

July 25, 1933.

H. G. DAVIS

1,919,541

DISHWASHER

Filed Aug. 3, 1931

3 Sheets-Sheet 1

Fig 1

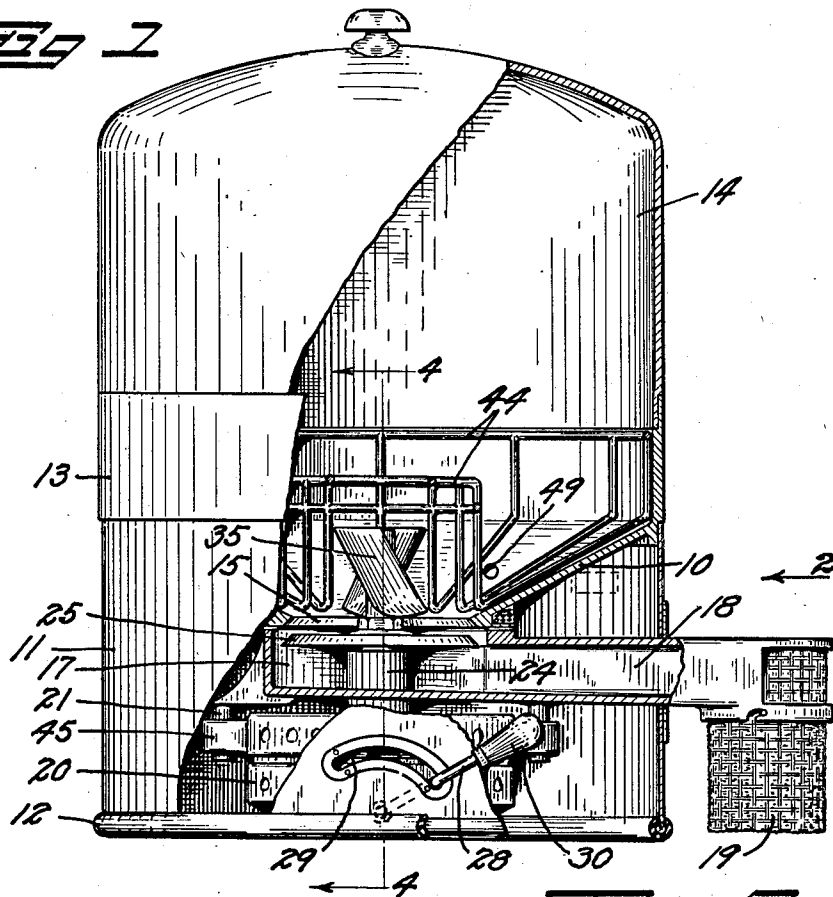


Fig 3

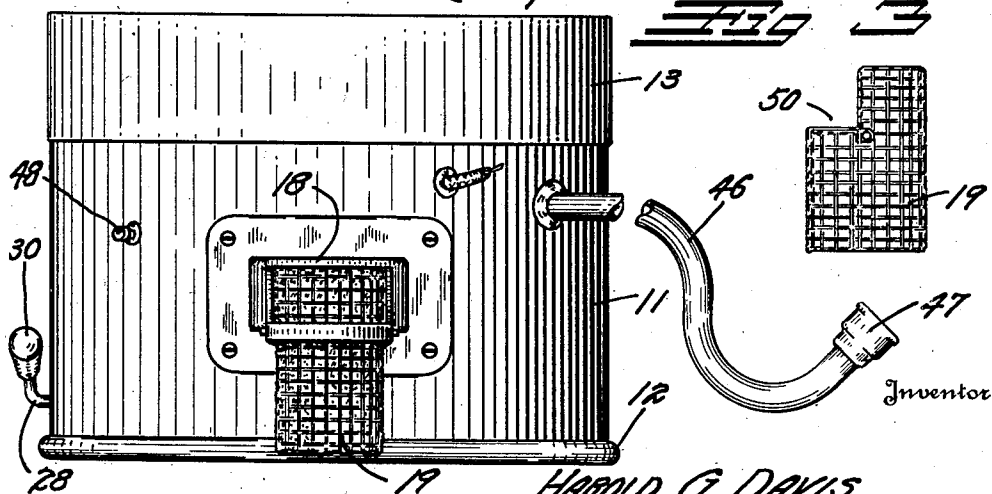


Fig 2

