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Higginson

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[54] **SELF-RAISING SEAT**

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[52] **U.S. Cl.** **4/240**

[51] **Int. Cl.** **A47k 13/00,** A47k 13/12

[58] **Field of Search** 4/236, 240; 267/25, 27, 267/57

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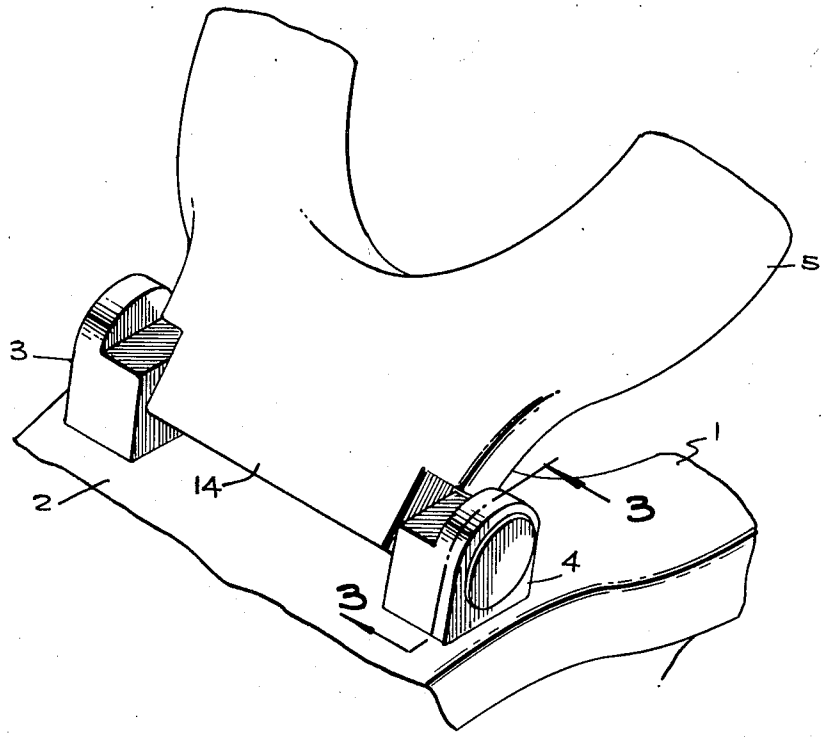
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[57] **ABSTRACT**

A self-raising seat for water closets, wherein the seat is fixedly mounted upon a hinge tube, with the tube ends hingedly held in hinge posts secured to the closet bowl. A torsion spring composed of a bundle of leaf springs has one end attached to one end of the hinge tube and its opposite end projecting beyond the opposite end of the tube. A spring holder rotatably mounted in a hinge post is fitted over the projecting end of the spring bundle, and an adjustment screw through the hinge post and in contact with an abutment on the spring holder biases the spring to establish an at rest, raised position of the seat. In another form of the invention, the projecting end of the spring bundle seats in a recess of similar cross-section in the hinge post, providing a fixed anchor for the spring end but no means for spring adjustment.

