July 12, 1955 G. X. BATLAS ET AL 2,712,654

MECHANISM FOR AUTOMATICALLY APPLYING AND REMOVING A SANITARY, PAPER TOILET SEAT COVER

Filed Sept. 2, 1954 4 Sheets-Sheet 1

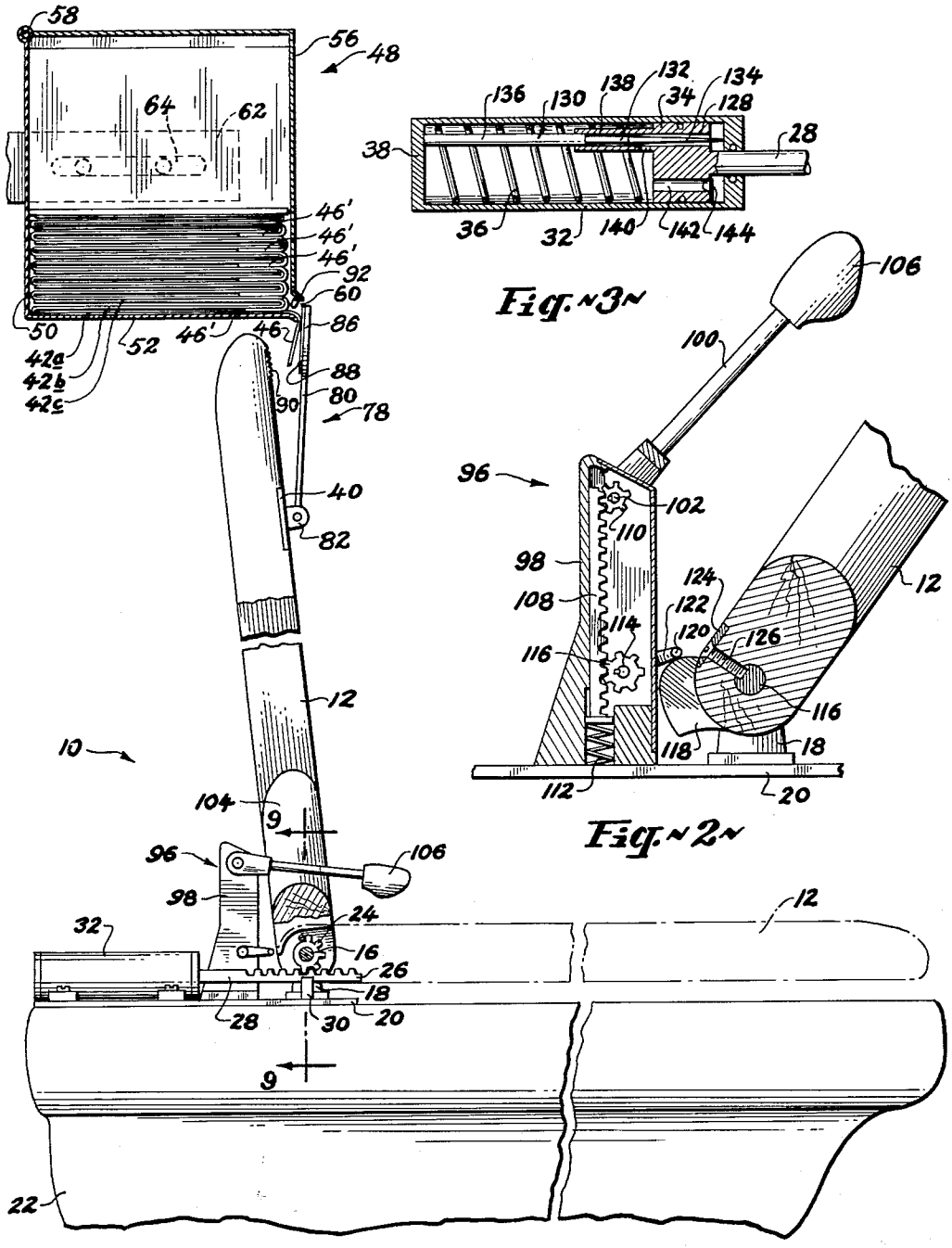


Fig. 1

Fig. 3

Fig. 2

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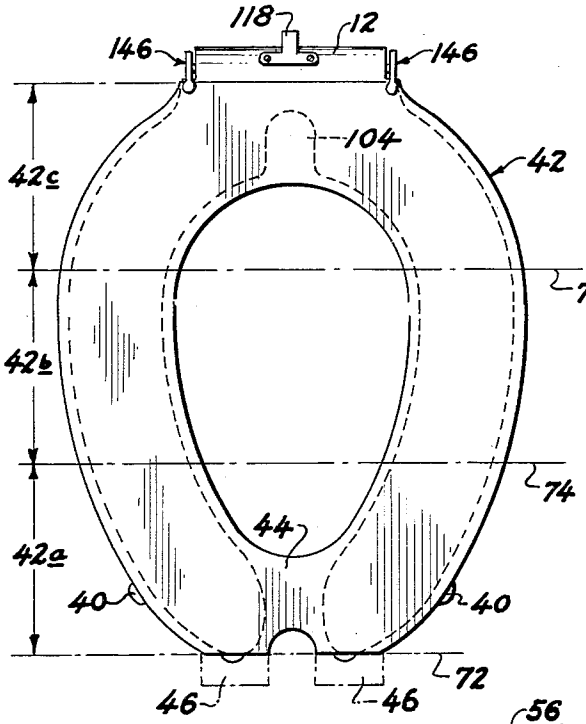