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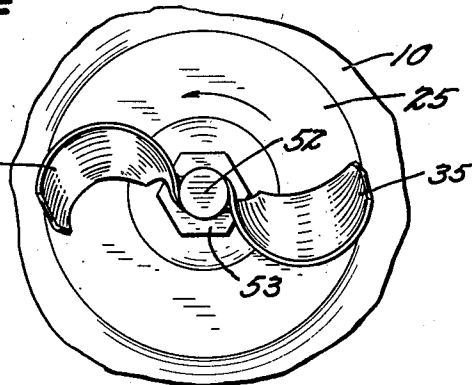
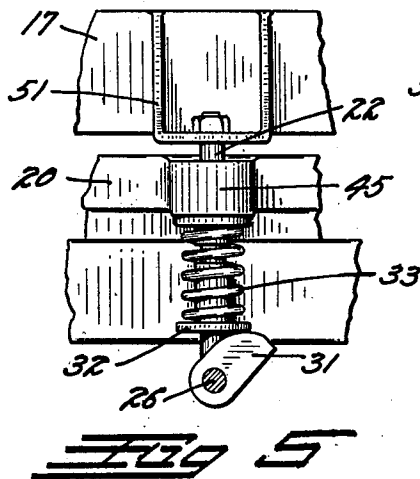
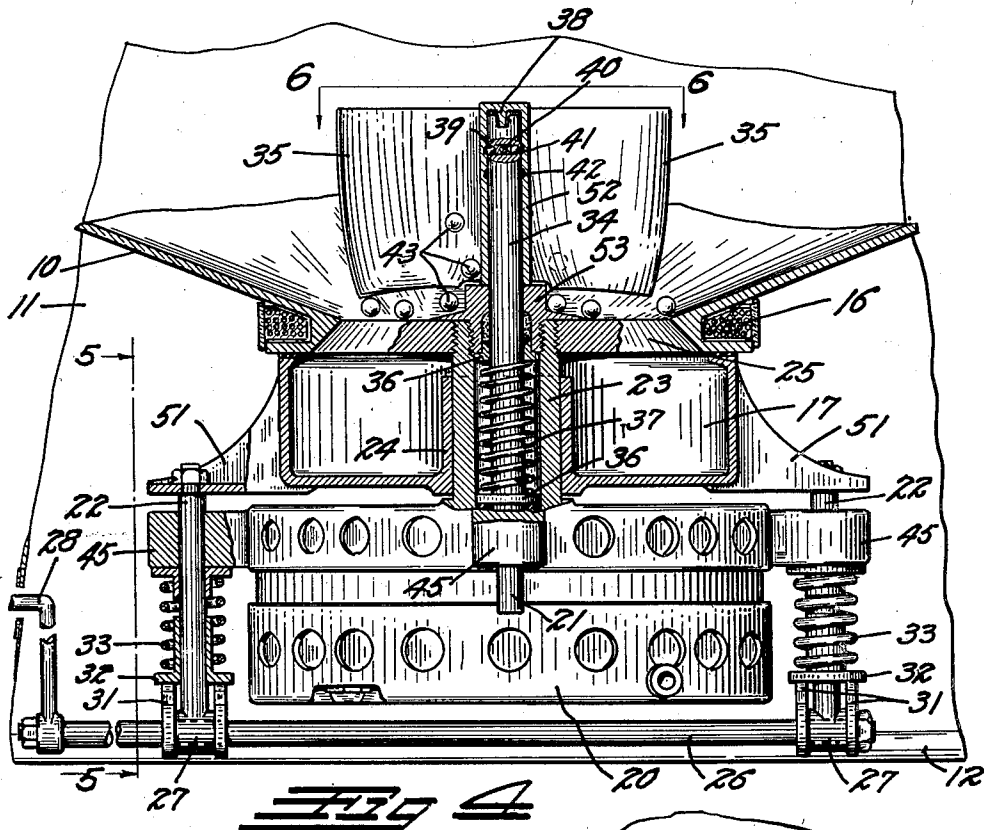
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3 Sheets-Sheet 2



