 3-3 of Fig. 6.

Fig. 4 is a horizontal section taken on line 4-4 of Fig. 7.

Fig. 5 is a section taken on line 5-5 of Fig. 3.

Fig. 6 is a vertical section on line 6-6 of Fig. 3.

Fig. 7 is a section taken on line 7-7 of Fig. 3.

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 17 of the sterilizing cabinet 14. Seat 12 is secured 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 8 is mounted in the cabinet so that its rays will be directed by a suitably shaped reflector 19 which is mounted in cabinet 14 onto the usable face of the toilet-seat while the seat is vertically positioned in the cabinet.

Shaft 13 vertically supports the seat 12 for swinging movement from its vertical position in the sterilizing cabinet 14 to its horizontal posi-

tion for use, and is operable to swing the seat from its lowered position to its sterilized position in the cabinet 14 by the hydraulic mechanism. The toilet seat is adapted to swing shaft

13 to operate the hydraulic mechanism to discharge the water from its cylinder when the seat is manually lowered from its sterilizing position to its usable position over the bowl. An arm 18 fixed to one end of the said shaft, is connected to said piston and forms an operating connection between shaft 13 and said piston.

The hydraulic mechanism comprises a casing 20 in which is formed a cylinder 21. The upper end of casing 20 is pivoted by a pin 23 to a lug or bracket 23-a which is supported in the cabinet 14. A piston 24 is slidable in the cylinder 21 and provided with a depending stem 25, the lower end of which is pivoted by a pin 26 to the distal end of arm 18. The upper end of the cylinder has an integral wall and its lower end is closed by a removable head 26. The piston stem 25 extends through a packing 27 which is confined in head 26 by a gland 28.

Water is supplied to the cylinder 21 for operating piston 24 by a flexible pipe 30 which is connected to the water pipe, which is used to supply the water to the bowl. The supply pipe 30 is communicatedly connected to an inlet duct 31 which is formed in the casing and conducts water to a pressure regulating valve which controls the flow of water in the desired predetermined pressure to the hydraulic device.

This pressure regulator comprises a diaphragm 39 which has its margin clamped between an annular wall 40 on casing 20 and a head or cap 41 which is screw-threaded to said wall; a closure or valve-member 37 loaded by a spring 38 and movable against a seat 36 in a cup-shaped member 34 which is screw-threaded into annular wall 35; a screw-threaded stem 44 on valve member 37; a washer 42 screw-threaded to stem 44 and a washer 43 through which said stem extends, for clamping the central portion of the washer; a nut 45 which is threaded to the outer end of stem 43 and adapted to clamp washers 42 and 43 against diaphragm 39; a plug 47 screw-threaded into an angular flange on the cap 41; and a spring 39-a between washer 43 on the diaphragm and plug 47. Valve-member 37 controls the flow of water from inlet port 31 which communicates with the inlet port 30 through the cup-shaped member 34 and into the chamber 49, one side of which is formed by diaphragm 39. Springs 38 and 39-a exert a counter or balancing pressure on the diaphragm

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39. The pressure to which diaphragm 39 is responsive for closing valve-member 37 can be varied by the adjustment of plug 47 to vary the inward pressure exerted by the spring 39—*a* against the diaphragm 39. A locknut 48 holds plug 47 in its adjusted position. The pressure of spring 39—*a* may be adjusted, for example, to permit a pressure of 15 lbs. per square inch against the inner face of the diaphragm 39 to close valve 37 against seat 36 and cut off the delivery of water to chamber 49 when the pressure of water exceeds 15 lbs. per square inch. This regulation of the operation of valve-member 37 adapts the hydraulic device for use with supply lines in which the pressure fluctuates or which operate under different pressures; also, to control the flow of water to the cylinder 21, according to the speed with which it is desired to raise the toilet seat.

From chamber 49 in the pressure regulator the water flows through a duct 50 in casing 20 to the upper end of the cylinder 21 via a slidable control valve 53, which is closed when the seat is lowered, for operating the piston 24 downwardly to raise the toilet seat. Valve 53 is adapted to close against a seat 54 which is formed in the duct 50 between chamber 49 and cylinder 21 when the seat 12 has been lowered to its usable position and to cut off the full supply of water to cylinder 21. This valve 53 is shiftable by a lever 55 which is fulcrumed at 56 on the casing 20, has its upper end connected by a pin 57 to said valve and has its lower end extended for engagement by a cam 59 on arm 18 which is fixed to shaft 13, when the seat has been shifted to its lowered or usable position. Lever 55 is loaded by spring 58 to cause valve 53 to remain open, except when the seat is lowered and lever 55 is engaged by cam 59.

