

Jan. 27, 1970

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3,491,379

CLEANING APPARATUS FOR WATER CLOSETS AND THE LIKE

Filed Jan. 4, 1968

2 Sheets-Sheet 1

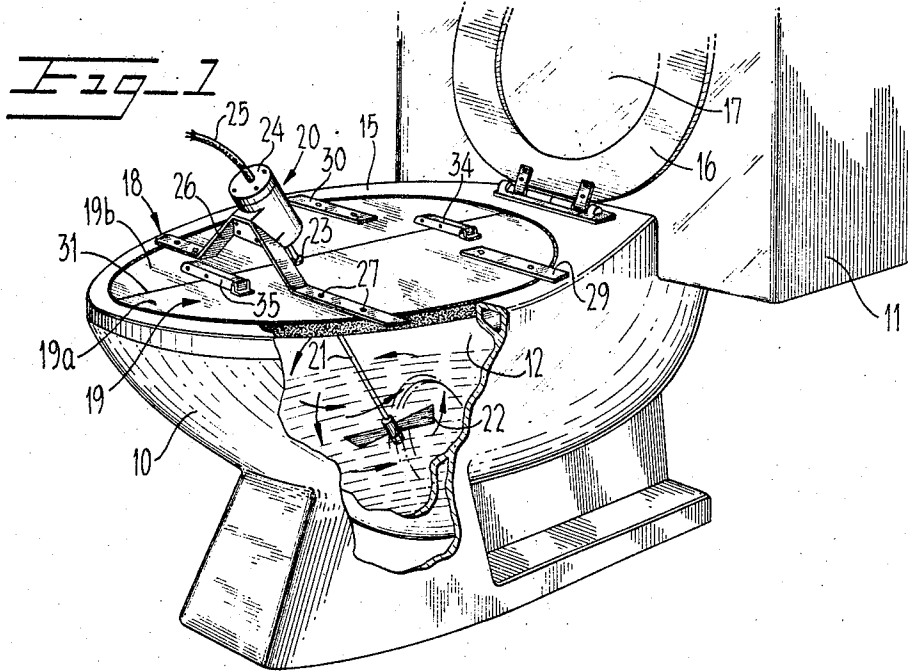
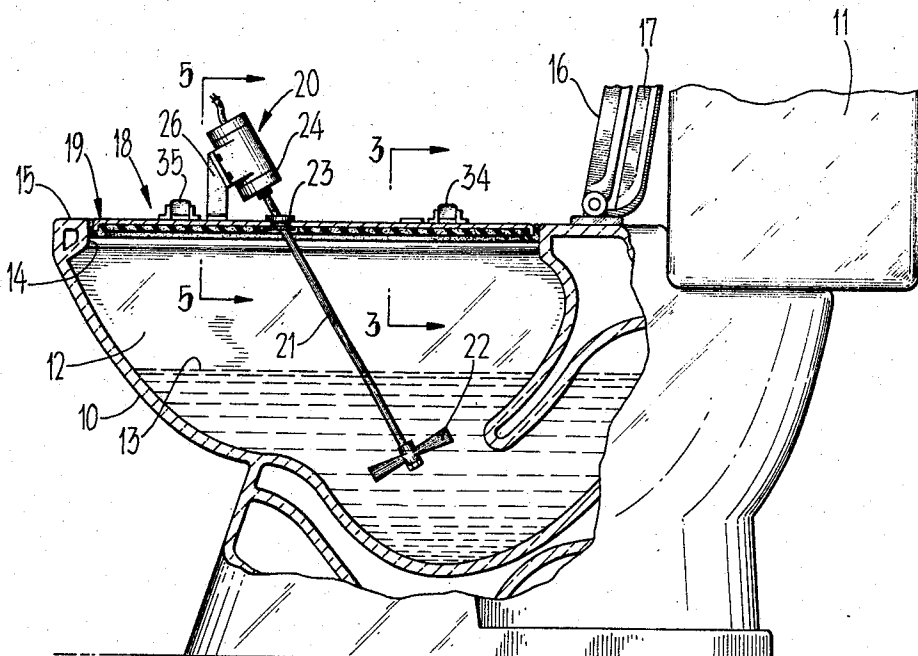