1 Claim, 8 Drawing Figures



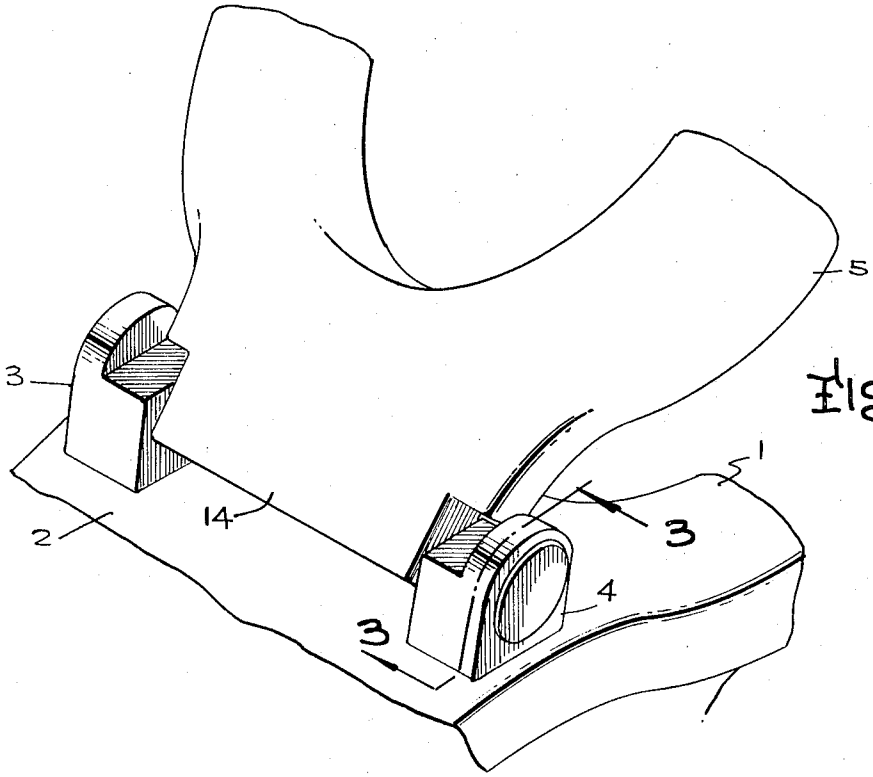


Fig-1

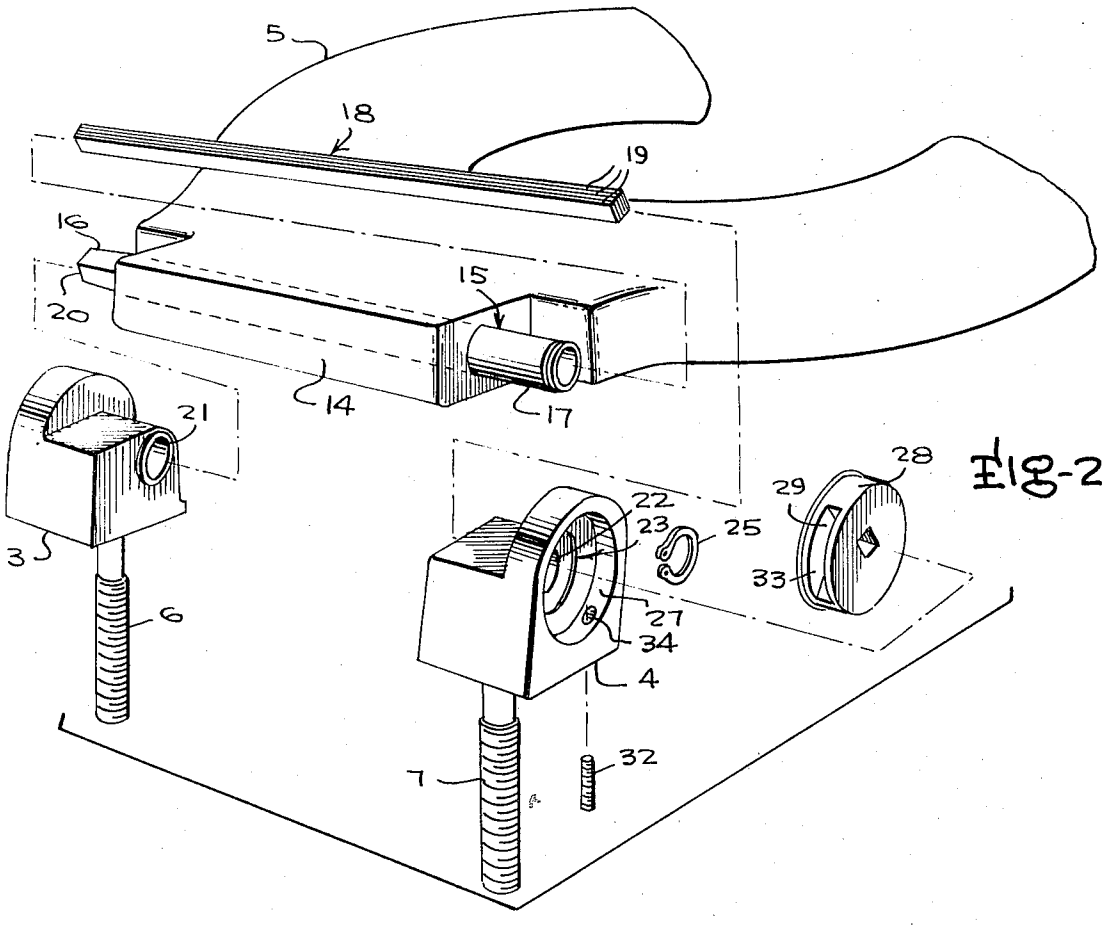