Fig. 4

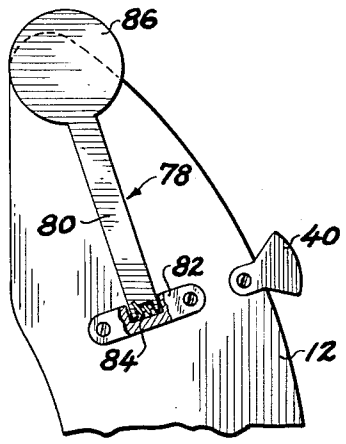


Fig. 5

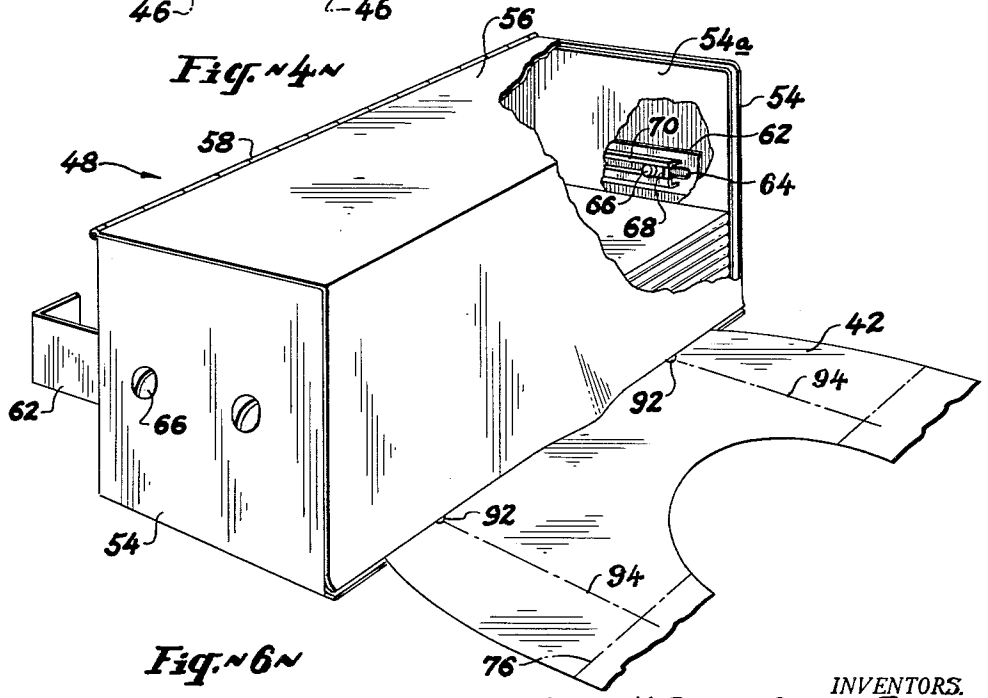


Fig. 6

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MECHANISM FOR AUTOMATICALLY APPLYING AND REMOVING A SANITARY, PAPER TOILET SEAT COVER

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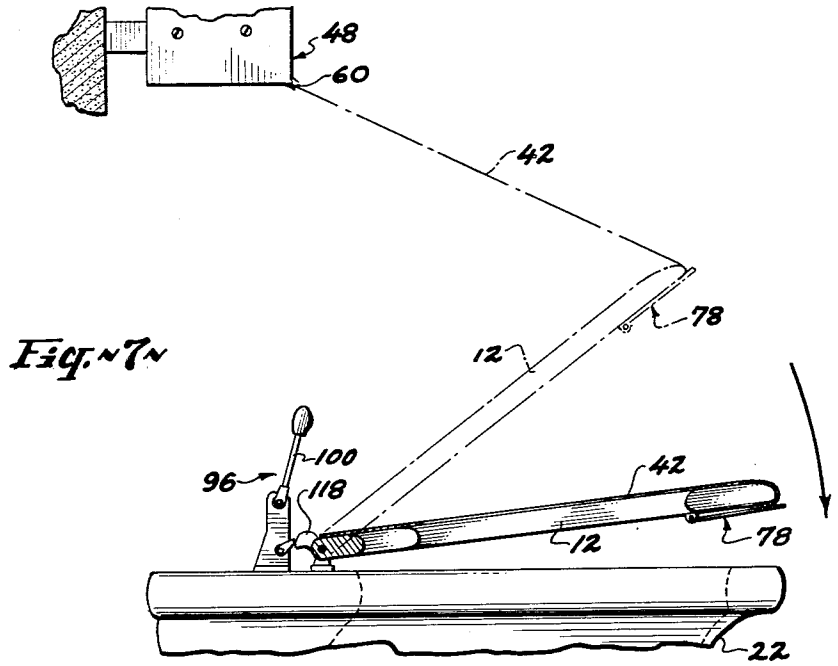


Fig. 7

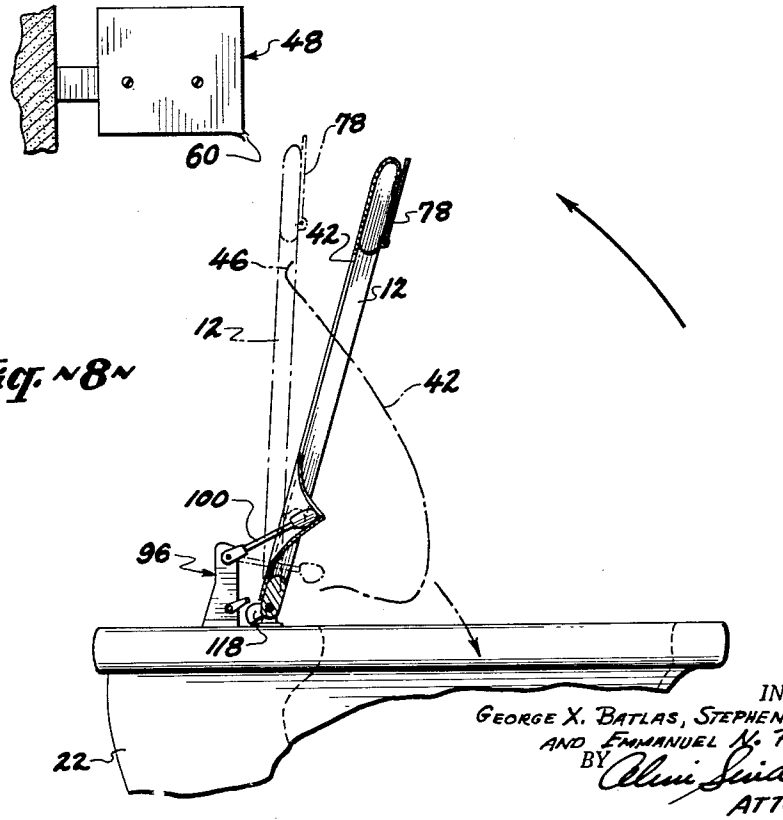


Fig. 8

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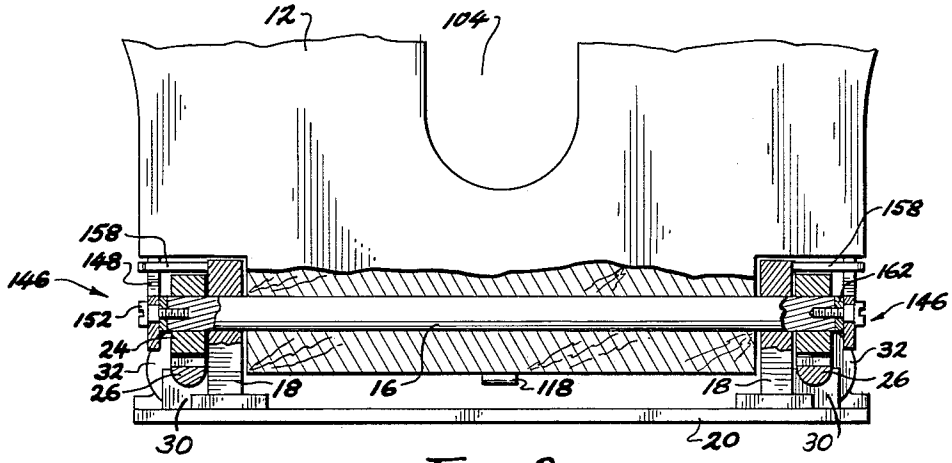