Fig. 2

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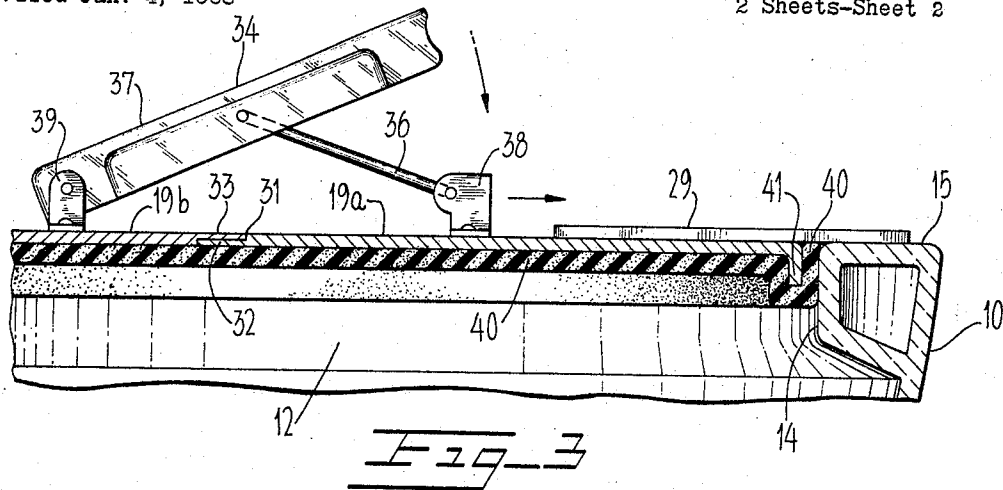
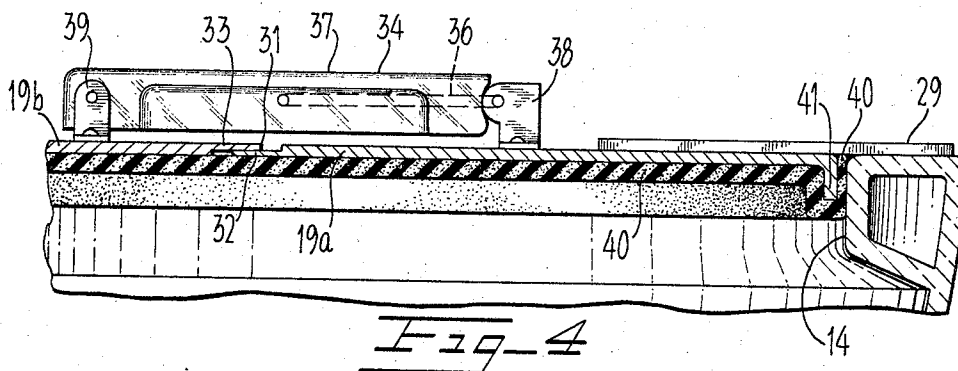
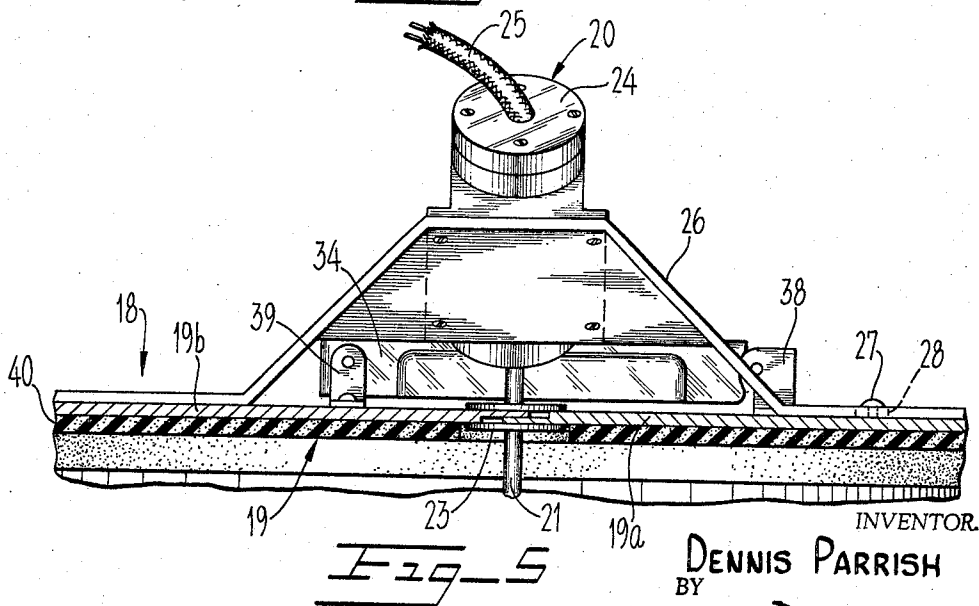
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**CLEANING APPARATUS FOR WATER CLOSETS
AND THE LIKE****Dennis Parrish, 4472 Wyman Drive,
Sacramento, Calif. 95821****Filed Jan. 4, 1968, Ser. No. 695,641****Int. Cl. A47k 17/00****U.S. Cl. 4—1****10 Claims****ABSTRACT OF THE DISCLOSURE**