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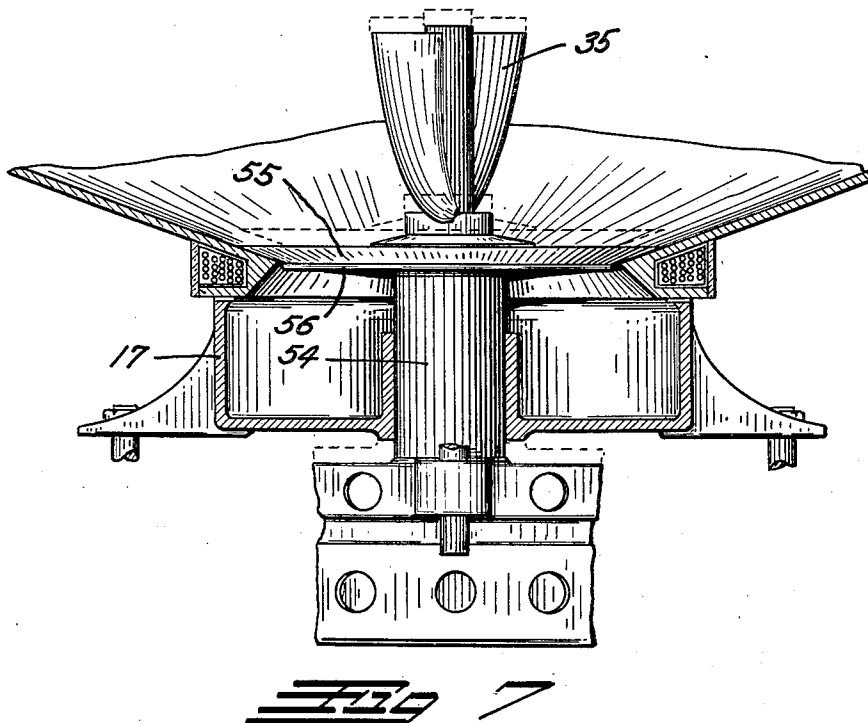
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DISHWASHER

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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DISHWASHER

Application filed August 3, 1931. Serial No. 554,687.

This invention relates to a machine for washing and drying dishes and the like and has for its principal object the provision of a machine of this character in which the dishes will be subjected to a violent and scouring current of mechanically impelled water; and in which substantially the entire bottom of the machine may be opened for the discharge of the water; and in which a large volume of air may be drawn through the open bottom for the drying of the dishes.

Another object of the invention is to provide a construction of the central impeller type in which the entire impeller and its driving mechanism will be moved as a unit with the discharge valve so as to avoid sliding stuffing boxes and the possibility of leakage about the impeller shaft.

Another object of the invention is to provide a discharge valve which will be forced to its seat by resilient means so that it will automatically accommodate any misalignment in the seat or any foreign materials which may be between the seat and valve without damage to either.

Still another object of the invention is to provide a dishwashing machine which will clean and scour the dishes by means of a series of mechanically impelled balls or pellets which will be continuously thrown against the surface of the dishes with sufficient force to exert a cleaning and scouring action.

A further object is to provide means for gathering and recovering these balls or pellets at the end of the cleaning operation.

A still further object of the invention is to provide means which will prevent the mechanical impeller in a dishwashing machine from being damaged should a culinary utensil fall into the arc of rotation of the impeller.

And a still further object of the invention is to provide means for heating the water in the dishwasher and maintaining it hot as well as heating the incoming drying blast of air.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy,

and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawings which forms a part hereof. Like numerals refer to like parts in all views of the drawings and throughout the description.

In the drawings:

Fig. 1 is a side elevation partly in vertical section of the improved dishwashing machine.

Fig. 2 is a side elevation looking in the direction of the arrow 2, Fig. 1, with the cover removed.

Fig. 3 is a detail view illustrating the screen drainage basket.

Fig. 4 is an enlarged section through the operating portion of the device taken on the line 4—4, Fig. 1.

Fig. 5 is a detail view illustrating the action of the lifting cams. This view is taken on the line 5—5, Fig. 4.

Fig. 6 is a plan view of the impeller taken on the line 6—6, Fig. 4.

