Aug. 10, 1948. H. G. DAVIS 2,446,693

DISHWASHING MACHINE

Filed Jan. 5, 1942 4 Sheets-Sheet 1

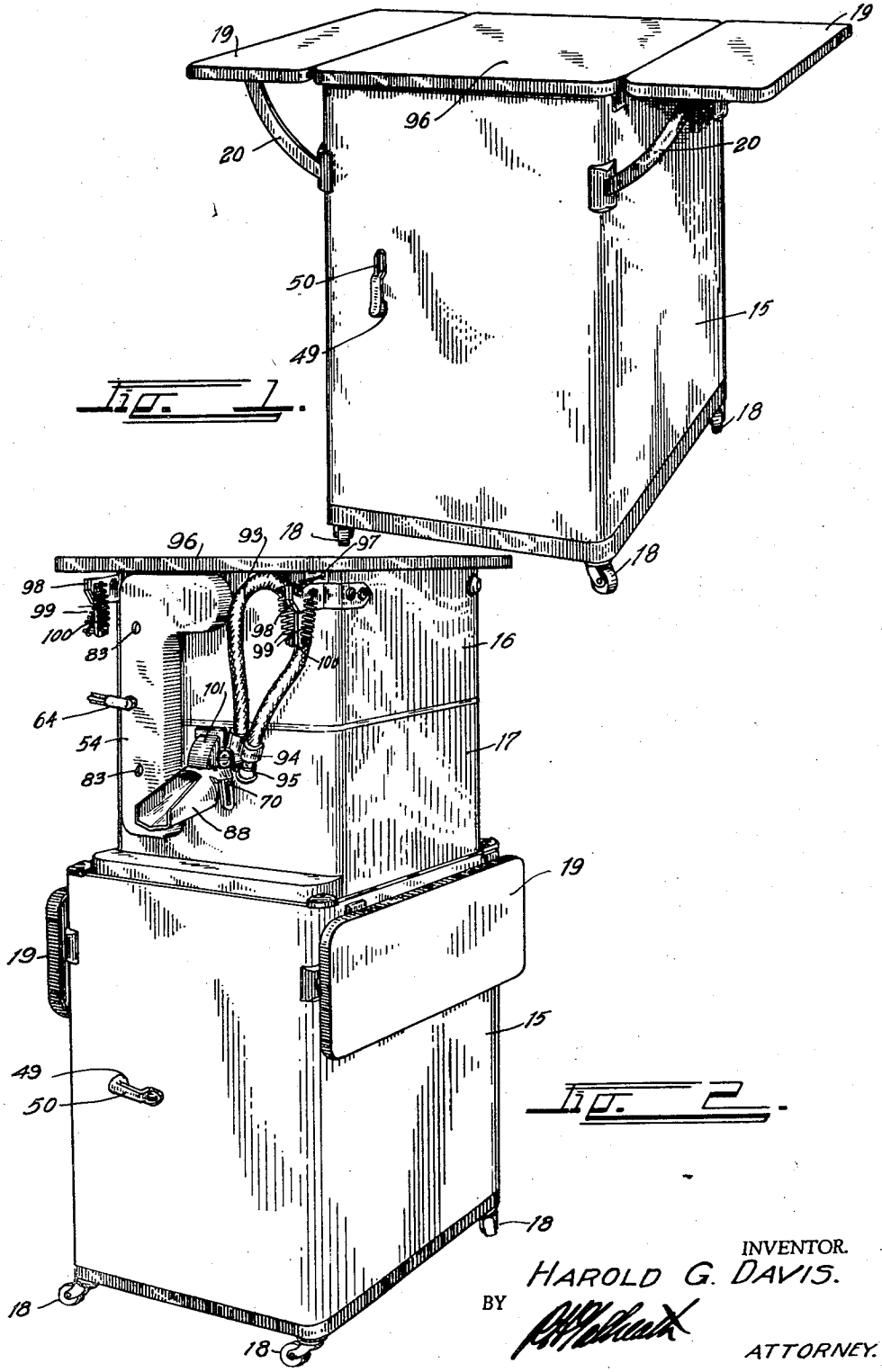


Fig. 1.

Fig. 2.