Apparatus for cleaning water closets and like containers provided therein with an open-topped chamber. The apparatus includes closure structure conforming generally to the configuration of the opening in such top so as to seat therewithin, and the closure structure is expandable into engagement with the surrounding opening-defining surface of the water closet to form a substantially watertight seal therewith. Agitator structure having an elongated shaft projecting through the closure structure is equipped at one end with an agitator blade adapted to be immersed within the body of water ordinarily held by the chamber of the water closet. A motor supported by the closure structure is connected with the shaft so as to rotatably drive the same, wherefore a cleaning agent, disinfectant, and other substances may be added to such body of water and when the resultant solution is agitated by rotation of the blade, the interior of the water closet chamber is thoroughly cleansed with no splashing of the solution to the exterior thereof.

This invention relates to apparatus for cleaning water closets or toilet bowls and like containers (a bidet, for example); and it relates more particularly to electro-mechanical apparatus cooperative with a body of water or water solution within the bowl or chamber of such container to agitate the water body sufficiently to thoroughly wash, disinfect or otherwise cleanse the interior surfaces of the chamber.

The task of cleaning the bowls of toilet stools or water closets and analogous containers is at best unpleasant and disagreeable, and it is also unsanitary work because it is done manually with small brushes or other handheld equipment and the required agitation of the body of water within the bowl (which usually will have a detergent, disinfectant or other cleansing agent added thereto) often causes the liquid to splash onto the workman and onto adjacent surfaces and equipment. This is especially objectionable in institutions such as hospitals, in military barracks, public washrooms and places of this type where the bowls may be most unsanitary and where cleansing nevertheless is either desirable or mandatory; and because of the number of water closets that must be cleansed, the manual cleaning task is also time-consuming.

In view thereof, objects, among others, of the present invention are to provide an improved arrangement for cleansing the bowls or chambers of water closets and like containers, and which arrangement prevents splashing from the container onto personnel and adjacent floors, furniture and equipment; and which improved arrangement also results in a much more thorough and complete cleansing than is provided by manual cleaning procedures. Further objects include among them the provision of an improved cleansing arrangement that generally reduces the amount of time required to clean a water closet bowl, that results in a higher degree of sanitation because of the improved cleansing it effects, and which further results in the cleaning equipment itself remaining more sanitary because it does not come into direct contact

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with the interior surfaces of the water closet bowl and since it comprises no porous and absorbent materials, it is readily dried after use and stored. Additional objects and advantages of the invention especially as concern specific features and characteristics thereof will become apparent as the specification develops.

The improved apparatus is electro-mechanical in character, and it comprises closure structure cooperative with a water closet adjacent the top or open upper end of the bowl thereof to substantially close such end and thereby prevent splashing and other escape of liquid from the bowl during cleaning thereof. The closure structure is equipped with an agitator having a shaft projecting through the closure structure and equipped at one end with an agitator blade adapted to be immersed within the body of liquid provided within the bowl. The shaft is rotatably driven by a motor supported by the closure structure with the result that the blade agitates the liquid and causes it to wash over the interior surfaces of the bowl. In a more particular sense, the closure structure conforms generally in shape to the configuration of the open top of the water closet so as to be able to seat within the opening thereof, and the closure structure is expandable into snug engagement with the surrounding surface portions of the water closet so as to form a watertight seal therewith. Thus, when the agitator blade is rotated no liquid can splash from the water closet irrespective of the degree of turbulence imparted to the liquid by the rotating blade.

An embodiment of the invention is illustrated in the accompanying drawings, in which:

FIGURE 1 is a broken perspective view, partially in section, of a typical water closet having the cleaning apparatus in operative position thereon;

FIGURE 2 is a broken longitudinal sectional view of the water closet and cleaning apparatus shown in FIGURE 1;

FIGURE 3 is an enlarged, broken vertical sectional view taken along the line 3—3 of FIGURE 2 and illustrating one of the tension components of the expandable closure in the release or open position thereof;

FIGURE 4 is a vertical sectional view similar to that of FIGURE 3 but showing the tension component in its operative or closed position; and

FIGURE 5 is a vertical sectional view taken along the line 5—5 of FIGURE 2.

