

Dec. 4, 1956

R. R. KNUDSEN

2,772,422

LIFTING MECHANISM FOR TOILET SEATS

Filed July 27, 1954

2 Sheets-Sheet 1

Fig. 1.

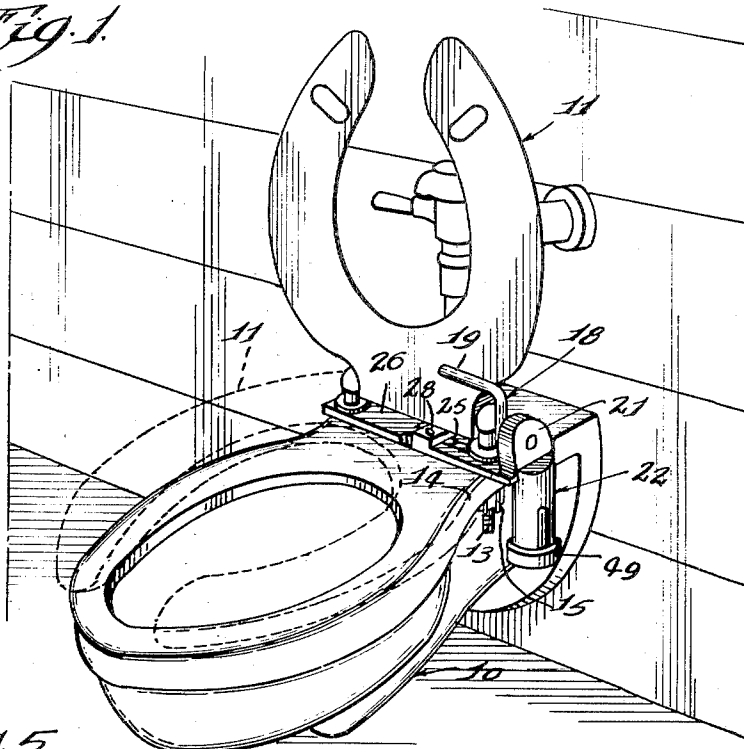


Fig. 5.

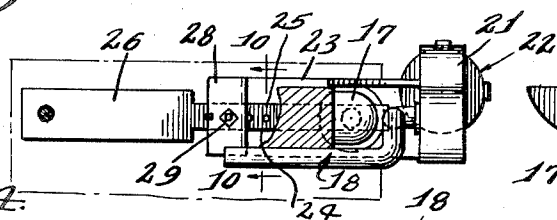


Fig. 4.

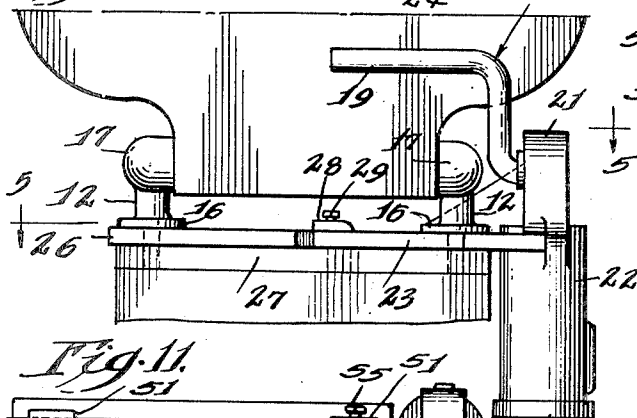


Fig. 11.

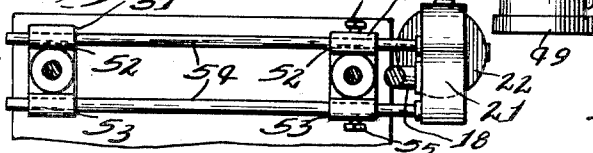


Fig. 12.