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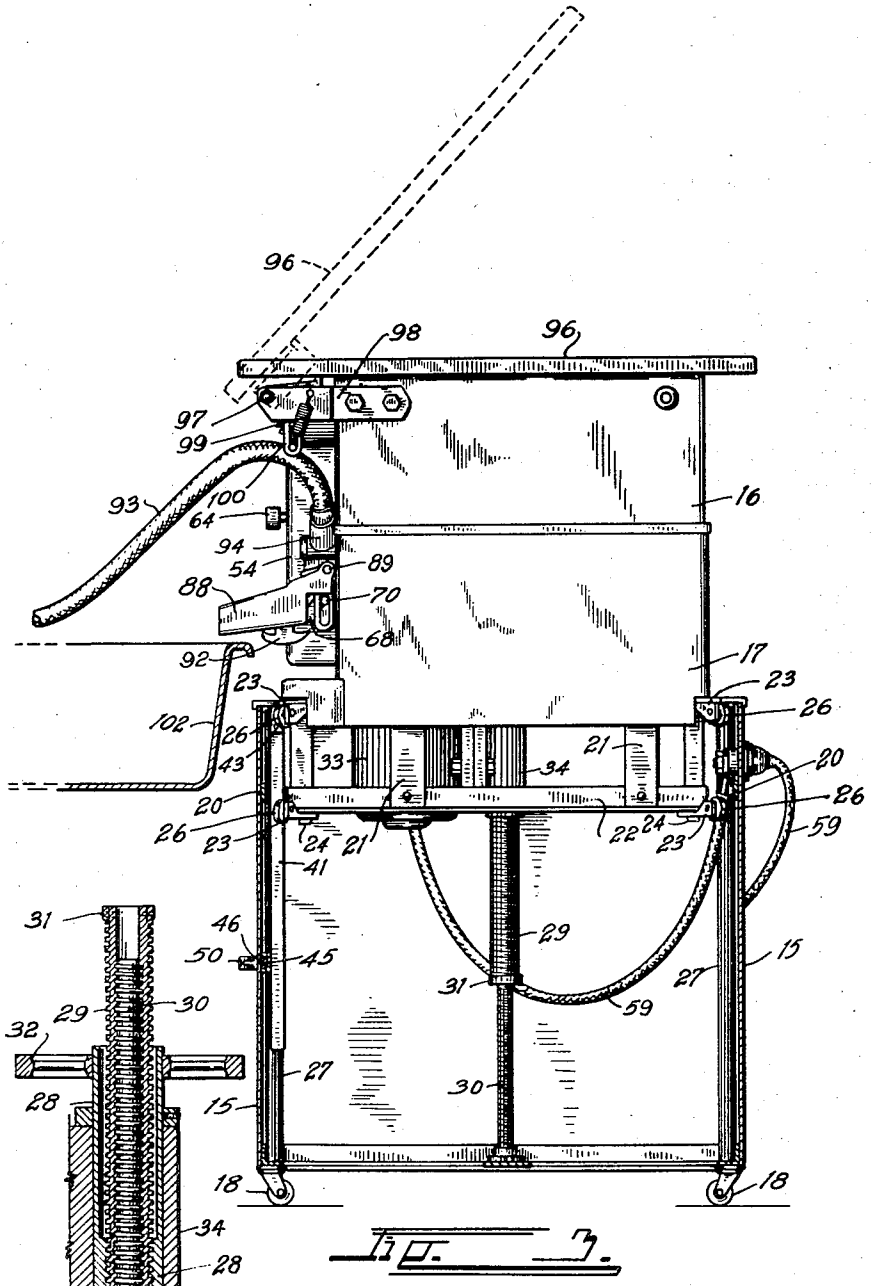


FIG. 3.

FIG. 4.

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DISHWASHING MACHINE

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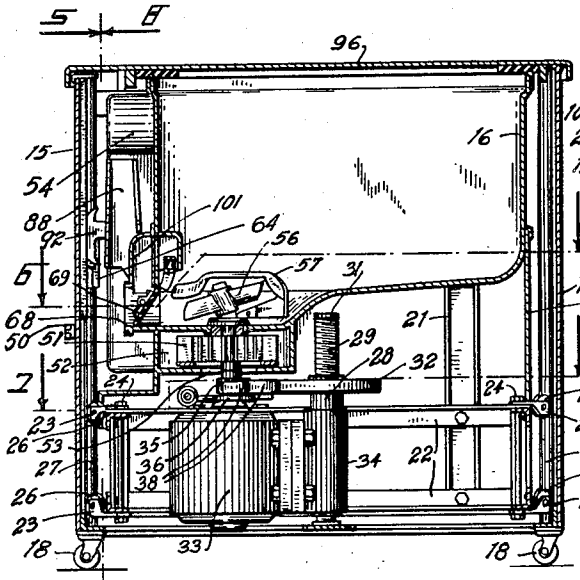


Fig. 4.