The seat 12 is manually lowered from its sterilizing position by the user and during its lowering movement the seat, through shaft 13 and arm 18 will raise the piston 24 in cylinder 21 and force water from cylinder 21 through a discharge valve in the upper portion of the casing 20. A handle 72 is provided on the seat which may engage the front of the cabinet to limit the upward pivotal movement of the seat.

The discharge valve comprises a closure or valve member 60 which is slidable in a chamber 64 in the casing 20. Member 60 is loaded by a spring 61 to close against a seat 62 which is communicatively connected by a duct 63 with the upper end of cylinder 21. The pressure to which the discharge valve is responsive can be varied by adjustment of screw-plug 70 which engages spring 61. Chamber 64 is connected to a drain port 65 which is extended at duct 66 to the lower portion of casing 20. A flexible drain pipe 67 is connected to the lower end of duct 66 for conducting water, and is connected to conduct water, into the toilet in any suitable manner. Spring 61 has a pressure slightly in excess of the maximum pressure of the water in cylinder 21, as controlled by the pressure regulator, so that the discharge valve will remain closed until the pressure of the water in said cylinder is raised by the lifting of piston 24 in the cylinder by the arm 18, as the seat 12 is manually lowered. As a result of the manual lowering of the toilet seat 12, the piston 24 causes the water to be discharged from cylinder 21 through ducts 65 and 66 to drain pipe 67. A drain-port 71 is provided in the casing 20 between the lower end of cylinder 24 and drain duct 66 so that any leakage of water past the piston 24 will flow to the drain connection.

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The control valve 53 which is held closed by cam 59 on arm 24 when the seat is in its usable position, is provided with a leak-port 68 for slowly delivering water from the chamber 49 to cylinder 21 to automatically initiate the lifting of the seat, for preventing the toilet seat from being left in its lowered position by the user in lieu of being lifted to its sterilizing position between uses. The port 68 permits leakage of water to cylinder 21 while the valve-member 53 is closed. After cam 59 is disengaged from lever 55 during the slow upward movement of piston 24, resulting from the leakage of water through groove 64 into the cylinder 21, spring 58 will shift valve-member 53 to its open position to permit the full flow of water from chamber 49 through duct 50 to the upper end of the cylinder for shifting the piston 24 to complete the upward movement of the toilet-seat into the sterilizer cabinet.

The operation will be as follows: When the seat 12 has been raised, water from inlet pipe 30 will flow under line-pressure through ducts 30 and 31 into the chamber around valve-member 37; valve-member 37 will be open and water will flow into chamber 49 and through duct 50 into the upper end of cylinder 21. The control valve member 53 will then be open. The water under pressure will hold piston 24 in its lowered position and hold the toilet seat raised and in the cabinet. The discharge valve member 60, being loaded by spring 61 so as to be responsive to a higher pressure in the cylinder, will remain closed. The pressure regulator will limit the pressure of water in the cylinder 21 so that it will not be sufficient to open the discharge valve. If the pressure in the supply line increases beyond a predetermined point, for example 15 lbs. per square inch, the pressure regulator will close inlet valve member 37 and prevent higher pressure in cylinder 21. During the discharge of water from cylinder 21, the pressure in the cylinder will be increased so as to operate the diaphragm 39 to seat valve member 37 and cut off flow of water from the inlet duct 31 to the regulator.

When the toilet seat is to be used, it will be lowered manually and, through arm 26 and piston-stem 25, will raise the piston 24 in cylinder 21 and subject the water in the cylinder to a sufficiently increased pressure to open valve-member 60 to discharge the water from the cylinder above the piston through ducts 60, 65 and 66 to the drain-pipe 67. As the toilet-seat reaches its usable position, cam 59 will engage the end of lever 55 and shift it against the force of spring 58 to close valve-member 53 against seat 54 and cut off the main flow of water to the cylinder 21.

While toilet seat 12 is lowered and valve 37 is closed, as the result of an increase in pressure in cylinder 21 caused by the lowering of the toilet seat, water from chamber 49 can leak through duct 50 and port 64 into the upper end of cylinder 21. During occupation of seat 12, arm 18 will hold piston raised in cylinder 21. When the weight of the user is removed from the toilet seat or if said seat is not used after being lowered, water will slowly escape from chamber 49 through leak-port 64 and duct 50 into the upper end of cylinder 21 and slowly move piston 24 to impart a slow initial upward movement to the toilet seat. When the cam 59 rotates away from lever 55, spring 58 will shift lever 55 to move valve 53 away from its seat 54 and permit a full flow of water from chamber 49 to cylinder 21, which will cause a reduction of pressure against diaphragm 39 and permit spring 39—*a* to shift the diaphragm to

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open inlet valve 37 so that thereafter water, at a predetermined rate, will flow from the regulator to the cylinder 21 until the down-stroke of piston 24 has been completed at a higher but limited rate of speed, and the seat 12 has been raised into its sterilizing position in the cabinet. This automatic operation insures the raising of the toilet seat into sterilizing position in the cabinet after each use or if the seat should be lowered without being used.