Fig-2

Fig-3

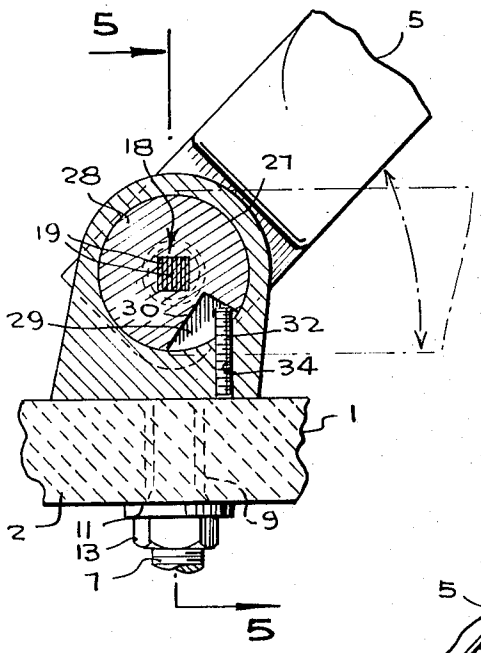
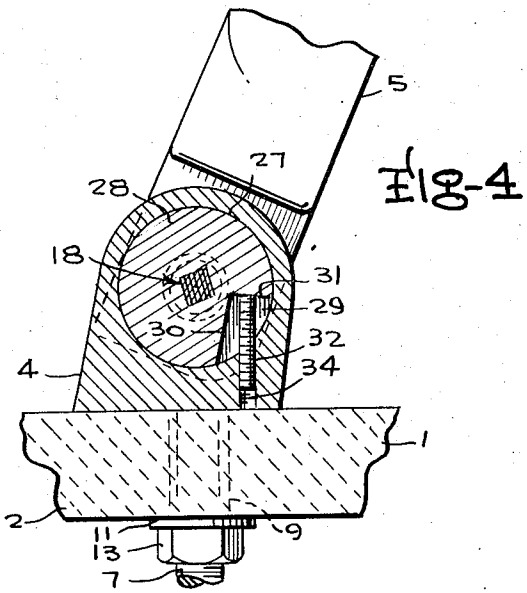