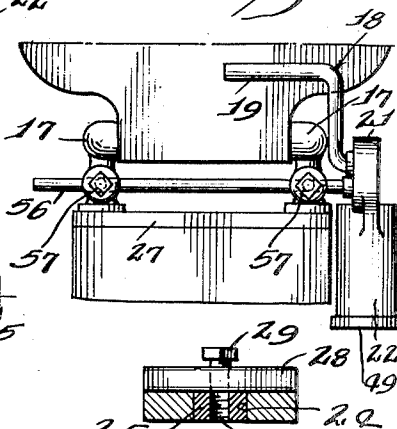


Fig. 10.

Inventor:
Richard R. Knudsen
By: Wilson & Saffert
Attorneys.

Dec. 4, 1956

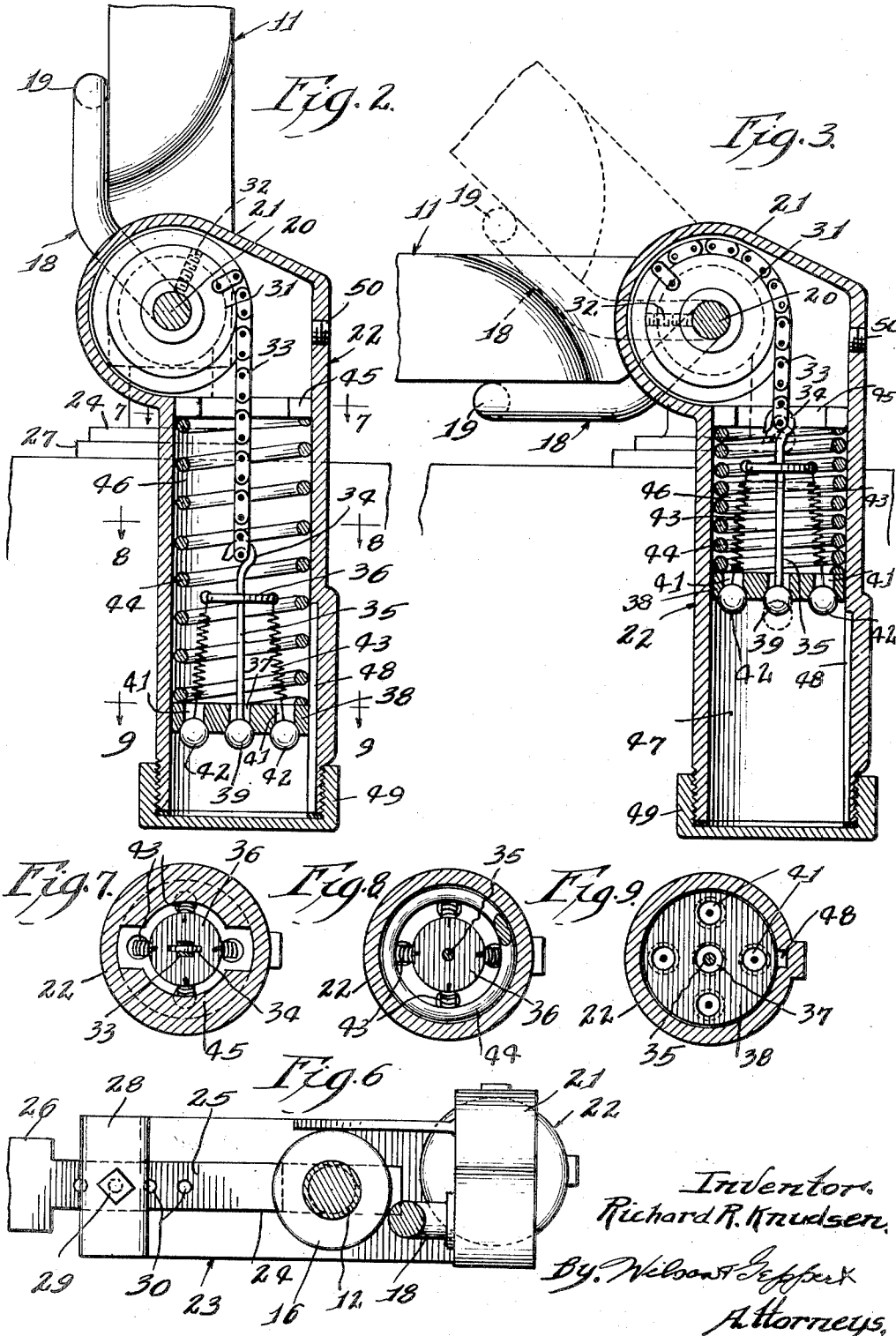
R. R. KNUDSEN.