By adjustment of the pressure regulator, the speed with which the seat returns from its slow initial movement to its sterilizing position can be regulated. This adjustment also adapts the hydraulic unit for use on water supply lines having different or variable pressure. The pressure required for discharging water from cylinder 21 during the lowering movement of the toilet seat can be adjusted by means of screw plug 70 which can be set so that a slight downward pressure on the seat will cause piston 24 to increase the pressure in the cylinder to force the water to the drain.

The invention exemplifies a hydraulic unit which is efficient in operation and simple in construction and by which the manually lowered seat will be automatically returned to its raised position, where it will be sterilized, without requiring the user to raise the toilet seat.

The invention is not to be understood as limited to the details described 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 sterilizing cabinet and a seat manually movable from a sterilizing position in the cabinet to a lowered usable position over the bowl, of a hydraulic device for shifting the seat including, a hydraulic cylinder and a piston slidable therein, a positive operating connection between the piston and the seat for shifting the piston in the cylinder by manual lowering movement of the seat and raising the seat by hydraulic operation of the piston, a self-closing valve for discharging water from the cylinder when the piston is shifted by the seat, and valve-means for automatically controlling the flow of water under pressure to the cylinder for shifting the piston to raise the seat to its sterilizing position said valve-means being responsive to the absence or removal of the weight of a user from the seat in its usable position.

2. The combination with a toilet comprising: a bowl, a seat sterilizing cabinet and a seat manually movable from a sterilizing position in the cabinet to a lowered usable position over the bowl, of a hydraulic device for shifting the seat including, a hydraulic cylinder and a piston slidable therein, a positive operating connection between the piston and the seat for shifting the piston in the cylinder by manual lowering movement of the seat and for raising the seat by hydraulic operation of the piston, a self-closing valve for discharging water from the cylinder when the piston is shifted by the seat, a valve for controlling the flow of water under pressure to the cylinder for shifting the piston to raise the seat to its sterilizing position, and means controlled by the absence or removal of the weight of a user from the seat in its usable position for automatically controlling the last named valve.

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3. The combination with a toilet comprising: a bowl, a seat sterilizing cabinet, a seat pivotally movable from a sterilizing position in the cabinet to a lowered usable position over the bowl, and a shaft rigid with the seat, of a hydraulic device for shifting the seat including, a cylinder and a piston slidable therein, an arm on the shaft and a stem for the piston pivotally connected to the arm, forming a positive operating connection between the piston and the seat for shifting the piston in the cylinder by manual lowering movement of the seat and raising the seat by hydraulic operation of the piston, a self-closing valve for discharging water from the cylinder when the piston is shifted by the seat, and valve-means controlled by the absence or removal of the weight of a user from the seat in its usable position and the rotation of the shaft for automatically controlling the flow of water under pressure to the cylinder for shifting the piston to raise the seat to its sterilizing position.

4. The combination with a toilet comprising: a bowl, a seat sterilizing cabinet and a seat pivotally movable from a sterilizing position in the cabinet to a lowered usable position over the bowl, and a shaft rigid with said seat, of a hydraulic device for shifting the seat including, a pivotally supported cylinder and a piston slidable therein, an arm on the shaft and a stem on the piston pivoted to the arm and forming a positive operating connection between the piston and the seat for shifting the piston in the cylinder by manual lowering movement of the seat and raising the seat by hydraulic operation of the piston, a self-closing valve for discharging water from the cylinder when the piston is shifted by the seat, a valve for controlling the flow of water under pressure to the cylinder for shifting the piston to raise the seat to its sterilizing position, and means on the arm controlled by the absence or removal of the weight of a user from the seat in its usable position for automatically controlling the last-named valve.

5. The combination with a toilet comprising: a bowl, a seat sterilizing cabinet and a seat manually movable from a sterilizing position in the cabinet to a lowered usable position over the bowl, of a hydraulic device for shifting the seat including, a hydraulic cylinder and a piston slidable therein, a positive operating connection between the piston and the seat for shifting the piston in the cylinder by manual lowering movement of the seat and raising the seat by hydraulic operation of the piston, a self-closing valve for discharging water from the cylinder when the piston is shifted by the seat, valve-means controlled by the absence or removal of the weight of a user from the seat in its usable position for automatically controlling the flow of water under pressure to the cylinder for shifting the piston to raise the seat to its sterilizing position, and a regulator for the pressure of water flowing to said valve means.