The assembly illustrated in FIGURES 1 and 2 constitutes a water closet or toilet comprising a stool 10 and a water storage tank or flush box 11 connected therewith so as to supply water, upon demand and under the control of manually operable valve structure, to the interior of a bowl or chamber 12 provided within the stool 10. The normal level of the body of water within the chamber 12 is determined by the construction of the stool; and in the water closet shown in the drawings, the normal elevation of the water is generally along the line 13. The stool 10 has a large opening at the top or upper end thereof (as shown generally at 14), and the upper surface 15 of the stool is substantially flat so as to firmly support thereon a seat 16 and cover 17 which are hingedly secured to the stool and are selectively movable between a horizontal position and the upwardly extending open position illustrated in FIGURES 1 and 2. As respects the present invention, the water closet may be completely conventional and, accordingly, no further description thereof need be provided.

The cleaning apparatus comprising the present invention is denoted in its entirety with the numeral 18, and it comprises closure structure 19 adapted to be removably supported by the water closet or stool 10 thereof in closing relation with the opening 14. The apparatus 18

further includes agitator structure 20 including a shaft 21 extending downwardly through the closure structure 19 and into the chamber 12, and at its lower end the shaft is equipped with an impeller or agitator blade 22 which is immersed within the body of liquid within the chamber 12. The shaft 21 is journaled for rotation in a suitable bearing support 23 therefor carried by the closure structure 19 and advantageously is provided with a packing gland or otherwise being constructed so as to minimize, and desirably prevent, the escape of water upwardly through the closure structure 19 along the shaft 21. The shaft at its upper end is connected with motor means 24 in the form of an electric motor adapted, when energized, to rotatably drive the shaft 21 and thereby rotate the blade 22 to agitate the body of liquid within the chamber 12.

The motor 24 is equipped with the usual power cord 25 provided at its end with a male plug (not shown) adapted to be inserted into an ordinary convenience outlet. The motor 24 may be completely conventional and any standard fractional horsepower AC motor might be used. The motor is mounted on the closure structure 19 in any convenient manner as, for example, by bracket structure 26 bolted or otherwise affixed to the motor, as shown in FIGURE 5, and which in turn is secured to the closure structure by screws or other appropriate fasteners.

It should be noted, however, that some relative movement is provided between the bracket 26 and closure structure 19 and, therefore, at least at one of its ends the bracket 26 is secured to the closure structure 19 by means of one or more pins 27 that extend downwardly through elongated openings 28 respectively provided therefor in the bracket 26 and are secured to the closure structure 19. The pins enable the closure structure 19 to move relative to the bracket 26 within the dimensional limits defined by the cooperative relationship defined by the pins and the elongated slots respectively associated therewith. By way of example, each pin 27 may be a bolt threadedly extending through a tapped opening provided therefor in the closure structure 19 and constrained in a suitable position of adjustment by a lock nut (not shown) so as to afford freedom between the bracket and closure structure sufficient to enable the aforesaid relative movement therebetween.

The closure structure 19 conforms generally to the configuration of the opening 14 provided by the stool 10 at the upper end thereof, and normally the closure structure is slightly smaller than the opening so as to be received therewithin, as shown in each of FIGURES 1 through 4. In order to maintain the closure structure in such position within the opening 14, a plurality of spaced apart feet or supports are provided which are fixedly secured to the closure structure 19 and are adapted to seat upon the upper surface 15 of the stool 10, as shown best in FIGURES 1, 3 and 4. In the specific structure illustrated, four such support feet are provided—two of which are formed by the outer extremities of the bracket 26 adjacent the opposite ends thereof, and the other two of which are provided by relatively rigid bars 29 and 30 bolted or otherwise secured to the closure structure 19 along its opposite sides and which project outwardly therefrom so as to seat upon the upper surface 15 of the stool. Analogously, the outer extremities of the bracket 26 are relatively rigid and project outwardly beyond the dimensional limits of the closure structure 19 so as to seat upon the upper surface 15 of the stool 10.