2,772,422

LIFTING MECHANISM FOR TOILET SEATS

Filed July 27, 1954

2 Sheets-Sheet 2



1

2,772,422

LIFTING MECHANISM FOR TOILET SEATS

Richard R. Knudsen, Chicago, Ill.

Application July 27, 1954, Serial No. 446,014

3 Claims. (Cl. 4—251)

The present invention relates to a novel means and manner of automatically elevating the seat of a toilet of the type employed particularly in public washrooms. In such washrooms where the toilet facilities are used by the public generally, the present invention contemplates providing a novel means and mechanism for automatically elevating the toilet seat after a predetermined time lag after each use so that a succeeding occupant may employ the toilet as a urinal without the necessity of manually elevating the seat.

As those of the general public employing the facilities of a public toilet include persons from all walks of life, many are unwilling not only to touch or raise a toilet seat because of the possible danger of contamination, but take care that no part of the clothing contacts therewith. Where the urinal facilities in such public washrooms are limited and toilets need be used, many will not touch or make the effort to raise the seat when lowered, resulting in a wetting of the seats and increasing the danger of contamination.

It is, therefore, an important object of the present invention to provide a novel assembly for automatically raising the seat of a public toilet after each lowering thereof and to retain such seat elevated for use as a urinal or until it is again intentionally lowered.

Another and very important object of the present invention is the provision of a novel attachment for automatically lifting the toilet seat, and which attachment is capable of installation upon various commercial types or models of toilet bowls having a seat pivotally or swingably mounted upon depending studs of such seats. As the external contour or design of such bowls frequently varies, although the studs for the seats are generally similarly spaced apart, the present invention comprehends a novel means for and manner of adjustably mounting the present attachment whereby the cylinder or housing for the actuating or seat elevating mechanism is disposed closely adjacent the bowl and thereat is securely retained.

A further object of the present invention is to provide a novel means and mechanism for automatically retaining the lowered but unoccupied seat in such lowered position for a predetermined period of time to permit the intended occupant to apply a seat covering or toilet tissues to the lowered seat as a sanitary measure, or to permit such intended occupant to clean or wipe the seat before use as a precautionary measure. This eliminates all necessity for the intended occupant holding the seat in lowered position while performing the above preliminary steps in sanitation as required in prior constructions where the seat is provided with mechanism for spring-biasing it to elevated position.

Although seat elevating mechanisms for public toilets are not new, such mechanisms are subject to frequent damage and many such installations have been removed because of the damage thereto caused by vandals who make use of such public facilities. Proper policing or requiring an attendant to be continuously present is too expensive except where the number of such toilets in public washrooms is sufficiently large to warrant the expense involved.

2

Where such prior public toilets have been provided with projecting tripping mechanisms, such mechanisms have been accepted by vandals as an invitation to cause damage or breakage so that such mechanisms soon become useless for the purpose intended. With this in mind, the present invention has been designed, constructed and assembled in a manner that danger of damage or breakage has been obviated or reduced to a minimum. All of the operating mechanism, except for the rigid actuating arm which in the present novel embodiment is detached from the seat, is contained or mounted within a rigid housing or casing that is rigidly anchored closely adjacent to one side of the bowl and adjacent the pivotal mounting for the seat.