6. The combination with a toilet comprising: a bowl, a seat sterilizing cabinet and a seat manually movable from a sterilizing position in the cabinet to a lowered usable position over the bowl, of a hydraulic device for shifting the seat including, a cylinder and a piston slidable therein, a positive operating connection between the piston and the seat for shifting the piston in the cylinder by manual lowering of the seat and for raising the seat by hydraulic operation of the piston, a self-closing valve for discharging water from the cylinder when the piston is shifted by the seat, and valve-means controlled by the absence or re-

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removal of the weight of a user from the seat in its usable position for automatically and successively controlling the flow of water under pressure at different speeds of flow for raising the seat to its sterilizing position at successively different rates of speed.

7. The combination with a toilet comprising: a bowl, a seat sterilizing cabinet and a seat manually movable from a sterilizing position in the cabinet to a lowered usable position over the bowl, of a hydraulic device for shifting the seat including, a cylinder and a piston slidable therein, a positive operating connection between the piston and the seat for shifting the piston in the cylinder by manual lowering of the seat and for raising the seat by hydraulic operation of the piston, a self-closing valve for discharging water from the cylinder when the piston is shifted by the seat, and valve-means controlled by the absence or removal of the weight of a user from the seat in its usable position for automatically and successively controlling the flow of water under pressure at different rates of flow to the cylinder for raising the seat successively at different rates of speed to its sterilizing position.

8. The combination with a toilet comprising: a bowl, a seat sterilizing cabinet, a seat pivotally movable from a sterilizing position in the cabinet to a lowered usable position over the bowl, and a shaft rigid with said seat, of a hydraulic device for shifting the seat including, a cylinder and a piston slidable therein, an arm on the shaft and a stem for the piston pivotally connected to said arm, forming an operating connection between the piston and the seat for shifting the piston in the cylinder by manual lowering of the seat and for raising the seat by hydraulic operation of the piston, a self-closing valve for discharging water from the cylinder when the piston is shifted by the seat, a valve for successively controlling the delivery of water at different rates of flow under pressure to the cylinder to successively raise the seat at different speeds to its sterilizing position, and means rotatable with said shaft controlled by the absence or removal of the weight of a user from the seat in its usable position for controlling said valve-means.

9. The combination with a toilet comprising: a bowl, a seat sterilizing cabinet, a seat pivotally movable from a sterilizing position in the cabinet to a lowered usable position over the bowl, and a shaft rigid with said seat, of a hydraulic device for shifting the seat including, a cylinder and a

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piston slidable therein, an arm on the shaft and a stem for the piston pivotally connected to said arm, forming an operating connection between the piston and the seat for shifting the piston in the cylinder by manual lowering of the seat and for raising the seat by hydraulic operation of the piston, a self-closing valve for discharging water from the cylinder when the piston is shifted by the seat, a valve for successively controlling the delivery of water at different rates of flow under pressure to the cylinder to successively raise the seat at different speeds to its sterilizing position, and means on the arm controlled by the absence or removal of the weight of a user from the seat in its usable position for automatically controlling said last-named valve.

10. The combination with a toilet comprising: a bowl, a seat sterilizing cabinet and a seat manually movable from a sterilizing position in the cabinet to a lowered usable position over the bowl, of a hydraulic device for shifting the seat including, a cylinder and a piston slidable therein, a positive operating connection between the piston and the seat for shifting the piston in the cylinder by manual lowering of the seat and for raising the seat by hydraulic operation of the piston, a self-closing valve for discharging water from the cylinder when the piston is shifted by the seat, valve-means controlled by the absence or removal of the weight of a user from the seat in its usable position for automatically and successively controlling the delivery of water under pressure to the cylinder at different rates of flow for raising the seat to its sterilizing position at successively different rates of speed, and a regulator for the pressure of water flowing to said valve-means.

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REFERENCES CITED

40 The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
45 1,531,626	Rowntree	Mar. 31, 1925
1,630,932	Friedrich	May 31, 1927
1,744,069	Dapron	Jan. 21, 1930
1,865,913	Hynes	July 5, 1932
2,214,323	Carter	Sept. 10, 1940
50 2,253,736	Sullivan	Aug. 26, 1941
2,281,265	Campbell	Apr. 28, 1942
2,329,240	Bendon et al.	Sept. 14, 1943