Fig-4



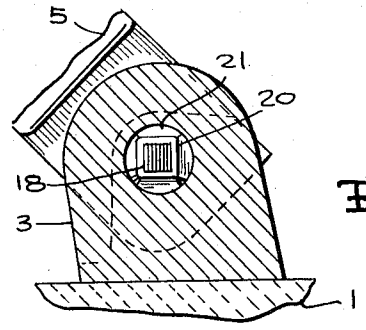


Fig-6

Fig-5

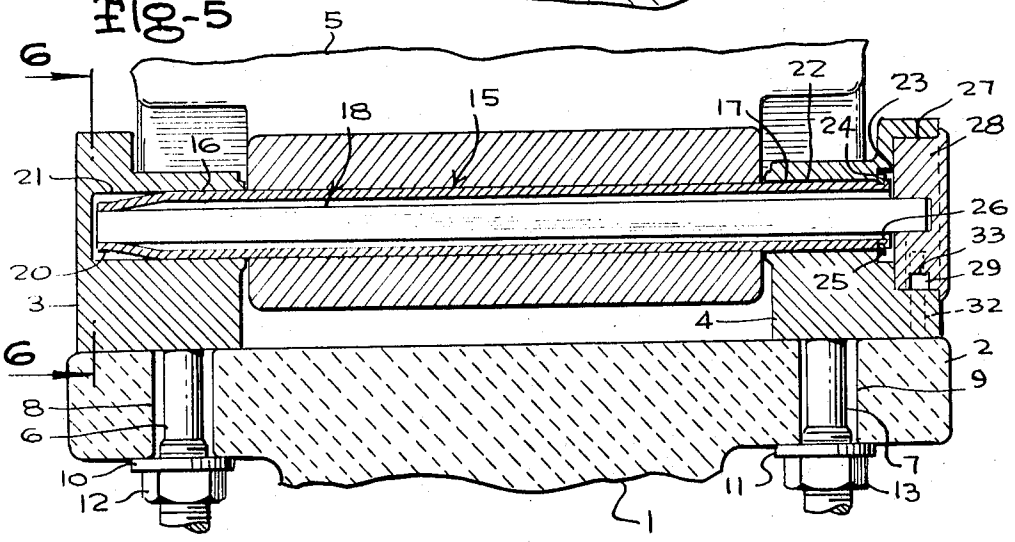
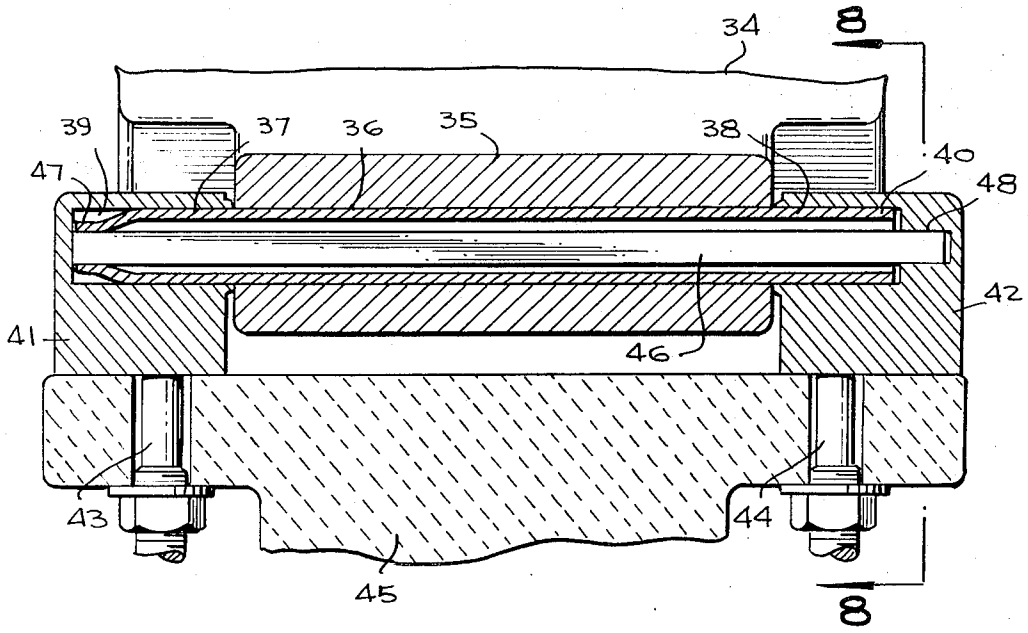


Fig-7



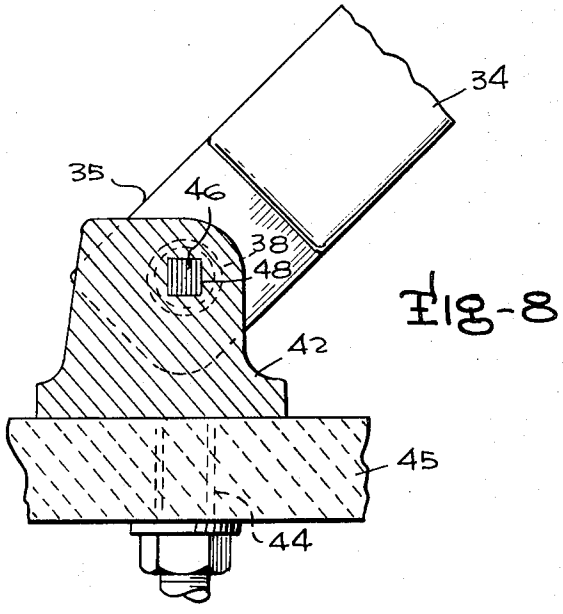


Fig-8

SELF-RAISING SEAT

BACKGROUND OF THE INVENTION

This invention relates to improvements in seats for water closets, and more particularly to such seats that have a normal, at-rest position raised above the water closet, and which are known as self-raising seats.

The general type of seat with which the present invention is concerned, is well known and is used primarily in public washrooms and tiolets. The seat is biased to a raised position, out of contact with the water closet bowl, but will move to normal, bowl-contacting position when weight is put upon it. Upon removal of the weight, the seat automatically raises to its predetermined, at-rest position.