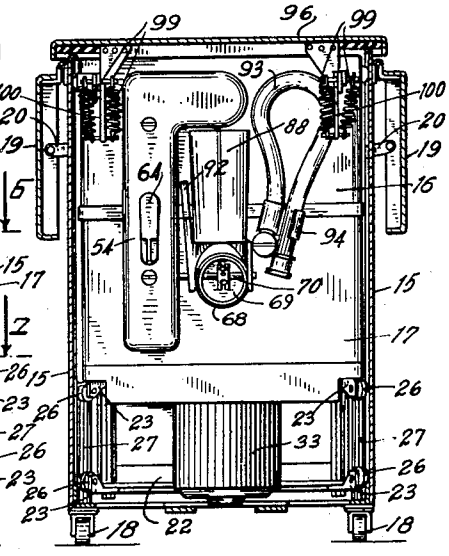


Fig. 5.

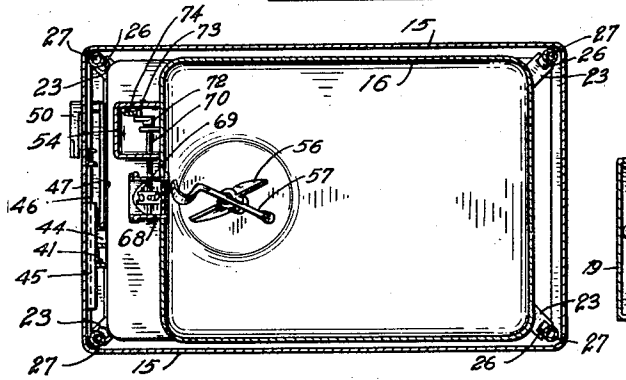


Fig. 6.

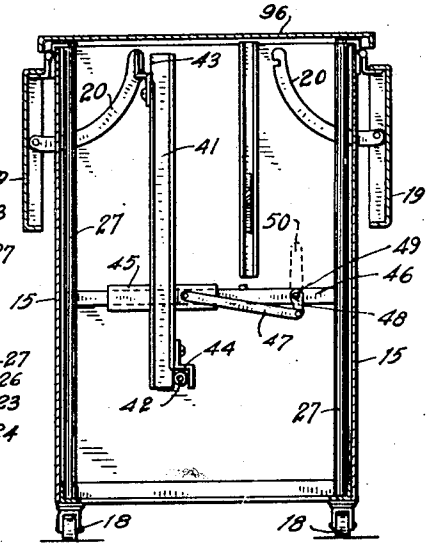


Fig. 8.

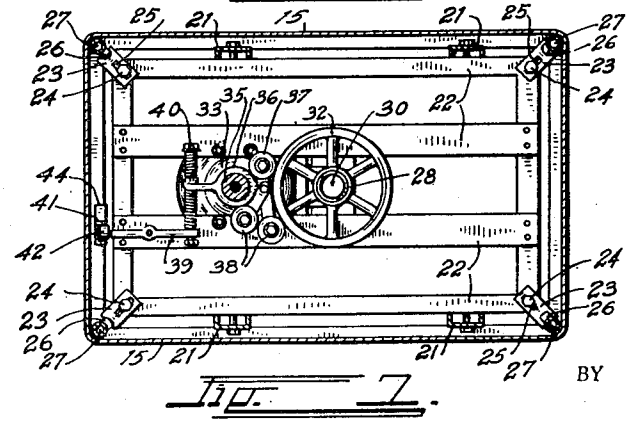


Fig. 7.

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DISHWASHING MACHINE

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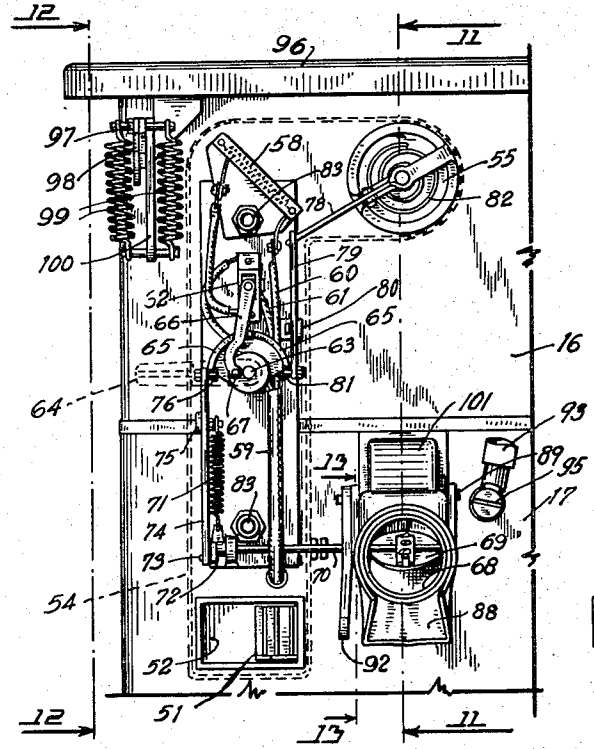


Fig. 10.