Further objects are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly and operation, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

In the drawings:

Figure 1 is a perspective view of a toilet bowl and seat equipped with the present novel hydraulically-actuated lifting mechanism for the seat.

Fig. 2 is a view in vertical cross section through the hydraulic cylinder or housing and its control mechanism for lifting the seat, the control mechanism being in the position it assumes when the seat has been elevated.

Fig. 3 is a view similar to Fig. 2 but showing in full lines the seat and actuating mechanism in the lowered position of the seat, and also showing in dotted outline the seat partially raised by the lifting arm of the lifting mechanism.

Fig. 4 is a fragmentary view in front elevation of the adjustably mounted lifting mechanism with the seat shown in elevated position.

Fig. 5 is a fragmentary top plan view showing the adjustable mounting for supporting and retaining the hydraulic cylinder or housing and its control mechanism closely adjacent the closet bowl and whereby the present invention is adapted for assembly on various makes and models of toilet bowls, the view being taken on approximately the line 5—5 of Fig. 4.

Fig. 6 is an enlarged fragmentary view of Fig. 5 to show more clearly the manner of adjusting the support or mounting for the cylinder or housing and its control mechanism.

Fig. 7 is a view in horizontal cross section taken in a plane represented by the line 7—7 of Fig. 2 and viewed in the direction of the arrows.

Fig. 8 is a view in horizontal cross section taken in a plane represented by the line 8—8 of Fig. 2 and viewed in the direction of the arrows.

Fig. 9 is a view in horizontal cross section taken in a plane represented by the line 9—9 of Fig. 2 and viewed in the direction of the arrows.

Fig. 10 is a fragmentary enlarged view in vertical cross section taken on the line 10—10 of Fig. 5 and viewed in the direction of the arrows.

Fig. 11 is a plan view of an alternate form of adjustable mounting or support for the seat lifting mechanism.

Fig. 12 is a fragmentary view similar to Fig. 4 but showing a further alternate form of adjustable support for the seat lifting mechanism.

Referring to the disclosure in the drawings and more particularly to the illustrative embodiment shown in Figs. 1 to 10, inclusive, the present invention is shown mounted upon the bowl 10 of a toilet or water closet having a pivotally mounted seat 11 movable from a substantially horizontal position to an upright position which may be substantially vertical or tilted beyond the vertical and thus movable through an angle of 90° or more.

3

The pivotal mounting for the seat consists of a pair of depending studs 12 spaced apart at a prescribed distance with the threaded end of the depending shank 13 of each stud projecting through a bore or opening in a rearwardly projecting flange 14 at each side and adjacent the rear of the bowl and rigidly anchored to this flange by a nut 15 which draws the studs downwardly and retains the annular flange 16 of the stud in anchored position. The head or enlargement 17 on each stud is provided with the usual laterally opening recess for receiving a pivot pin projecting from each side of the seat whereby the seat is pivotally mounted for movement from its lowered, substantially horizontal position shown in full lines in Fig. 3 and in dotted outline in Fig. 1, to its elevated position as shown in full lines in Figs. 1 and 2.

To automatically elevate the seat there is provided a control arm 18, the free end 19 of which is disposed beneath and at one side of the seat 11. The other end 20 of this arm projects through and into the upper end or head 21 of a rigid housing or cylinder 22. As toilet bowls 10 are made or formed in various external contours, the present attachment is so constructed and arranged as to mount this housing or cylinder 22 closely adjacent the adjoining edge or peripheral flange 14 of the bowl. To so position the housing or cylinder 22, it is rigidly joined to a mounting plate 23 having a longitudinally extending slot or groove 24 adapted to adjustably receive a tongue or projection 25 on a fixed mounting plate 26. Each mounting plate 23 and 26 is mounted on a fixed base or plate 27 provided with spaced openings each adapted to conformably receive the shank 13 of a stud 12.