The closure structure 19 is provided with movable sections or segments expandable into substantial engagement with the generally circumjacent or surrounding edges of the stool defined at the opening 14 thereof so as to establish a substantially liquid-tight engagement with such edges. In the particular apparatus being considered, the closure structure 19 is segmented centrally generally along a median line 31, and for purposes of identification, the two segments are respectively denoted 19a and 19b. The

segments 19a and 19b are movable relative to each other between the positions respectively illustrated in FIGURES 3 and 4 and which, for purposes of description, may be taken to be a retracted or closed position and an extended or open position. In the retracted position of the two segments, the closure structure 19 can be placed into and removed from the opening 14; but when in their extended or open position, the segments 19a and 19b are displaced outwardly with respect to each other so as to press against the surrounding edges or wall surface defining the opening 14 at the upper end of the stool 10. In order to accommodate relative movement yet completely close the opening 14, the segments 19a and 19b have overlapping edge portions along the median line 31, and such edge portions are reduced in thickness so as to dimensionally accommodate the overlap defined thereby. For identification, the overlapping edge of the segment 19a is denoted 32 and it underlies the complementary edge 33 of the segment 19b.

The closure structure 19 is provided with a pair of substantially identical multiple-position tension components 34 and 35 which are spaced apart longitudinally along the median line 31 and span the same. The member 34 is shown in detail in FIGURES 3 and 4, and referring thereto it is seen to comprise a pair of elements 36 and 37 movable between an open position corresponding to the segments 19a and 19b being retracted (as shown in FIGURE 3) and a closed position in which the segments 19a and 19b are extended (as shown in FIGURE 4). The element 36 may be an elongated, generally U-shaped link or loop pivotally supported adjacent one end thereof by a post 38 bolted or otherwise fixedly secured to the segment 19a along the upper surface thereof. At its opposite end, the element 36 is pivotally secured to the element 37 intermediate the ends thereof, and in this respect, the element 36 may extend into a central opening provided within the element 37 which in turn is supported for pivotal displacements adjacent one end by a post 39 bolted or otherwise fixedly related to the segment 19b.

The dimensional relationships involving the elements 36 and 37, the pivotal axes therefor defined by the posts 38 and 39, and the interconnection of the two elements necessarily effects relative displacements of the segments 19a and 19b whenever the tension components 34 and 35 are moved between the open and closed positions thereof. More particularly, and considering for purposes of description that the component 19b remains stationary because at its outer perimeter it is in substantial abutment with the walls of the opening 14, the post 39 is therefore fixed as is the pivot axis defined thereby for the element 37 of the tension component 34. Accordingly, whenever the element 37 is swung downwardly or in a clockwise direction as shown by the arrow in FIGURE 3, the segment 19a must be displaced toward the right in the direction of the arrow in FIGURE 3 because the effective length of the element 36 and element 37 (i.e., from the pivotal connection thereof with the element 36 to the post 39) is greater than the spacing between the pivot axes defined by the posts 38 and 39, wherefore the spacing between such axes must be increased by displacement of the segment 19a toward the right and into the position shown in FIGURE 4.

Such relative displacement of the segments 19a and 19b is evident by comparing the positions of the overlapping edge portions 32 and 33 as they are respectively illustrated in FIGURES 3 and 4. Conversely, when the tension components 34 and 35 are opened by upward movement of each element 37, the distance between the posts 38 and 39 must decrease; and such decrease thereof is accomplished by inward movement of one or the other or both of the segments 19a and 19b. Each of the components 34 and 35 may have a slightly over-center action as between the elements 36 and 37 thereof so that they

tend to remain in each of their open and closed positions.

In order to obtain a relatively good liquid-tight seal between the perimetric edges of the closure structure 19 and surrounding wall surfaces defining the opening 14 of the stool 10, the closure structure has a resilient seal along the perimetric edge portions thereof engageable with such surrounding or generally circumjacent edges of the stool. The resilient seal is denoted with the numeral 40, and in the form shown it is seen to extend over the entire undersurface of the closure structure and at its outer edge is turned upwardly to extend along a depending flange 41 provided by the closure structure along the perimetric edge thereof. Any suitable material may be used for the seal, a resilient material such as rubber (natural or synthetic) or certain of the resilient plastics, and the material may be adhesively or otherwise secured to the contiguous surfaces of the closure structure.