In the past, seats of this type have included coil springs as the biasing means. The spring has been tensioned by winding, and it has been difficult to adjust the tension with any degree of accuracy. Considerable winding movement is necessary to provide appreciable change in the at-rest position of the seat. This has made adjustment by simple means difficult. Further, coil springs tend to lose their tension in use, resulting in frequent adjustment, or a gradual lowering of the at-rest seat position. Another factor of importance is the need for employment of coiled springs of appreciable diameter to obtain the biasing action necessary to lift the seat.

SUMMARY OF THE INVENTION

The general object of the present invention is to provide a self-raising water closet seat having improved means to bias it to raised position.

A more specific object of the invention is to provide a seat employing a biasing means which will be capable of simple and accurate adjustment.

Another object is the provision of the self-raising seat with a biasing means in the form of a leaf spring.

A further object is to provide a seat wherein friction is utilized in conjunction with spring torsion in the biasing means to urge the seat to raised, at-rest postion.

It is also an object to provide a seat with a simple screw-type adjusting means, wherein small increments of adjusting movement result in relatively large changes in raised seat position.

Still a further object of the invention is to provide a self-raising water closet seat in which a bundle of leaf springs in surface engagement are fixed as a unit at one end of the seat, and an adjusting means is attached to the opposite end for cooperation with an adjusting screw in the seat mounting post to torsionally bias the leaf spring bundle to hold the seat in desired lifted position.

Other objects of the invention will become apparent from the following description of one practical embodiment thereof, when taken in conjunction with the drawings which accompany, and form part of, this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a self-raising seat incorporating the improvements of the present invention, shown mounted on a water closet bowl, parts of the seat and bowl being broken away;

FIG. 2 is an exploded perspective view of the seat, its mounting and biasing means;

FIG. 3 is a vertical section through the hinge post containing the biasing member adjusting means and is taken on the line 3—3 of FIG. 1;

FIG. 4 is a view similar to FIG. 3, but with the adjustment means moved to bring the seat to a higher at-rest position;

FIG. 5 is a longitudinal, vertical section through the seat mounting, and is taken on the line 5—5 of FIG. 3;

FIG. 6 is a vertical section through the hinge post opposite the one containing the adjustment means, taken on the line 6—6 of FIG. 5;

FIG. 7 is a section similar to FIG. 5 but illustrating a modified construction; and

FIG. 8 is a vertical section through a hinge post showing the spring end in a seat in the post, and is taken on the line 8—8 of FIG. 7.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings in detail, and first to that form of the invention shown in FIGS. 1 to 6, there is shown a conventional water closet bowl, having the usual rearwardly-extending, flat apron 2. Hinge posts 3 and 4 are attached to the apron and support a seat 5 for pivotal movement to and from the top surface of bowl 1. FIG. 5 shows that the hinge posts 3 and 4 have conventional threaded studs 6 and 7 which project downwardly through openings 8 and 9 in the bowl apron. Washers 10 and 11 are placed upon the lower ends of the studs, and nuts 12 and 13 are used to fix the posts tightly to the bowl.

Seat 5 has the normal, rearwardly-projecting mounting tongue 14, and a hinge tube 15 extends through the tongue and projects laterally on either side of the tongue, forming pivot trunnions 16 and 17. The hinge tube is fixed to the seat tongue, so that there can be no movement of the tube relative to the seat.

Hinge tube 15 carries a seat-biasing spring 18. The spring is an elongated member composed of a plurality of similar leaf springs 19. The springs are in face-to-face contact and form a spring bundle of rectilinear cross-section, the bundle shown being of a square cross-section. The several springs making up the bundle are free of one another to permit sliding movement under torsional adjustment of the bundle, as will be described. At one end, the trunnion 16 end, the hinge tube is swaged, as at 20, into clamping engagement with the spring bundle to fix the bundle to the hinge tube, hole one end of the bundle rigid relative to the tube and to the seat, and to clamp the several spring elements together at one end. The remainder of the leaf spring bundle extends freely axially of the tube and projects beyond the opposite end of the tube.

That portion of the tube end which is swaged is but a small part of trunnion 16, so that the major portion of the trunnion may be pivotally received within pivot socket 21 of hinge post 3 to provide firm pivotal mounting for the seat. The opposite trunnion, 17, is mounted for free rotation within a pivot opening 22 in the hinge post 4. Opening 22 is enlarged near the outboard side to provide a recess 23 having a shoulder 24, which serves as an abutment for a split ring 25 that seats in a groove 26 in the free end of tube 15. This holds the tube and seat against shifting movement.