Fig. 9

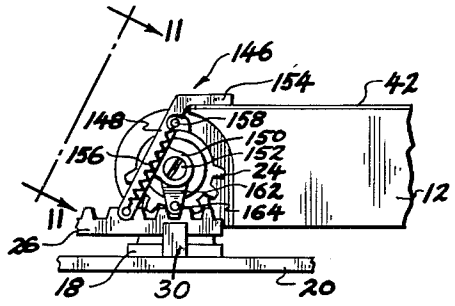


Fig. 10

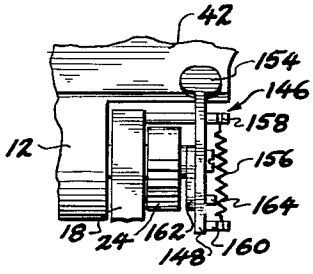


Fig. 11

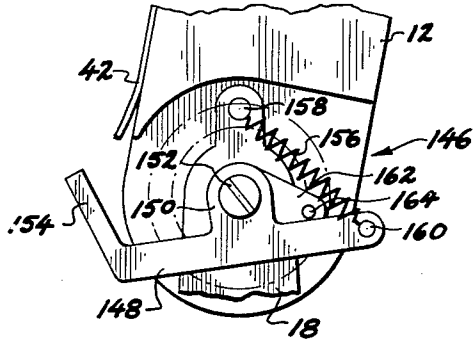


Fig. 12

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MECHANISM FOR AUTOMATICALLY APPLYING AND REMOVING A SANITARY, PAPER TOILET SEAT COVER

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Application September 2, 1954, Serial No. 453,882

19 Claims. (Cl. 4—243)

This invention relates to an automatic mechanism for applying and removing a sanitary, paper toilet seat cover.

Although mechanisms have been heretofore proposed to perform the above functions, such existing mechanism, if automatic, are extremely complex and correspondingly expensive to manufacture, install and maintain, while the complexity of the mechanisms increases the incidence of failures and malfunctioning.

Accordingly, it is a primary object of the present invention to provide a relatively simple mechanism for automatically applying and removing a sanitary, paper toilet seat cover, and wherein such mechanism can be easily installed in association with existing toilet structures and requires a minimum of alteration of the latter.

Another object is to provide mechanism of the described character which is sanitary and fool-proof in operation.

In accordance with an aspect of the invention, folded paper toilet seat covers are stored in a dispensing receptacle and adapted to be removed one at a time therefrom, and the toilet seat, which is swingable about a hinge axis adjacent its back end between an operative horizontal position and an inoperative upstanding position, is provided with gripping means engaging one of the seat covers when the seat is in its inoperative position so as to draw-out the gripped seat cover from the receptacle during subsequent movement of the seat to its operative position, whereupon the cover is disposed on the seat.

Another aspect of the invention provides mechanism for automatically removing the used seat cover and for discharging the latter into the toilet bowl in response to the return of the seat to its inoperative, upstanding position.

Another feature of mechanism embodying the invention resides in the automatic movement of the seat from its operative horizontal position to its inoperative upstanding position thereby to insure disposal of the used seat cover, with such movement being controlled so that, following placement of a new cover on the seat by the movement of the latter to its operative position, the seat may be released and an adequate interval of time will be provided before the seat reaches the elevated position at which the seat cover is removed to permit the user to adjust his or her garments preparatory to sitting on the covered seat.

Still another object is to ensure that the folded paper seat covers, when withdrawn from the dispensing receptacle, will lay relatively flat on the toilet seat.

A further object is to provide a mechanism of the described character which automatically secures the paper seat cover to the toilet seat thereby to prevent adherence of the paper cover to the user's body, and which releases the cover to permit removal and discharge thereof.

The above, and other objects, features and advantages of the invention, will be apparent in the following detailed description of an illustrative embodiment which

is to be read in connection with the accompanying drawings, forming a part hereof, and wherein:

Fig. 1 is a side elevational view of a mechanism embodying the present invention shown partly broken away and in section, with the associated toilet seat being represented in full lines in its inoperative or raised position and in broken lines in its operative or lowered, horzontal position;

Fig. 2 is a vertical sectional view, on an enlarged scale, of a cover removing and discharging device included in the mechanism of Fig. 1;

Fig. 3 is an axial sectional view, on an enlarged scale, through a cylinder included in the mechanism of Fig. 1 for effecting the controlled raising of the associated toilet seat;

Fig. 4 is a top plan view of the toilet seat of Fig. 1, but shown with a sanitary, paper cover disposed thereon;

Fig. 5 is a fragmentary, bottom plan view of a portion of the toilet seat;

Fig. 6 is an enlarged perspective view, partly broken away, of a dispensing receptacle for folded paper covers included in the mechanism of Fig. 1, and with a cover being withdrawn from the receptacle;

Fig. 7 is a diagrammatic, side elevational view of the mechanism of Fig. 1 and illustrating two phases in the operation of placing a sanitary paper cover upon the toilet seat;

Fig. 8 is a view similar to Fig. 7, but illustrating two phases in the operation of automatically removing the used paper cover from the toilet seat and discharging the removed cover into the toilet bowl;

Fig. 9 is a detail, sectional view taken along the line 9—9 of Fig. 1;

Fig. 10 is a fragmentary side elevational view of a paper cover gripping device at the back end of the toilet seat and with the latter shown in its operative position;

Fig. 11 is an elevational view of the cover gripping device as viewed in the direction of the arrows **11—11** of Fig. 10; and

Fig. 12 is an enlarged side elevational view of the device of Figs. 10 and 11 but with the seat shown in the position effecting release of the gripping device.

Referring to the drawings in detail, and initially to Fig. 1 thereof, a mechanism for automatically applying and removing a sanitary, paper toilet seat cover in accordance with the present invention is there illustrated and generally identified by the reference numeral **10**. The mechanism **10** is associated with a conventional toilet seat **12** which may be of a generally U-shaped or horseshoe configuration opening at the front end. The seat **12** is hingedly mounted on top of a toilet bowl **22** to swing between the full and broken-line positions of Fig. 1. For this purpose, an axle **16** extends laterally through the back end of seat **12** and is secured relative to the latter, with the projecting opposite end portions of axle **16** being rotatably journalled in suitable bearing supports **18** extending upwardly from a mounting plate **20** secured on top of the toilet bowl **22**.

In accordance with this invention, the seat **12** is automatically and yieldably urged from the horizontal, operative position thereof, shown in broken lines on Fig. 1, to an inoperative, upstanding position, shown in full lines on Fig. 1. In order to effect such swinging movement of seat **12**, a spur gear **24** is secured to each of the opposite ends of axle **16** outwardly of the adjacent bearing support **18** (Fig. 9) and meshes with a gear rack **26** (Fig. 1) formed on a horizontally reciprocatable plunger **28** which extends below the axle **16**. Preferably, each gear rack **26** slidably rests upon a bearing **30** (Figs. 1 and 9) formed as a part of the adjacent support **18**, and the related plunger **28** extends into a horizontally disposed cylinder **32** secured on plate **20**.

As seen in Fig. 3, within the cylinder 32 the plunger 28 connects to a piston 34, and a helical compression spring 36 is interposed between the back end wall 38 of the cylinder and the piston 34 to continuously urge the latter forwardly. The force exerted by the springs 36 in the cylinders 32 is sufficient to overcome the weight of the seat 12 so that, when the latter is free to swing upwardly, the pistons 34, plungers 28 and gear racks 26 move forwardly and, through the meshing engagement of the racks 26 with the gears 24, turn axle 16 counterclockwise, as viewed in Fig. 1, to swing the toilet seat to its raised or upstanding, inoperative position.