In use of the cleaning apparatus, the seat 16 and cover 17 of a water closet to be cleaned are swung upwardly into the position shown in FIGURES 1 and 2, and the cleaning apparatus is placed in the position shown so that it is supported by the various spaced apart feet within the opening 14 at the upper end or top of the stool 10. The tension components 34 and 35 at this time are in the open positions thereof (as shown in FIGURE 3) to enable the closure structure 19 to seat within the opening 14; and after such seating thereof is accomplished, the elements 37 of the closure structure are pressed downwardly to effect relative outward movement between the sections 19a and 19b to press the perimetric edge portions thereof into tight abutment with the surrounding surface of the opening 14. A substantially liquid-tight seal is established by such abutment because of the interposition of the resilient seal 40. The cord 25 is then connected with an electric convenience outlet to energize the motor 24, thereby causing the blade 22 to agitate the liquid contained within the bowl or chamber 12 of the stool 10.

Such agitation of the liquid causes the same to wash over all of the interior surfaces of the chamber 12 so as to cleanse the same of any soil or contamination by germs or bacteria resulting from prior use of the water closet. Accordingly, any disinfectant and/or cleaning agent placed within the chamber 12 prior to the cleaning apparatus 18 being positioned thereon will be thoroughly mixed with the body of water ordinarily within the bowl and will be effective in such cleaning, disinfecting or other cleansing of the bowl surfaces. After a sufficient time interval has elapsed, the motor 24 is deenergized, the tension components 34 and 35 released by swinging the elements 37 thereof upwardly, and the apparatus may then be removed for further use or storage.

The motor 24 may be provided with the usual on-off switch (not shown) so that the energizing circuit can be controlled at the motor. Also, the motor can be equipped with a timer to terminate its operation automatically after the expiration of a predetermined time period without the requirement for manual intervention for this purpose. Thus, a workman can carry on other tasks once the cleaning apparatus is in operation knowing that it will be shut off after a predetermined time interval sufficient in length to effect the requisite cleansing of the water closet.

While in the foregoing specification an embodiment of the invention has been set forth in considerable detail for purposes of making a complete disclosure thereof, it will be apparent to those skilled in the art that numerous changes may be made in such details without departing from the spirit and principles of the invention.

What is claimed is:

1. Apparatus for cleaning water closets and the like having an open-topped chamber adapted to be at least partially filled with liquid, comprising closure structure adapted to be removably supported by such water closet in closing relation with the open top of the chamber thereof, agitator structure carried by said closure struc-

ture and having components projecting downwardly therefrom for receipt within such chamber to agitate the liquid therein, and drive means connected with said components for energizing the same to agitate the liquid within such chamber and thereby cleanse the interior thereof.

2. The apparatus of claim 1 in which said closure structure is equipped with a resilient seal engageable with adjacent surfaces of such water closet to form a substantially liquid-tight engagement therewith.

3. The apparatus of claim 1 in which said closure structure conforms generally to the configuration of the opening in the top of such water closet so as to seat within such opening, and in which said closure structure is equipped with a plurality of supports engageable with such water closet so as to support the closure structure within said opening.

4. The apparatus of claim 3 in which said closure structure has movable segments expandable toward engagement with the surrounding generally circumjacent surfaces of such water closet to restrict the passage of liquid therebetween.

5. The apparatus of claim 4 and further comprising multiple-position tension components having elements thereof respectively connected with said movable segments of said closure structure and being selectively displaceable between an open position in which said segments are retracted and a closed position in which said segments are expanded toward such engagement with the circumjacent surface of said water closet.

6. The apparatus of claim 5 in which said closure structure is equipped with a resilient seal along the perimetric edge portions thereof substantially engageable with the circumjacent surfaces of such water closet so as to effect a liquid-tight seal therewith.

7. The apparatus of claim 6 in which said closure structure is divided longitudinally along a median line to form the aforesaid segments thereof, said segments having transversely slidable overlapping edge portions along such median line so as to enable said segments to be displaced transversely relative to each other into their extended position while maintaining a closure along the median line.

8. The apparatus of claim 7 in which said agitator structure includes an elongated rotatable shaft projecting through said closure structure and being equipped adjacent one end with an agitator blade, and further includes a motor supported by said closure structure and being drivingly connected with said shaft for rotating the same.

9. The apparatus of claim 8 and further comprising a bracket spanning the median line dividing said segments and being connected with each and also being secured to said motor to support the same, the connection of said bracket with at least one of said segments affording relative movement therebetween to enable said segments to be displaced between the retracted and extended positions thereof.

10. The apparatus of claim 9 and further comprising bearing structure carried by said closure structure and providing a rotatable support for said shaft.

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U.S. Cl. X.R.

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