A still further enlarged opening 27, coaxial with the rotational axis of the seat assembly, is provided in hinge

post 4 to form a housing for an annular spring-holding member 28. This member fits snugly, but rotatably, within the housing and also acts as a closure member for the end of the hinge post. Spring holder 28 has a recess 29 opening to its peripheral surface, which has an angular bottom 30, one surface of which, the surface 31, provides an abutment for a vertical adjustment screw 32, threaded through the bottom portion of the hinge post 3 for passage into recess 29 and bearing contact with the recess surface 31. It is to be noted from FIGS. 3 and 4 of the drawing that recess 29 and adjustment screw 32 are located forwardly of a vertical plane passing through the axis of rotation of the seat assembly. By forwardly, is meant in a direction toward the seat proper. A seat 33 in the inner face of the spring holder receives the free end of the spring bundle 18. Spring seat 33 is of the same cross-sectional shape as the spring bundle, so that the spring holder is rotationally fixed to the spring bundle. There is no actual connection of the spring holder to the spring, but as the spring is held by tube 15 and the tube in turn is held by split ring 25, there can be no movement of the spring axially of the pivot assembly. Spring holder 28, when positioned in the housing 27 with adjusting screw 32 having its end within recess 29, is also movable axially of the pivot assembly, so that the spring end will remain within the seat 33 in the spring holder.

When the seat is to be mounted on the closet bowl, the seat with its rigidly fixed hinge tube 15 is first assembled with the hinge posts 3 and 4. This is done by slipping the hinge post 3 onto the swaged end trunnion 16 until the trunnion is seated in the hinge socket 21. Hinge post 4 is then slipped over trunnion 17 until the end of the hinge tube projects into the enlarged recess 23. The hinge post 4 is locked in this position by snapping split ring 25 onto groove 26. As the abutment of the retaining ring with the shoulder 24 holds the post against movement away from the seat, the free end of the spring bundle 18, which projects beyond the tube end is held in predetermined position within the opening 27 ready to receive the spring holder 28. The spring holder is then inserted into opening 27 with the seat 33 in its face fitted over the end of the spring bundle. Adjustment screw 32 is inserted into threaded opening 34 in hinge post 4 and screwed upwardly until its leading end moves into the recess 29 in spring holder 28 and into contact with the abutment surface 31. At this time, the hinge post 4, the spring holder 28, adjustment screw 32, spring bundle 18 and seat 5 will occupy substantially the relationship shown in FIG. 4 of the drawings. If little lift of the seat is desired, no further adjustment is necessary and the hinge post studs 6 and 7 can be inserted into the holes 8 and 9 in the bowl apron and fastened in place. If, however, it is desired to have the seat assume a higher lifted position, adjustment screw 32 will be screwed further into the opening, which will cause the spring holder to rotate in a counterclockwise direction (as viewed in FIG. 4) and the spring bundle, in turn, will rotate in the same direction. As the far end of the spring bundle is fixed to hinge tube 15, the tube and the seat will also rotate in the same direction. When the desired angular relationship between the hinge post and seat has been attained, the hinge posts will be mounted on the bowl apron. Of course, when the seat is attached to the bowl, its weight will be imposed on the spring. As the seat weight is transferred rotationally by the hinge tube to the spring end fixed to the tube, the spring will tend to rotate in a clockwise direction. With the spring end held in the spring holder, and rotation of the spring holder in a clockwise direction prevented by adjustment screw 32, the imposed seat weight will cause twisting of the spring bundle until the spring torsion equals the seat weight. The seat will then be in its operative, raised position. When additional weight is placed upon the seat, further twisting of the spring takes place, increasing the spring bias, but permitting the seat to move down into contact with the top of the bowl. After the load is removed, the spring will return to its original biased condition, lifting the seat to its predetermined raised position.

Anchoring the spring bundle free end in the spring holder and locking the spring holder is desired position, fixes the spring end angular position so that seat loads, transmitted to the opposite end of the spring bundle at its point of attachment to the hinge tube, causes rotation of that end of the spring and twisting of the bundle. As the independent leaf springs are free of connection to one another, the twisting of the bundle will cause some sliding movement of the individual springs relative to one another. Although the several springs are clamped together at the swaged tube end, they fit freely in seat 33 of the spring holder and this movement is possible. Nevertheless, the fractional contact of the springs with one another increases spring resistance beyond the simple sum of the torsional resistance of the individual leaf springs.