In order to permit manual lowering of the seat 12 to its operative, horizontal position without requiring contact between the user's hands and the seat itself, the seat 12, adjacent its front end, is preferably provided with laterally extending metal tabs 40 which are secured to the underside of the seat and project therefrom (Figs. 4 and 5), such tabs being easily cleaned and maintained in a sanitary condition and offering a sufficient area to be grasped in manual lowering of the seat.

As seen in Fig. 4, each of the sanitary paper covers to be disposed on the seat 12, and generally identified by the reference numeral 42, is substantially the same in plan-form as the toilet seat, but is preferably continuous, having a portion 44 at the front to extend across the opening between the forward ends of the arms of the seat 12, and a pair of tabs 46 extend forwardly from the front portion 44 to be gripped, in a manner hereinafter described in detail, during the applying and disposition of a seat cover on the toilet seat. The paper seat covers are stored in folded condition in a stack with a dispensing receptacle which is generally identified by the reference numeral 48 (Figs. 1 and 6), with the lowermost of the stack of folded paper covers being automatically withdrawn from the receptacle 48 when the seat 12 is manually moved from its inoperative, upstanding or raised position to its operative, horizontal position.

Referring to Figs. 1 and 6, it will be seen that the receptacle 48 includes a back wall 50, a bottom wall 52 and opposite end walls 54 which are suitably joined together to define a rectangular box opening upwardly and forwardly. A cover 56 of L-shaped cross-section is hingedly connected along its back edge to the upper edge of the back wall 50, as at 58, and, when in its closed condition, as shown in the drawings, define the top and front walls of the receptacle 48. As seen in Fig. 1, when the cover 56 is in its closed condition, the lower edge of the cover is spaced from the front edge of bottom wall 52 to define a discharge slot 60 through which the successive folded paper covers are individually drawn.

The dispensing receptacle 48 is mounted above the back portion of the toilet bowl 22 and is there located so that, when the seat 12 is in its inoperative, raised position, the front end of the seat 12 is disposed immediately under the forward part of bottom wall 52 (Fig. 1). In order to provide for mounting of receptacle 48 in the above described position from a wall or the like (not shown), an L-shaped bracket 62 is arranged adjacent each of the opposite ends of the receptacle and has one of its legs extending slidably forward through a suitable opening in back wall 50. The forwardly extending leg of each bracket 62 is adjustably secured to the receptacle and for that purpose may be longitudinally slotted, as at 64 (Fig. 1), with two bolts 66 extending through each end wall 54 and the slot 64 of the adjacent bracket to be threadably received in nuts 68 which are slidably and non-rotatably carried in a channel 70 on the inner side of the forwardly extending leg of bracket 62. Thus, the brackets 62 may be secured to a supporting wall and the receptacle 48 adjustably located with respect to the wall to occupy the desired position in relation to the seat 12. Preferably, inner end walls 54*a* are disposed inside the end walls 54 so that smooth surfaces are presented within the receptacle for guiding the folded covers stored in the latter.

Prior to being placed in the receptacle 48, each of the sanitary paper covers 42 is folded about three transversely extending fold lines 72, 74 and 76 (Fig. 4), and fold line 72 being disposed between the tabs 46 and the front portion 44 of the cover, while the fold lines 74 and 76 divide the remainder of the cover into zones 42*a*, 42*b* and 42*c* of substantially equal width. In folding the cover 42, the zone 42*b* is laid on top of the zone 42*a*, and the zone 42*c* is laid on top of the zone 42*b* (Fig. 1). When the folded covers are stacked within the receptacle 48, the tabs 46 of the lowermost folded cover are bent down and extended through the discharge slot 60, while the tabs 46' of each of the superposed folded covers are folded under and disposed between the zones 42*a* and 42*b* of the next lower folded cover (Fig. 1). Thus, the lowermost folded cover can be removed from receptacle 48 through slot 60 by pulling on the extended tabs 46 thereof. As the lowermost cover is drawn out of the receptacle 48, the tabs 46' of the next higher folded cover are drawn through the slot 60 to be available when the related cover, which then becomes the lowermost cover in the stack is to be removed from the receptacle.

In order to provide for removal of the lowermost paper cover 42 from the receptacle 48 in response to movement of seat 12 from its inoperative, raised position to its operative, horizontal position, the seat 12, adjacent its front end, is provided with gripping means, generally identified by the numeral 78, which are operative to grip the extended tabs 46 of the lowermost folded cover as the seat begins its downward swing from the raised, inoperative position thereof.

In the illustrated embodiment of the invention, the gripping means 78 includes a lever 80 (Figs. 1 and 5) disposed below the front end portion of each of the arms of the seat 12, with each of the levers 80 being pivotally mounted adjacent its back end to the underside of the seat, as at 82, to swing toward and away from the underside of the seat. Each lever 80 is yieldably urged against the underside of seat 12, for example, by a torsion spring 84 (Fig. 5), and, at its front end, is enlarged, as at 86, to there carry a pad 88 of slip-resistant material, such as, rubber and the like, on its upper surface for cooperation with a registering roughened portion 90 of the underside of seat 12 in gripping the tabs 46 therebetween.

As seen in Fig. 1, each of the levers 80 extends beyond the front end of the related arm of seat 12 to engage against the front edge of bottom wall 52 of the receptacle 48 as the seat 12 swings to its raised, inoperative position under the action of the springs 36. The movement of seat 12 in the spring-urged direction (counter-clockwise as viewed in Fig. 1) is limited by the contact of piston 34 against the front end wall of the related cylinder 32, and the several parts are dimensioned and arranged so that the spring-urged movement of the seat 12 continues for a small angular distance after the levers 80 have engaged the front edge of bottom wall 52, whereby the levers 80 are angularly separated from the underside of seat 12 (Fig. 1) with the projecting tabs 46 then being disposed between the pads 88 on the levers 80 and the roughened portions 90 of the underside of the seat.

During initial movement of seat 12 toward its horizontal, operative position, the levers 80 continue to engage the front edge of bottom wall 52 while they swing about pivots 82 relative to seat 12 until the levers 80 lie against the underside of the seat with the tabs 46 gripped therebetween. As the swinging of seat 12 toward its horizontal, operative position continues, the lowermost paper cover 42, held to the seat at its front end by gripping means 78, is drawn out of the receptacle 48, and in the course of being drawn out is unfolded, as repre-

sented in broken lines on Fig. 7. As the seat 12 approaches its horizontal, operative position, the withdrawal of the gripped cover 42 from the receptacle 48 is completed, and the cover 42 falls into place on top of the seat 12 to provide a sanitary covering for the latter, as shown in full lines on Fig. 7.

In order to prevent refolding of the cover 42 about the fold lines 74 and 76 (Fig. 4) after the back end of the cover is released from the receptacle 48, two spaced apart pins 92 (Figs. 1 and 6) project downwardly from the lower edge of cover 56 into the slot 60 and longitudinally crease the cover 42 along the lines 94 (Fig. 6) which cross the fold line 76, as the cover 42 is drawn out of the receptacle 48. Since the creases along the lines 94 open upwardly, while the fold along line 76 opens downwardly, the creases along the lines 94 prevent refolding of the released cover about the fold line 76.

The weight of a person seated on the covered seat 12 is of course more than sufficient to resist the upward swinging of seat 12 under the action of the springs 36. However, when the weight of the person is removed from the seat, the springs 36 and the associated transmission mechanism described above effect the automatic return swinging of the seat 12 to its inoperative, raised position.