Fig. 7 illustrates an alternate method of mounting the drain valve.

Construction

The invention comprises a hopper-shaped bowl 10 supported on a casing 11, the bottom edge of which terminates in a bead surrounded by a rubber tubular cushion 12. The outer wall of the bowl 10 extends above the casing 11 forming a peripheral band 13. The top of the band 13 is formed with an internal mortice to receive the lower edge of a cover 14.

The bottom of the bowl 10 terminates in a relatively large, circular discharge opening 15; the periphery of which is beveled outwardly at the bottom to form a relatively large circular valve seat. An electrical heating coil 16 is carried by the bowl 10 immediately about the discharge orifice 15. Below the discharge orifice 15 a valve chamber 17 is secured, from which, a combined drain and air intake passage or tube 18 extends. The tube 18 extends through the

housing 11 and terminates in a removable screen basket 19.

An electric motor 20 is positioned immediately below the valve chamber 17. The motor 20 is vertically movable and is guided by means of lugs 45 which slide on two short studs 21 and two relatively long studs 22 which project downwardly from brackets 51 on the valve chamber 17. A bearing sleeve 23 projects upwardly from the motor 20 through a collar 24 in the valve chamber 17. A beveled disc, discharge valve 25 is threaded on the upper extremity of the sleeve 23 and is maintained in place thereon by means of a suitable packing nut 25.

The motor 20 can be raised and lowered on the studs 21 and 22 by means of a cam shaft 26 which is carried in bearings 27 formed on the extremities of the studs 22 and terminates in an operating handle 28. The operating handle is preferably curved so as to extend through an arcuate slot 29 in the housing 11 and terminates in a hand grip 30 on the exterior of the housing. The cam shaft 26 is provided with a series of cams 31 which act against sliding spring sleeves 32 so as to cause a pair of compression springs 33 to act against the lugs 45 of the motor 20 to lift the latter.

It is desired to call attention to the fact that the springs 33 reach their fullest compression when the handle 28 is vertical. As the vertical position is passed, the expansion of the springs holds the handle locked in the left end of the slot 29. It is preferred to allow a slight play between the sleeve 23 and the collar 24 and between the motor lugs 45 and the studs 21 and 22. This leaves the valve 25 free to rock slightly to accommodate any misalignment in the seat. This rocking movement is accommodated by the springs 33. The springs have another advantage in that they prevent damage to the valve or its seat should a knife, spoon or other foreign object become engaged therebetween.

The motor shaft indicated at 34 extends upwardly through the sleeve 23 and is operatively connected to an impeller 35. Leakage is prevented around the motor shaft 34 by means of a pair of packing glands 36 which are forced against suitable packing at opposite ends of the sleeve 23 by means of a packing spring 37. The spring, the glands, and the packing may be removed by removing the packing nut 53.

It is desired to call particular attention to the method of attaching the impeller 35 to the motor shaft 34. The hub of the impeller, indicated at 52, is provided with a closed top as illustrated in Fig. 4. A radially extending, beveled key 38 extends downwardly across the closed top of the hub 52 into a beveled keyway in the top of the shaft 34. The key 38 is held down into the keyway by

means of a pair of locking balls 39 which are urged outwardly from opposite sides of the shaft 34 by means of a spring 40. The balls ride in an internal groove 41 in the hub of the impeller when the key 38 is in place in the keyway. Should the impeller, however, strike an obstruction the increased load thereon will cause the beveled key 38 to climb out of the keyway so as to lift the impeller. This causes the balls 39 to leave the groove 41 and snap into a lower groove 42 which acts to support the impeller free from the shaft 34 so that it can immediately stop while the motor shaft continues to rotate.

The impeller 35 preferably comprises a pair of scoop shaped blades which will act to scoop water from the bottom of the bowl 10 and project it directly upward. The blades are curved forwardly at their outer edges, as illustrated in Fig. 6, so as to overcome centrifugal action as much as possible and project the water upward in a whirling and expanding column.

The device is designed to employ a quantity of relatively small balls or pellets 43, which will also be thrown upwardly by the scooping action of the impeller blades so as to impinge against the dishes to assist in the cleaning thereof. These pellets may be of any desired material. It is preferred however, to mold them from rubber of relatively high specific gravity so that they will not float in the water.