The plate 26 is provided with an opening aligned with the adjacent opening in the base 27 through which the shank 13 of one of the studs 12 projects, the shank of the other stud 12 projecting through the slot or groove 24 in the mounting plate 23 and an opening in the base 27 whereby the plate 23 and its housing or cylinder 22 are movable relative to its stud 12, the plate 26 and the base 27. To retain the tongue or projection 25 in the groove 24, the spaced bifurcations of the mounting plate 23 at the inner or open end of its slot or groove 24 are connected or bridged by an embossment 28 adapted to receive a set screw 29, the end of which is received in any one of a plurality of closely spaced recesses 30 in the tongue 25 to lock the mounting plates 23 and 26 in assembled relation.

Although these studs 12 and their shank 13 are generally spaced apart the same distance and thus standard for different toilet bowls, due to various changes in conformation of the external contour of the bowl I provide for the novel longitudinal adjustment of the mounting plate 23 and its housing or cylinder 22 to assure locating the latter closely adjacent the periphery or flange 14 of the bowl 10.

The inner end 20 of the control arm 18 provides a stub shaft journaled in the opposite sides of the head 21 of the housing or cylinder 22. Upon this stub shaft within the head 21 is attached a sprocket wheel 31 pinned or secured to the stub shaft by a set screw or the like 32. To this sprocket wheel 31 is joined or connected one end of a chain or articulated member 33 with the other end of the chain depending into the body of the housing or cylinder and thereat connected to a hook 34. This hook is provided with a depending stem 35 to which is securely or rigidly affixed intermediate its length a transverse plate 36. The depending end of the stem 35 projects through an opening or port 37 in a piston 38, and to the lower end of this stem is affixed a ball or spherical valve member 39 adapted to be received and seat in a cupped recess in the underside of the port 37 for closing this port.

The piston 38 is provided with additional spaced ports 41 each adapted to be closed at their lower recessed

4

end by a ball or spherical valve member 42 each spring-biased and adapted to be elevated into closed or valve seating contact in the underside of its port by a light coil spring 43, one end of each spring being attached to a ball 42 and its other end anchored to the plate 36. A relatively heavy coil or compression spring 44 is located within the interior of the housing or cylinder 22 with one end of the spring abutting a fixed collar or flange 45 provided in and adjacent the upper end of the housing or cylinder and its lower end seating upon the piston 38. Thus this coil spring 44 spring-biases the piston to its lowered position which it assumes when the seat 11 is raised to its elevated position as shown in Fig. 2 and the spring is extended.

When the seat 11 is manually lowered as in Fig. 3, the coil spring 44 is compressed by rotation of the sprocket wheel 31 in a direction to raise the chain 33 and the hook 34 whereupon the ball 39 seats in its port 37 and the piston 38 is elevated to the position shown. As the seat is being manually lowered and the relatively heavy spring 44 is being compressed, the balls 42 attached to the relatively light springs 43 are temporarily unseated to permit oil or hydraulic fluid contained in the cylinder 22 to pass or flow from the space 46 above the piston 38 to the space 47 therebeneath, and as the seat reaches its lowered position these balls 42 again seat and close the ports 41 in the piston.

When the occupant leaves the lowered seat, the arm 18 in contact with the underside of the seat 11, causes the seat to slowly rise due to the expansion of the spring 44 which spring-biases the piston 38 toward its lowered position. To permit such raising effort, oil or hydraulic fluid in the space 47 in the lower portion of the cylinder 22 slowly leaks past the periphery of the piston 38 between it and the adjacent interior wall of the cylinder 22 whereby the seat rises slowly through an angle of approximately 30°. The piston, cylinder and associated parts are so proportioned and related and the cylinder provided with a by-pass 48 so located that when the seat 11 rises to an angle of approximately 30°, the by-pass for the flow of oil or hydraulic fluid is uncovered to permit flow therethrough of the oil and the seat 11 then rises rapidly to the limit of its upward movement.