In accordance with the present invention, the used cover 42 is automatically removed from the seat 12 and discharged into the bowl 22 in response to such return swinging of the seat to its inoperative position. In the embodiment of the invention illustrated in the drawings, the above functions are performed by a cover removing and discharging device which is generally identified by the reference numeral 96 and includes a hollow housing 98 secured to mounting plate 20 and extending upwardly from the latter at a central location in back of the swinging axis of seat 12. A cover removing and discharging arm 100 is secured at one end to a shaft 102 which extends rotatably through the upper portion of housing 98, and the arm 100 is swingable between an upstanding position (Fig. 7) and a forwardly extending position (Fig. 1). As shown in Figs. 1, 2, 7 and 8, the swinging movements of arm 100 are synchronized with the movements of the seat 12 so that the arm 100 moves from its upstanding position to its forwardly extending position as the seat is spring-urged from its operative, horizontal position to its inoperative, upstanding or raised position and so that the arm 100 is returned to its upstanding position as the seat is manually moved to its operative position.

As seen in Figs. 1, 4 and 9, the back portion of seat 12 is formed with a central, forwardly opening notch or recess 104 to accommodate arm 100 when the latter is in its forwardly extending position and the seat is raised to its inoperative position. Preferably, the free end of arm 100 carries a rounded, slip-resistant member 106 made, for example, of rubber and the like, to engage against the back portion of the used cover 42 during removal and discharging of the latter in the manner hereinafter described in detail.

As the seat 12 is raised by the action of springs 36, the member 106 contacts the rear portion of the used cover 42 when the seat and arm 100 have reached positions intermediate their opposite limits of swinging movement. Further, swinging of seat 12 toward its inoperative position is accompanied by further swinging of arm 100 toward its forwardly extending position and the arm 100 crosses the plane of the seat 12, as shown in full lines on Fig. 8, to tension the cover 42 and to exert a pull on the latter away from the gripping means 78 and generally toward the bowl 22. During the final movement of seat 12 to its inoperative raised position, the arm 100 moves to its forwardly extending position (shown in broken lines on Fig. 8) with a snap action, following freeing of the tabs 46 of the cover 42 from the gripping means 78 by contact of the latter with the receptacle so that the freed cover is thereby propelled through the central opening of the raised seat and into the bowl 22.

In the embodiment of the invention illustrated in the accompanying drawings, the movement of arm 100 is coordinated with the movement of seat 12 by providing a vertically movable gear rack 108 (Fig. 2) which is slidably guided in housing 98 and meshes with a spur gear 110 secured on the shaft 102. A compression spring 112 acts upwardly against the lower end of rack 108 thereby to yieldably urge arm 100 to its forwardly extending position. The gear rack 108 also meshes with a spur gear 116 secured on a shaft 114 which extends rotatably through the lower portion of housing 98. A radial cam 118 projects from the back end of seat 12 and is engageable by a follower roller 120 carried by the free end of an arm assembly 122 which extends radially from shaft 114. The radial cam 118 may be integral with a mounting plate 124 which is secured to the seat 12 by screws 126 extending into suitably tapped bores of axle 16 to also perform the function of securing the seat on that axle.

Preferably, the gear 116 is of larger pitch diameter than the gear 110 so that a relatively small angular displacement of arm assembly 122 produces a relatively large angular displacement of arm 100. It is apparent that the spring 112, in urging the rack 108 upwardly, tends to turn arm assembly 122 in the clock-wise direction, as viewed on Fig. 2, to engage roller 120 with the periphery of cam 118. The periphery of cam 118 is shaped so that arm assembly 122 is turned in the counter-clockwise direction, as viewed on Fig. 2, during movement of seat 12 from its raised, inoperative position to its horizontal position, and the gears 110 and 116 and the rack 108 transmit the turning of assembly 122 to the arm 100 to swing the latter to its upstanding position. As the seat is raised by the action of springs 36, the cam 118 permits turning of assembly 122 in the clockwise direction so that the arm 100 springs progressively toward its forwardly extending position. When the member 106 on arm 100 moves across the plane of seat 12 and engages the rear portion of the cover to tension or pull the cover against the resistance of the gripping means 78, as shown in full lines on Fig. 8, the swinging of seat 12, and hence of cam 118 continues, while the turning of arm 100 under the influence of spring 112 is resisted so that the periphery of cam 118 moves away from the follower roller 120. Thus, when the gripping levers 80 engage the receptacle 48 to release the tabs 46, the pull exerted by member 106 on the cover 42 in response to the action of spring 112 pulls the tabs 46 from between the gripping levers 80 and the underside of seat 12, and the spring 112 completes the movement of arm 100 from the full-line to the broken-line positions of Fig. 8, with a snap action to ensure the discharge of the released cover into the toilet bowl 22.

Following the removal and discharge of the used paper cover, the seat 12 again reaches its raised, inoperative position with the levers 80 angularly separated from the underside of the seat to receive the projecting tabs 46 of the lower-most folded cover in receptacle 48 between the levers 80 and the underside of the seat.

Preferably, the speed of movement of seat 12 from its operative, horizontal position to its inoperative raised position under the influence of springs 36 is controlled so that, after swinging of the seat to its operative, horizontal position to dispose a new sanitary cover 42 on the seat, the seat can be released and will then move slowly toward its raised position to provide ample time for the user to adjust his or her garments preparatory to sitting on the covered seat before the upwardly moving seat reaches the position wherein the device 96 becomes effective to remove and discharge the unused cover. However, it is apparent that the upward swinging of the seat as it approaches the raised, inoperative position thereof must be accomplished at a relatively high speed in order

to ensure the proper and reliable operation of the device **96** during the final phase of the upward swinging of the seat **12**.

The desired control of the upward swinging of seat **12** in the illustrated mechanism is effected by providing a hydraulic liquid in at least one of the cylinders **32** to variably resist the movement of the related piston **34** in the direction along the cylinder corresponding to raising of the seat **12**. As seen in Fig. 3, piston **32** is formed with a control orifice **128** extending axially therethrough, and a control needle, generally identified by the numeral **130**, extends through the orifice **128** and abuts at its opposite ends against the opposite end walls of cylinder **32**. Needle **130** includes a cylindrical, relatively large diameter portion **132** which cooperates with the orifice **128** during a substantial initial portion of the upward swinging of the seat **12** from its horizontal, operative position to define a relatively narrow annular space through which the hydraulic liquid can flow from the right hand side to the left hand side of piston **34**, as viewed on Fig. 3. The cylindrical portion **132** of needle **130** runs into a tapering portion **134** of progressively decreasing diameter which cooperates with the orifice **128** during the final portion of the upward swinging of seat **12** to then reduce the hydraulic resistance to the movement of piston **34** under the action of spring **36**. Preferably, the needle **130** is maintained concentric with the orifice **128** by a guide sleeve **138** extending from the piston **34** and engaging closely around the needle **130**. In order that the clearance between the needle **130** and orifice **128** will determine the hydraulic resistance to movement of the piston **34** rather than the clearance between the body **136** of the needle and the sleeve **138**, the latter is formed with at least one relatively large radial opening **140** immediately adjacent the face of piston **34** against which the spring **36** abuts.