In use, the machine may be placed upon the drain board of a kitchen sink so that the tube 18 may discharge directly into the sink. A filling hose 46, having a faucet attachment 47, is provided for filling the bowl from the sink faucets. The hose discharges into the interior of the bowl through a filling port 49 (see Fig. 1).

Operation

The dishes or other articles to be cleaned are placed in suitable racks such as indicated at 44 which support them in the proper position and also protect them from the impeller 35. The operating handle 28 is swung to the left so as to cause the cams 31 to force the springs 33 upwardly. The springs 33 then act against the motor lugs 45 to lift the motor 20 and through it the discharge valve 25, forcing the latter to its seat in the discharge opening 15.

The bowl 13 is now filled with hot water through the filling hose 46. A suitable soap, preferably powdered, is placed in the bowl. Approximately one pint of the pellets 43 are placed in the bowl. The motor 20 is started by operating a suitable switch 48 which also acts to connect the heater 16 with the source of current. This causes the impeller to project a constant rising column of water and pellets upward and outward through the cen-

ter portion of the stacked dishes. This water and the pellets fall back around the edge of the bowl and return underneath the impeller. This violent and continuous flow of hot

5 soapy water and relatively hard pellets exerts a scouring action which quickly cleans the most obdurate dishes, pots and pans.

After the cleaning operation is completed the handle 28 is swung to the right to lower 10 the motor and open the valve 25. This allows the entire volume of water and pellets to discharge into the valve chamber 17 and out through the discharge tube 18 into the screen bowl 19. The water discharges 15 through the screen into the sink or other suitable receptacle and the balls are retained in the screen bowl.

The cover 14 is now removed. The impeller 35 is allowed to continue to rotate. 20 It now serves as a fan drawing its air through the tube 18 and discharging it against the dishes. The air is heated by its passage adjacent the heater 16 and through the hot tube 18, which has been heated by 25 both the discharging hot water and the heater 16. This draft of warm air blown directly upon the dishes quickly dries them of their contained moisture without water spots. When the dishes have dried the switch 48 30 is operated to stop the motor and the operation is complete.

It is desired to call attention to the following features:

35 The pellets 43 cannot become wedged between the valve 25 and the beveled valve seat for since the two faces are parallel the pellets, if they enter at all, will fall completely through. The blades of the impeller are spaced above the valve plate a distance exceeding the diameter of the pellets. This 40 prevents the blades from striking the pellets, and throwing them outwardly as they roll down the hopper bottom of the bowl. They are free to travel in toward the hub of the 45 impeller so that they can be lifted and projected upwardly by the scoop action of the blades.

When the valve 25 is opened, it will rest on the top of the collar 24 so as to perfectly 50 seal the valve chamber 17 from any leakage during the draining operation.

The springs 33 serve another function in addition to their accommodation of the sealing of the valve 25. They act as cushions 55 for the motor 20 and absorb the vibrations and noise thereof, which results in an unusually quiet machine.

The strainer bowl is notched as indicated at 50 so that its outer wall can pass upwardly 60 across the open end of the tube 18 so as to allow a passage for the indrawn air even though the cup 50 be filled with pellets or other solid material.

In Fig. 7 an alternate method of mounting 65 a drain valve is illustrated. In this figure the

motor sleeve is indicated at 54, carrying on its upper extremity a drain valve member 55, above which, the impeller 35 may be mounted. The valve 55 seats against the hopper 70 bottom of the bowl 10. Upward movement of the driving mechanism lifts the valve away from the bottom of the bowl allowing the water to discharge into the valve chamber 17. The valve 55 may be formed of any 75 desired material. It is suggested, however, that it be molded from flexible material such as rubber and supported on a rigid valve plate 56. This will allow the pressure of the water in the bowl to force the valve to conform to the contour of the bowl bottom 80 and eliminates machining operations. The weight of the motor or other driving mechanism will maintain the valve upon its seat.