The open lower end of the cylinder 22 is provided with a screw cap or detachable closure 49 for access to the interior of the cylinder. An opening 50 is also provided in the head 21 of the housing or cylinder 22 for access to the interior thereof and to the chain 33 and sprocket wheel 31.

It is to be understood that the component parts of the seat lifting mechanism may be so related that the seat may be elevated at any desired speed of travel and the initial relatively slow movement from its lowered position may be through any desired angle and for any desired time period, after which the seat may rise more rapidly to its fully elevated position. In the present embodiment, it is contemplated that the seat when lowered and unoccupied may be retained lowered for a period permitting the intended occupant to spread toilet tissues or a seat covering, or to clean the seat before occupying it.

The threaded recesses 30 in the tongue 25 on the mounting plate 26 for receiving the set screw 29 (Fig. 10) may extend therethrough or only partially through the tongue 25, as desired.

Fig. 11 discloses an alternate mounting for the cylinder 22 on the studs or posts 12 of the seat. It comprises spaced plates 51 each provided with an opening to receive and mount a plate on the shank 13 of a stud or post 12 and each plate is provided with spaced transverse bores or recesses 52 and 53 to adjustably and slidably receive one of a pair of rods 54, one end of these rods being fixed or secured in a recess in the inner wall of the head 21 of the housing or cylinder 22. A set screw 55 in one or both of the plates 51 anchors each rod 54 in adjusted but fixed position in which the housing or cylin-

der is anchored or located in a position closely adjacent or abutting the edge or flange 14 of the bowl 10.

Fig. 12 discloses a further embodiment in which a single rod 56 is employed in place of the two rods shown in Fig. 11. In the embodiment of Fig. 12, the single rod is affixed at one end to the head 21 of the housing or cylinder 22 and loosely projects through an opening in each stud 12. This rod is provided with a longitudinal keyway receiving a key formed or provided in each stud to prevent relative rotation therebetween. A set screw 57 in one or both studs will then anchor the rod fixed in its longitudinally adjusted position with the housing or cylinder located closely adjacent or abutting the adjoining edge or flange of the bowl.

When the seat 11 has been raised to its upright position, the end 19 of the lifting or control arm 18 follows the seat to its elevated position. When the seat is manually lowered, this lifting or control arm is forced down with the seat to its substantially horizontal position. In this lowered position, the heavy spring 44 is under maximum compression and to permit lowering of the seat and arm 18 the balls 42 on the depending ends of the light coil springs 43 are opened by the pressure of the oil in the space 46 to allow for the passage of this oil through the spaced ports 41. In the lowered position of the seat when pressure downwardly through the ports 41 is relieved, these balls 42 again seat in and close the ports 41.

When the seat is unoccupied, oil or hydraulic fluid leaks or seeps past the periphery of the piston permitting the arm 18 to raise the seat slowly through an angle of approximately 30°, when the by-pass 48 is uncovered permitting increased flow, whereby the seat is elevated quickly to its fully raised position.

The ball 39 on the depending end of the stem 35 is opened (as shown in dotted outline in Fig. 3) only when the seat is manually raised so that the arm 18 may quickly follow the manually lifted seat to its elevated position. The access opening 50 is preferably threaded and adapted to be closed by a threaded plug or closure.

Having thus disclosed the invention, I claim:

1. In combination with a toilet having a bowl and a pivotally mounted seat provided with spaced anchoring studs for detachably mounting the seat upon the bowl, an attachment for automatically lifting the toilet seat from its lowered position including means for detachably and adjustably mounting said attachment on the bowl and retaining it by said studs, a lifting arm having one end offset and projecting beneath one side of the seat to lift the seat to elevated position when unoccupied and the arm is rotated to its raised position, a housing having a head in which the other end of said arm is journaled and a depending cylinder containing hydraulic fluid, a piston connected to said other end of said arm, spring means for spring-biasing said piston to rotate said arm and raise the seat, means for controlling the flow of fluid under pressure from one to the opposite side of said piston as said arm is rotated and said seat is raised and lowered whereby said seat may be rapidly lowered manually to compress said spring means and when unoccupied said arm is rotated and said seat is raised slowly from its lowered position during its initial travel and then more rapidly to its fully elevated position by the expansion of said spring means, and in which elevated position the seat is retained by said arm until it is again manually lowered.