In order that the variable hydraulic resistance to movement of piston **34** in cylinder **32** is imposed only during the upward swinging of seat **12**, a relatively large auxiliary orifice **142** extends through the piston **34** and is provided with a suitable check valve **144** which permits flow through orifice **142** in only one direction, that is, from left to right as viewed on Fig. 3. Thus, during raising of seat **12** by the action of springs **36**, check valve **144** is closed and the hydraulic liquid can flow only through the controlled orifice **128**. However, when the seat is being manually lowered to its horizontal, operative position, check valve **144** opens to permit flow of hydraulic liquid through auxiliary orifice **142**, whereby little or no hydraulic resistance is offered to such downward swinging of the seat. In actual practice, it has been found that the check valve **144** may be desirably formed of a hemispherical valve member carried by a leaf spring which is mounted on the face of piston **34** and urges the hemispherical member against the adjacent end of orifice **142**, as illustrated in in Fig. 3.

While the mechanism **10** described in detail herein and illustrated in the accompanying drawings includes two cylinders **32**, of which only one need have the hydraulic control arrangement described above, it is apparent that a mechanism embodying this invention may employ the hydraulic control arrangement in both cylinders or may employ only a single cylinder with the spring **36** therein being of increased strength to effect the upward swinging of the seat without the assistance of another similar spring.

In order to prevent lifting of the back portion of the cover **42** from the seat **12** by reason of adherence of the cover to the user's body when the latter rises, the mechanism **10** preferably includes gripping devices generally identified by the reference numerals **146** and shown in detail on Figs. 9, 10, 11 and 12. As seen on Fig. 4, a gripping device **146** is arranged at each of the opposite ends of the back portion of the seat **12** enclosing the axle **16** to grip the adjacent portions of the cover **42**. Each of the gripping devices **146** includes an arm **148** having an offset lug **150** (Figs. 10 and 12) intermediate its ends which is rockably mounted on a pivot screw **152** threaded into the related end of the axle **16**. At one end, each of the arms **148** is formed with a bent pad **154** which is adapted to bear down upon the back end of a cover **42** disposed on the seat **12** (Figs. 10 and 11).

A tension spring **156** extends between a pin **158** projecting axially from the upper portion of the adjacent bearing support **18** and a pin **160** extending from the end of arm **148** remote from the pad **154**. The pin **158** is disposed so that, when the seat **12** is in its horizontal operative position with the pad **154** bearing down on the top surface of the rear portion of the seat, the line of force of spring **156** will be disposed to one side of pivot screw **152** (Fig. 10) to urge the arm **148** to swing in the direction pressing pad **154** against the seat **12**. However, as the seat **12** is raised to its upstanding inoperative position (Fig. 12), the arm **148** swings with the seat until the movement of pin **160** with arm **148** relative to the fixed pin **158** causes the line of force of tension spring **156** to be displaced to the other side of the axis of screw **152** (Fig. 12), whereupon spring **156** rocks arm **148** relative to the seat **12** and axle **16** in the direction moving pad **154** away from the top surface of the toilet seat, thereby to free the previously gripped back end of the paper cover **42**.

In order to limit the swing of arm **148** relative to seat **12** and axle **16** in the direction moving the pad **154** away from the seat surface, a bracket **162** is fixed by screw **152** on the end of axle **16** and has a stop **164** projecting therefrom into the path of movement of arm **148** (Figs. 11 and 12).

Thus, when the seat **12** is in its raised, inoperative position, the gripping devices **146** are open. As the seat **12** is manually moved toward its horizontal position and a cover **42** is deposited on the seat, in the manner described above, stop **164** swings with the seat about the axis defined by axle **16** and bears against the arm **148** of the related gripping device **146** to cause the arm **148** to swing with the seat. The various parts of each gripping device **146** are arranged so that when the seat has reached the position shown in full lines on Fig. 7, where the back end of the cover **42** has been drawn out of the receptacle **48** and falls onto the seat, the line of force of spring **156** passes the swinging axis of arm **148** and then rocks the latter in the direction moving pad **154** into gripping engagement with the back end of the cover **42** on the seat (Fig. 10).

On the other hand, as the seat **12** is automatically raised and approaches the position shown in full lines on Fig. 8, the line of force of spring **156** shifts to the other side of the pivoting axis of arm **148** and then rocks the latter in the direction disengaging the pads **154** from the back end of the previously gripped cover **42** so that the latter is then free to be removed and discharged by the device **96** in the manner previously described in detail.

It is apparent from the foregoing that the gripping devices **146** hold the back end of the cover **42** to the seat **12** when the user raises his or her body from the seat and thereby ensure that the cover **42** will be properly positioned for the removing and discharging action of the device **96** when the seat is automatically displaced upwardly to the position shown in broken lines on Fig. 8.

It is to be noted that the upper surface of the seat **12** is substantially unobstructed by any of the mechanism provided in accordance with this invention for positioning and removing the paper cover **42**, the pads **154** engaging only the back edge portion of the seat, whereby the user's comfort is unaffected by such mechanism. Further, the described mechanism operates to remove and discard the used sanitary cover in response to the automatic upward movement of the seat following the

use thereof, while a new or clean cover is automatically disposed on the seat in response to the manual lowering of the latter preparatory to use of the toilet. These automatic operations are performed by relatively simple devices which can be installed on existing toilets with a minimum of alteration of the latter.

While a preferred embodiment of the invention has been described in detail and illustrated in the accompanying drawings, the invention is not limited to the construction and arrangements of that precise embodiment and various changes and modifications may be effected therein, by anyone skilled in the art, without departing from the scope or spirit of the invention as defined in the appended claims.

What is claimed is:

1. In combination with a toilet seat mounted on a toilet bowl for swinging about a transverse axis disposed adjacent the back end of said seat between a horizontal operative position and an upstanding inoperative position; a device for applying and removing a toilet seat cover comprising a dispensing receptacle for toilet seat covers disposed adjacent the location of the front end of said seat when the latter is in said operative position and effective to project the toilet seat covers one at a time therefrom, means on said seat engageable with a seat cover projecting from said receptacle when said seat is in said inoperative position and gripping the projecting seat cover during movement of said seat to its operative position thereby to withdraw the gripped seat cover from the receptacle for disposition on said seat, and cover removing means operative in response to movement of said seat from said operative position toward said inoperative position of the seat to effect removal of the seat cover from said seat and discharge of the removed seat cover into said toilet bowl prior to the arrival of said seat at said inoperative position.

2. In combination with a toilet seat mounted on a toilet bowl for swinging about a transverse axis disposed adjacent the back end of said seat between a horizontal operative position and an upstanding inoperative position; a device for applying and removing a toilet seat cover comprising a dispensing receptacle for toilet seat covers disposed adjacent the location of the front end of said seat when the latter is in said inoperative position and effective to project the toilet seat covers one at a time therefrom, means on said seat engageable with a seat cover projecting from said receptacle when said seat is in said inoperative position and gripping the projecting seat cover during movement of said seat to its operative position thereby to withdraw the gripped seat cover from the receptacle for disposition on said seat, cover removing means operative in response to movement of said seat from said operative position toward said inoperative position of the seat to effect removal of the seat cover from said seat and discharge of the removed seat cover into said toilet bowl prior to the arrival of said seat at said inoperative position, and means yieldably urging said seat from said operative position to said inoperative position thereof whereby, when the user rises from the covered seat, the latter automatically swings to said inoperative position and, during such swinging movement, the used seat cover is removed and discharged into the toilet bowl to condition the seat for the reception of a new cover when the seat is again moved to said operative position thereof.