While a specific form of the improvement 85 has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what 90 is claimed and desired secured by Letters Patent is:—

1. A dishwashing machine comprising: a bowl having a drainage opening in its bottom; a valve chamber below said opening; 95 a drainage conduit leading from said valve chamber; a motor positioned below said valve chamber; a drain valve arranged to close said opening; means extending from said motor into said valve chamber for supporting said drain valve; an impeller positioned above said drain valve; a shaft connecting said motor with said impeller, said shaft passing through said valve supporting 100 means; and means for raising and lowering said motor so as to cause said drain valve to open and close said drainage opening.

2. A dishwashing machine comprising: a bowl having a drainage opening in its bottom; a valve chamber below said opening; 110 a drainage conduit leading from said valve chamber; a motor positioned below said valve chamber; a drain valve arranged to close said opening; means extending from said motor into said valve chamber for supporting said drain valve; an impeller positioned above said drain valve; a shaft connecting said motor with said impeller, said shaft passing through said valve supporting 115 means; means for raising and lowering said motor so as to cause said drain valve to open and close said drainage opening, said means comprising a manually operated lever operatively connected with said motor to raise 120 the latter.

3. A dishwashing machine comprising: a bowl having a drainage opening in its bottom; a valve chamber below said opening; 125 a drainage conduit leading from said valve chamber; a motor positioned below said

valve chamber; a drain valve arranged to close said opening; means extending from said motor into said valve chamber for supporting said drain valve; an impeller positioned above said drain valve; a shaft connecting said motor with said impeller, said shaft passing through said valve supporting means; means for raising and lowering said motor so as to cause said drain valve to open and close said drainage opening, said means comprising a cam shaft; means for manually rotating said cam shaft; and cams carried by said cam shaft and operatively connected with said motor to raise the latter.

4. A dishwashing machine comprising: a washing bowl with a discharge opening in the bottom thereof; a valve disc arranged to close said opening; a motor; a shaft extending from said motor through said valve disc; a sleeve extending from said motor about said shaft so as to support said valve disc; an impeller carried by said shaft adjacent the inner face of said valve disc; and means for moving said motor, impeller, and valve disc as a unit to open and close said discharge opening.

5. A dishwashing machine comprising: a washing bowl with a discharge opening in the bottom thereof; a valve seat formed about said opening; a valve member arranged to move upwardly to close said seat; a valve chamber arranged below and about said valve member; a motor positioned below said chamber; a sleeve extending upwardly from said motor into said chamber and supporting said valve member; a shaft extending upwardly from said motor through said sleeve; an impeller carried by said shaft above said valve member; and means for raising said motor so as to cause said valve member to contact with said seat.

6. A dishwashing machine comprising: a washing bowl with a discharge opening in the bottom thereof; a valve seat formed about said opening; a valve member arranged to move upwardly to close said seat; a valve chamber arranged below and about said valve member; a motor positioned below said chamber; a sleeve extending upwardly from said motor into said chamber and supporting said valve member; a shaft extending upwardly from said motor through said sleeve; an impeller carried by said shaft above said valve member; and means for raising said motor so as to cause said valve member to contact with said seat, said means comprising a cam shaft extending beneath said motor; and cams carried by said shaft and arranged to lift said motor as said shaft is rotated.

7. A dishwashing machine comprising: a washing bowl with a discharge opening in the bottom thereof; a valve seat formed about said opening; a valve member arranged to move upwardly to close said seat;

a valve chamber arranged below and about said valve member; a motor positioned below said chamber; a sleeve extending upwardly from said motor into said chamber and supporting said valve member; a shaft extending upwardly from said motor through said sleeve; an impeller carried by said shaft above said valve member; and means for raising said motor so as to cause said valve member to contact with said seat, said means comprising, vertical studs extending below said valve chamber; lugs formed on said motor and arranged to slide on said studs; springs about certain of said studs and arranged to carry the weight of said motor; and means for compressing said springs upwardly so as to raise said motor and force said valve member to its seat.