2. In combination with a toilet having a bowl and a pivotally mounted seat provided with spaced anchoring studs for detachably mounting the seat upon the bowl, an attachment for automatically lifting the toilet seat from its lowered position including a lifting arm having one end offset and projecting beneath one side of the seat to lift it to elevated position when unoccupied and the arm is rotated to its raised position, a housing having a head in which the other end of said arm is journaled and a depending cylinder containing fluid, a piston connected

to said other end of said arm, spring means for spring-biasing said piston to rotate said arm and raise the seat, means for controlling the flow of fluid under pressure from one to the opposite side of said piston as said arm is rotated and said seat is raised and lowered whereby said seat may be rapidly lowered manually to compress said spring means and when unoccupied said arm is rotated and said seat is raised slowly from its lowered position during its initial travel and then more rapidly to its fully elevated position by the expansion of said spring means, and in which elevated position the seat is retained by said arm until it is again manually lowered, and means for detachably and adjustably mounting said attachment on the bowl and retaining it by said studs, said last mentioned means including a part held in fixed position upon the bowl by one of said studs and a second part rigidly affixed to and carrying said housing and adjustable with respect to said first mentioned part, and anchoring means for rigidly retaining said parts and housing in adjusted position.

3. In combination with a toilet having a bowl and a pivotally mounted seat provided with spaced anchoring posts, an attachment for automatically lifting the seat from its lowered position and permitting the seat to be manually lowered from its elevated position for use, comprising a lifting arm having one end offset and projecting beneath and free of the underside of the seat to lift the seat to elevated position when unoccupied and said arm is rotated to its raised position, a housing mounted at one side and closely adjacent the bowl and the pivotal mounting for said seat, said housing having a head in which the other end of the arm is journaled and a depending cylinder containing a reciprocating piston and fluid, a connection between said other end of said arm and said piston, spring means in said cylinder for spring-biasing said piston to its lowered position in which the arm is rotated to raise the seat to its elevated position when not occupied, means for controlling the flow of fluid under pressure from one to the opposite side of said piston as said arm is rotated and said seat is raised and lowered whereby said seat may be rapidly lowered manually to compress said spring means and when unoccupied said arm is automatically rotated and said seat is raised slowly from its lowered position during its initial travel and then more rapidly to its fully elevated position by the expansion of said spring means, and in which elevated position the seat is retained by said arm until it is again manually lowered, and an adjustable mounting for locating and rigidly retaining said attachment closely adjacent the exterior of the bowl at one side thereof and adjoining the seat, said adjustable mounting for said attachment including a pair of detachable members supported on the rear of the bowl, one of said members provided with a projection and the other with a longitudinal slot to receive said projection with one member held fixed by one of said posts and the other member affixed to and carrying the attachment and movable and adjustable relative to said fixed member and to the other post, and means for securely retaining said movable and adjustable member in its adjusted position with the housing disposed closely adjacent the exterior surface of the bowl.

References Cited in the file of this patent

UNITED STATES PATENTS

985,239	Winans	Feb. 28, 1911
1,050,395	Schleicher	Jan. 14, 1913
2,042,276	Revers	May 26, 1936
2,214,323	Carter	Sept. 10, 1940
2,705,330	Knudsen	Apr. 5, 1955

FOREIGN PATENTS

610,953	Germany	Feb. 28, 1935
635,971	Great Britain	Apr. 19, 1950
662,425	Great Britain	Dec. 5, 1951