3. In combination with a toilet seat mounted on a toilet bowl for swinging about a transverse axis disposed adjacent the back end of said seat between a horizontal operative position and an upstanding inoperative position, a dispensing receptacle for containing a series of toilet seat covers and having a dispensing slot at the bottom of the front thereof through which the front ends of the covers successively project, said receptacle being disposed so that the front end of said seat moves rearwardly below said dispensing slot during swinging of said seat to said inoperative position thereof, and gripping elements movably mounted on the underside of said seat at the front end of the latter and urged against the underside of the seat to grip the front end of a toilet seat cover between said gripping elements and the underside of said seat, said gripping elements extending beyond the front end of said seat and engaging the front of said receptacle during movement of said seat to its inoperative position whereby said gripping elements are moved away from said underside of the seat to receive the front end of the cover projecting from said receptacle between said underside of the seat and said gripping elements so that, upon movement of said seat to its operative position, the front end of the seat cover projecting from said receptacle is gripped between said underside and said gripping elements and the gripped seat cover is withdrawn from said receptacle through said dispensing slot to fall into covering position on said seat.

4. In combination with a toilet seat mounted on a toilet bowl for swinging about a transverse axis disposed adjacent the back end of said seat between a horizontal operative position and an upstanding inoperative position, a dispensing receptacle for containing a series of toilet seat covers and having a dispensing slot at the bottom of the front thereof through which the front ends of the covers successively project, said receptacle being disposed so that the front end of said seat moves rearwardly below said dispensing slot during swinging of said seat to said inoperative position thereof, gripping elements movably mounted on the underside of said seat at the front end of the latter and urged against the underside of the seat to grip the front end of a toilet seat cover between said gripping elements and the underside of said seat, said gripping elements extending beyond the front end of said seat and engaging the front of said receptacle during movement of said seat to its inoperative position whereby said gripping elements are moved away from said underside of the seat to receive the front end of the cover projecting from said receptacle between said underside of the seat and said gripping elements so that, upon movement of said seat to its operative position, the front end of the seat cover projecting from said receptacle is gripped between said underside and said gripping elements and the gripped seat cover is withdrawn from said receptacle through said dispensing slot to fall into covering position on said seat, and cover removing means operative in response to movement of said seat from said operative position toward said inoperative position of the seat to effect removal of the seat cover from said seat and discharge of the removed cover through said seat into the toilet bowl prior to the arrival of said seat at said inoperative position.

5. In combination with a toilet seat mounted on a toilet bowl for swinging about a transverse axis disposed adjacent the back end of said seat between a horizontal operative position and an upstanding inoperative position, a dispensing receptacle for containing a series of toilet seat covers and having a dispensing slot at the bottom of the front thereof through which the front ends of the covers successively project, said receptacle being disposed so that the front end of said seat moves rearwardly below said dispensing slot during swinging of said seat to said inoperative position thereof, gripping elements movably mounted on the underside of said seat at the front end of the latter and urged against the underside of the seat to grip the front end of a toilet seat cover between said gripping elements and the underside of said seat, said gripping elements extending beyond the front end of said seat and engaging the front of said receptacle during movement of said seat to its inoperative position whereby said gripping elements are moved away from said underside of the seat to receive the front end of the cover projecting from said receptacle between said underside of the seat and said gripping elements so that, upon move-

ment of said seat to its operative position, the front end of the seat cover projecting from said receptacle is gripped between said underside and said gripping elements and the gripped seat cover is withdrawn from said receptacle through said dispensing slot to fall into covering position on said seat, cover removing means operative in response to movement of said seat from said operative position toward said inoperative position of the seat to effect removal of the seat cover from said seat and discharge of the removed cover through said seat into the toilet bowl prior to the arrival of said seat at said inoperative position, auxiliary gripping means at the back end of said seat operative to hold the back end of the cover on said seat, and actuating means for said auxiliary gripping means responding to swinging of said seat between said operative and inoperative positions to render said auxiliary gripping means operative after the seat cover falls into covering position on said seat during movement of the latter toward its operative position and to release said auxiliary gripping means during the movement of said seat toward said inoperative position so that the released cover is then free to be removed and discharged by said cover removing means.

6. The combination according to claim 5; wherein said auxiliary gripping means includes gripping levers rockably mounted on the swinging axis of said seat and each having a pad at one end to engage against the upper surface of said seat at the back edge of the latter thereby to grip the back end of a cover on the seat between said upper surface and said pads; and wherein said actuating means includes a tension spring for each gripping lever connected to the other end of the latter and to a fixed anchor, and a stop fixed relative to said seat limiting the rocking of the related gripping lever with respect to said seat in the direction moving said pad away from the upper surface of the seat, said fixed anchor for the spring being disposed so that as the gripping lever moves with said seat the line of force of said spring is displaced from one side of the rocking axis of said gripping lever to the other side of said rocking axis thereby to rock said gripping lever between a released position against said stop and an operative position in which said pad bears on the upper surface of said seat.

7. In combination with a toilet seat mounted on a toilet bowl for swinging about a transverse axis disposed adjacent the back end of said seat between a horizontal operative position and an upstanding inoperative position, a dispensing receptacle for containing a series of toilet seat covers and having a dispensing slot at the bottom of the front thereof through which the front ends of the covers successively project, said receptacle being disposed so that the front end of said seat moves rearwardly below said dispensing slot during swinging of said seat to said inoperative position thereof, gripping elements movably mounted on the underside of said seat at the front end of the latter and urged against the underside of the seat to grip the front end of a toilet seat cover between said gripping elements and the underside of said seat, said gripping elements extending beyond the front end of said seat and engaging the front of said receptacle during movement of said seat to its inoperative position whereby said gripping elements are moved away from said underside of the seat to receive the front end of the cover projecting from said receptacle between said underside of the seat and said gripping elements so that, upon movement of said seat to its operative position, the front end of the seat cover projecting from said receptacle is gripped between said underside and said gripping elements and the gripped seat cover is withdrawn from said receptacle through said dispensing slot to fall into covering position on said seat, cover removing means operative in response to movement of said seat from said operative position toward said inoperative position of the seat to effect removal of the seat cover from said seat and discharge of the removed cover through said seat into the toilet bowl prior to the arrival of said seat at said inoperative position, and spring actuated means yieldably urging said seat to the inoperative position of the latter so that, when the seat is free to swing upwardly from said operative position, the seat automatically returns to its inoperative position with the used cover being removed and discharged during such automatic return thereby to condition the seat for the receipt of a new cover during its subsequent movement to the operative position of the seat.