The seat assembly is a simple one, and the spring used provides ample seat bias while occupying little space and requiring but slight added size to the hinges simply to accommodate it. The leaf springs will maintain their resiliency over long periods, so that the seat will need little adjustment. Although the spring bias is adjustable, there is no visible evidence of the adjusting means when the seat is mounted. All openings are closed, and only smooth surfaces are exposed for ease in cleaning and the maintenance of sanitary conditions.

With the type of spring used in the present seat, slight twisting is sufficient to add considerable bias. Therefore, only small increments of adjustment movement are necessary to cause relatively large changes in the raised position of the seat. This greatly reduces the space required for the adjustment screw. The bundle of leaf springs provides a biasing member of great strength, yet the division of the torsion member into a plurality of individual leaf springs provides the resiliency necessary for a device of the kind disclosed herein.

Turning now to that form of the invention shown in FIGS. 7 and 8, the structure is the same as before except that no means is provided for adjusting the spring and the spring end is anchored in one of the hinge posts.

In this form, the seat 34 has a rearwardly-extending mounting tongue 35 in which a hinge tube 36 is rigidly fixed. The tube extends beyond the mounting tube on either side, forming hinge trunnions 37 and 38. Trunnions 37 and 38 are rotatably mounted in pivot sockets 39 and 40, respectively, of hinge posts 41 and 42. The posts have mounting studs 43 and 44, secured to the water closet bowl 45.

Hinge tube 36 houses a seat-biasing spring 46, as before. The spring is identical to the one in the first-described form, being composed of a plurality of leaf

springs in face contact to form a spring bundle. The spring has one end secured to the hinge tube by swaging the trunnion end **37** into gripping relation with the spring, as at **47**. The opposite end of the spring bundle fits freely into an anchor seat **48** in the hinge post **42**. Seat **48** opens to the bottom of pivot socket **40** and is in axial alignment with pivot socket. It is of the same cross-sectional shape as the spring bundle so as to hold the spring bundle end against rotative movement relative to the hinge post, yet allow the individual leaf springs to move freely relative to one another as the spring bundle is twisted in use.

The orientation of the anchor seat will be such that when the spring end is in the anchor seat and the hinge posts mounted on the bowl, the seat will be held in raised position. As the seat is swung downwardly, the hinge tube will rotate causing the attached spring end to rotate also. The opposite end of the spring is held against rotation, and the spring will twist, putting it under load. As soon as pressure, or weight, is removed from the seat, the spring untwists, returning to its original condition and lifting the seat to its at-rest, raised position.

In all respects, the structure of the FIGS. **7** and **8** modification will operate the same as the form shown in FIGS. **1** to **5** when the structures are mounted. The second form, however, will have no means to vary, or adjust, the seat-biasing effect of the spring, but will have a spring of fixed bias. As the spring bundle provides a very strong biasing member, this will have little practical effect in the operation of the seat. The structure, of course, is less expensive than the first-described form.

While in the above practical embodiments of the invention have been disclosed, the specific details of construction shown and described are merely by way of example, and the invention may take other forms within the scope of the appended claims.

I claim:

1. Self-raising water closet seat adapted to be mounted on a water closet bowl comprising, a water closet seat having a central opening and a continuous tongue extending rearwardly of said seat, a pivot tube positioned through said tongue and having end projecting beyond the seat at each side with the pivot tube fixed against rotation relative to the seat, spaced hinge posts fixed to said bowl and receiving; on the tube projection ends with said pivot tube being rotatable in the hinge posts, an elongated torsion spring composed of a bundle of unconnected leaf springs axially slidable with respect to each other carried within said pivot tube and projecting beyond said pivot tube at one end only and fixed to the pivot tube at the other end by means of a narrowed swaged end of said tube clamping said leaf springs while permitting axial slidable movement of said springs relative to said tube, and engaging and twisting means within the hinge post at the side where the spring projects beyond said pivot tube end to engage the spring projecting end and twist the spring in a seat-raising direction to bias the seat to raised position, with respect to said bowl said engaging and twisting means including a fixed stationary non-round bore integral with said hinge post.

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