8. A dishwashing machine comprising: a washing bowl with a discharge opening in the bottom thereof; a valve seat formed about said opening; a valve member arranged to move upwardly to close said seat; a valve chamber arranged below and about said valve member; a motor positioned below said chamber; a sleeve extending upwardly from said motor into said chamber and supporting said valve member; a shaft extending upwardly from said motor through said sleeve; an impeller carried by said shaft above said valve member; and means for raising said motor so as to cause said valve member to contact with said seat, said means comprising, vertical studs extending below said valve chamber; lugs formed on said motor and arranged to slide on said studs; springs about certain of said studs and arranged to carry the weight of said motor; and means for compressing said springs upwardly so as to raise said motor and force said valve member to its seat; said last mentioned means comprising spring sleeves slidable on said studs and supporting said springs; a cam shaft positioned below said spring sleeves; cams carried by said cam shaft in contact with said sleeves; and means for rotating said cam shaft so as to cause said cams to engage said spring sleeves and compress said springs.

9. A dishwashing machine comprising: a washing bowl with a discharge opening in the bottom thereof; a valve seat formed about said opening; a valve member arranged to move upwardly to close said seat; a valve chamber arranged below and about said valve member; a motor positioned below said chamber; a sleeve extending upwardly from said motor into said chamber and supporting said valve member; a shaft extending upwardly from said motor through said sleeve; an impeller carried by said shaft above said valve member; and means for raising said motor so as to cause said valve member to contact with said seat, said means comprising, vertical studs ex-

tending below said valve chamber; lugs formed on said motor and arranged to slide on said studs; springs about certain of said studs and arranged to carry the weight of said motor; and means for compressing said springs upwardly so as to raise said motor and force said valve member to its seat, said last mentioned means comprising, bearings carried by said studs below said springs; a cam shaft supported by said bearings below said springs; cams on said cam shaft arranged to compress said springs when said shaft is rotated; and means for rotating said shaft.

10. A dishwashing machine comprising: a washing bowl with a discharge opening in the bottom thereof; a valve seat formed about said opening; a valve member arranged to move upwardly to close said seat; a valve chamber arranged below and about said valve member; a motor positioned below said chamber; a sleeve extending upwardly from said motor into said chamber and supporting said valve member; a shaft extending upwardly from said motor through said sleeve; an impeller carried by said shaft above said valve member; means for raising said motor so as to cause said valve member to contact with said seat; and a collar extending upwardly from the bottom of said valve chamber about said sleeve so as to prevent leakage from said valve chamber.

11. A dishwashing machine comprising: a washing bowl with a discharge opening in the bottom thereof; a valve seat formed about said opening; a valve member arranged to move upwardly to close said seat; a valve chamber arranged below and about said valve member; a motor positioned below said chamber; a sleeve extending upwardly from said motor into said chamber and supporting said valve member; a shaft extending upwardly from said motor through said sleeve; an impeller carried by said shaft above said valve member; means for raising said motor so as to cause said valve member to contact with said seat; and a collar extending upwardly from the bottom of said valve chamber about said sleeve

a substantial distance so that said valve member will contact with the top of said collar when in its open position to prevent leakage from said valve chamber.

12. A dishwashing machine comprising: a washing bowl with a discharge opening in the bottom thereof; a valve seat formed about said opening; a valve member arranged to move upwardly to close said seat; a valve chamber arranged below and about said valve member; a motor positioned below said chamber; a sleeve extending upwardly from said motor into said chamber and supporting said valve member; a shaft extending upwardly from said motor through said sleeve; an impeller carried by said shaft above said valve member; and means for raising said motor so as to cause said valve member to contact with said seat, said means comprising, vertical studs extending below said valve chamber; lugs formed on said motor and arranged to slide on said studs; springs about certain of said studs and arranged to carry the weight of said motor; and means for compressing said springs upwardly so as to raise said motor and force said valve member to its seat; said last mentioned means comprising spring sleeves slidable on said studs and supporting said springs; a cam shaft positioned below said spring sleeves; cams carried by said cam shaft in contact with said sleeves; means for rotating said cam shaft so as to cause said cams to engage said spring sleeves and compress said springs; and means for stopping said rotation slightly past the point of greatest compression so that said springs will exert a locking action on said shaft.

13. In a dishwashing machine, a bowl having a drainage opening in its bottom; a valve arranged to close said opening; an impeller positioned above said valve; a shaft extending upwardly through said valve to drive said impeller; a sleeve surrounding said shaft below said valve and supporting said valve; said sleeve being movable to operate said valve and means for driving said shaft.

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