8. In combination with a toilet seat mounted on a toilet bowl for swinging about a transverse axis disposed adjacent the back end of said seat between a horizontal operative position and an upstanding inoperative position, a dispensing receptacle for containing a series of toilet seat covers and having a dispensing slot at the bottom of the front thereof through which the front ends of the covers successively project, said receptacle being disposed so that the front end of said seat moves rearwardly below said dispensing slot during the swinging of said seat to said inoperative position thereof, gripping elements movably mounted on the underside of said seat at the front end of the latter and urged against the underside of the seat to grip the front end of a toilet seat cover between said gripping elements and the underside of said seat, said gripping elements extending beyond the front end of said seat and engaging the front of said receptacle during movement of said seat to its inoperative position whereby said gripping elements are moved away from said underside of the seat to receive the front end of the cover projecting from said receptacle between said underside of the seat and gripping elements so that, upon movement of said seat to its operative position, the front end of the seat cover projecting from said receptacle is gripped between said underside and said gripping elements and the gripped seat cover is withdrawn from said receptacle through said dispensing slot to fall into covering position on said seat, cover removing means operative in response to movement of said seat from said operative position toward said inoperative position of the seat to effect removal of the seat cover from said seat and discharge of the removed cover through said seat into the toilet bowl prior to the arrival of said seat at said inoperative position, spring actuated means yieldably urging said seat to the inoperative position of the latter so that, when the seat is free to swing upwardly from said operative position, the seat automatically returns to its inoperative position with the used cover being removed and discharged during such automatic return thereby to condition the seat for the receipt of a new cover during its subsequent movement to the operative position of the seat, and means controlling the speed of the automatic return of said seat to its inoperative position so that initial movement of the seat from said operative position is at a relatively slow speed to provide a substantial time interval between freeing of said seat and the arrival of the latter at the point in its swinging movement where the cover is removed and discharged from the seat whereby, after deposit of a new cover on the seat by swinging of the latter to its operative position, the seat may be released without the risk of the removal and discharge of a new cover during the time required for the user to assume a seated position on the covered seat.

9. The combination according to claim 8; wherein said cover removing means includes a support mounted centrally in back of the swinging axis of said seat, a cover removing arm mounted on said support for swinging about a transverse axis between an upstanding position and a forwardly extending position; and actuating means for said removing arm controlled by swinging of said seat to dispose said removing arm in said upstanding position when said seat is in said operative position and to swing said removing arm to said forwardly extending position thereof during the automatic return of said seat to its inoperative position, said removing arm being dimensioned to intersect the plane of said seat during swinging of said

arm toward its forwardly extending position so that the free end of the removing arm acts forwardly and downwardly against the rear portion of the paper cover and discharges the latter through the seat and into the toilet bowl upon the release of the cover from said gripping elements by contact of the latter with the front of said receptacle.

10. The combination according to claim 9; wherein said means controlling the speed of the automatic return of said seat to its inoperative position effects relatively rapid movement of said seat as the latter approaches its inoperative position whereby said removing arm, after intersecting the plane of the seat, travels angularly relative to said seat in the opposite direction at a high speed thereby to insure removal and discharge of the paper cover.

11. The combination according to claim 9; wherein said actuating means for the removing arm includes a cam member fixed on the back end of said seat, a cam follower engageable with said cam member, and transmission means connecting said cam follower to said removing arm to transmit the movements of said cam follower to said removing arm.

12. The combination according to claim 11; wherein said cam follower includes a roller mounted at the free end of a follower arm rockably mounted on said support, and said transmission means includes spur gears respectively fixed to said follower arm and removing arm, a slidable gear rack meshing with said spur gears, and a spring acting longitudinally on said rack to urge the latter in the direction moving said roller against said cam member and said removing arm toward said forwardly extending position so that, as said removing arm engages the paper cover in swinging across the plane of said seat during the return of the latter toward its inoperative position, said removing arm first tensions the paper cover and the cam follower roller is lifted off the cam member until the last mentioned spring completes the movement of said removing arm with a snap-action to ensure proper removal and discharge of the paper cover.

13. The combination according to claim 12; wherein the pitch diameter of the one of said spur gears fixed to said cam follower arm is larger than the pitch diameter of the other of said spur gears so that a relatively small angular displacement of said cam follower arm by said cam member produces a relatively large angular displacement of said removing arm.

14. The combination according to claim 9; wherein said spring actuated means yieldably urging the seat to its inoperative position includes at least one spur gear fixed to said seat concentric with the swinging axis of the latter, a longitudinally movable gear rack meshing with each of said spur gears, a cylinder aligned with each gear rack and having a piston therein connected to an extension of the related gear rack, and a compression spring in said cylinder acting against said piston in the direction of movement of said gear rack effecting turning of the related spur gear in the direction causing movement of said seat toward its inoperative position.

15. The combination according to claim 14; wherein said means controlling the speed of the automatic return of said seat to its inoperative position includes an hydraulic fluid in at least one of said cylinders, a valved orifice in the related piston to permit the flow of the hydraulic fluid from one side of said piston to the other, and means controlling the size of the effective opening of said valved orifice during the movement of said piston within said cylinder thereby to vary the resistance to movement of said piston by said compression spring during different phases of said return of the seat to its inoperative position.

16. The combination according to claim 15; wherein said means controlling the size of the effective opening of said valved orifice includes a needle valve member extending through said orifice and fixed relative to said cylinder, said needle valve member including a relatively large constant diameter portion along which said piston moves during the initial phase of the return of said seat to its inoperative position and a tapering, relatively small diameter portion along which said piston moves during the final phase of said return of the seat to its inoperative position so that said final phase of the return is accomplished at a relatively high speed.

17. The combination according to claim 16; wherein the opposite ends of said needle valve member abut against the ends of said cylinder and said needle valve member further includes a guide portion having a diameter larger than the diameters of said portions along which said piston moves, and a guide tube extending from said piston coaxially with said valved orifice and slidably receiving said guide portion of the valve member to hold the latter centered in said orifice, said guide tube having a relatively large radial opening adjacent said piston so that the clearance between said guide tube and guide portion of the needle valve does not affect the passage of hydraulic fluid through said valved orifice.

18. The combination according to claim 15; wherein said piston has a relatively large auxiliary orifice extending therethrough, and a check valve in said auxiliary orifice permitting flow through the latter only in the direction corresponding to the swinging of said seat to its operative position whereby the hydraulic resistance to swinging of the seat from its inoperative position to its operative position is minimized.

19. In combination with a toilet seat mounted on a toilet bowl for swinging about a transverse axis disposed adjacent the back end of said seat between an upstanding, inoperative position and a horizontal, operative position, a dispensing receptacle for a stack of toilet seat covers each of which is adapted to cover the upper surface of said seat, the covers in said receptacle being folded about transverse fold lines and stacked with front end portion of each folded cover disposed between the folds of the cover immediately thereunder, said receptacle having a dispensing slot along the bottom of the front thereof through which the front end portion of the lowermost folded cover in the stack projects, said receptacle being disposed so that said slot thereof is adjacent the front end of said seat when the latter is in its inoperative position, gripping means on said front end of the seat to engage the projecting front end portion of the lowermost folded cover when said seat is in its inoperative position so that the engaged cover is withdrawn through said slot and unfolded during movement of said seat to its operative position to fall into covering position on said seat, and laterally spaced apart pins on said receptacle projecting downwardly into said slot to longitudinally crease each cover as the latter is withdrawn through said slot thereby to prevent refolding of the cover about its transverse fold lines as the cover falls into covering position on the seat.

No references cited.