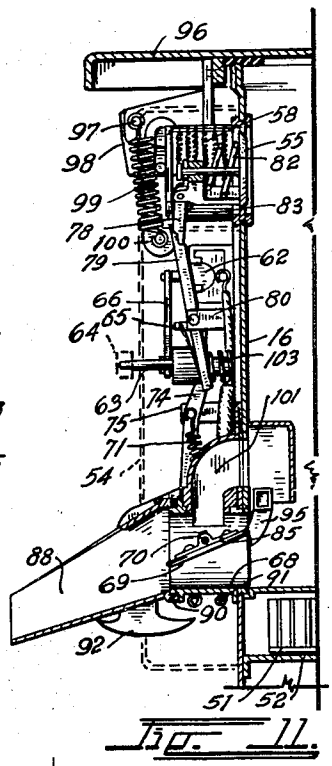


Fig. 11.

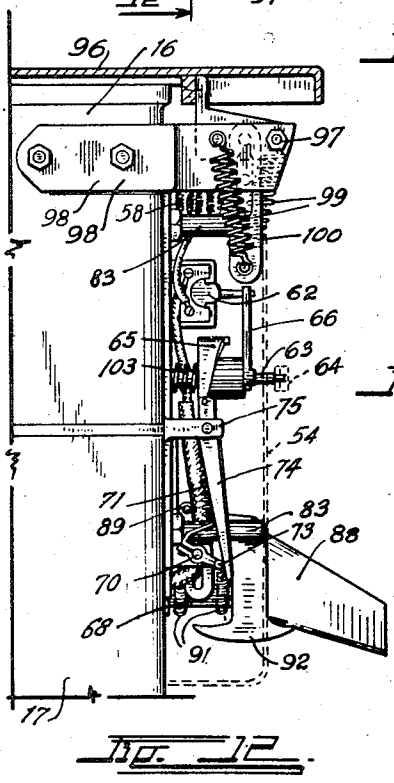


Fig. 12.

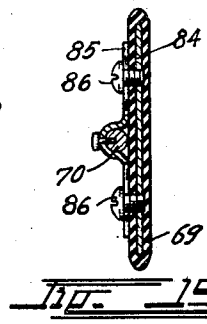


Fig. 15.

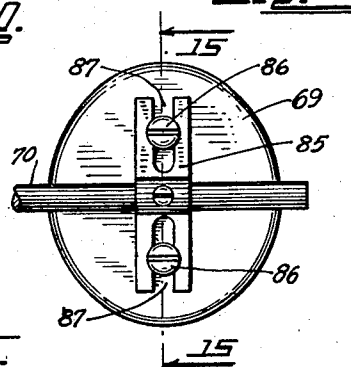


Fig. 14.

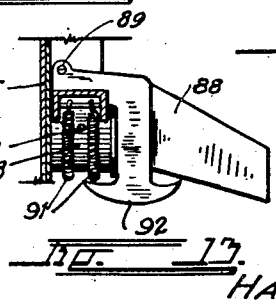


Fig. 13.

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Patented Aug. 10, 1948 2,446,693

UNITED STATES PATENT OFFICE

2,446,693

DISHWASHING MACHINE

Harold G. Davis, Denver, Colo.

Application January 5, 1942, Serial No. 425,679

6 Claims. (Cl. 134—117)

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This invention relates to a dish washing machine and has for its principal object the provision of a convenient, portable device which when not in use will serve as a table and which when in use will automatically elevate itself above the level of a kitchen sink so that it may discharge and drain directly into the sink without the use of pumps, etc.

Other objects of the invention are to provide automatic means for stopping the raising and lowering movements of the machine at adjustably pre-set points; to combine the electrical switching operations with the valve operating mechanism so that the various elements will operate in their proper combinations when controlled from a single operating handle; and to provide a drain chute for draining the machine into the sink which will fold automatically as the machine is lowered.

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 drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 illustrates the improved dish washing machine as it would appear in the lowered or folded position;

Fig. 2 is a similar view illustrating the machine in the raised or extended position;

Fig. 3 is a side elevation, partially in section, illustrating the machine in the raised or operating position;

Fig. 4 is a longitudinal, vertical section through the improved washer;

Fig. 5 is a vertical, cross section through the housing of the improved washer, taken on the line 5—5, Fig. 4;

Fig. 6 is a horizontal section, taken on the line 6—6, Fig 4;

Fig. 7 is a similar section, taken on the line 7—7, Fig. 4;

Fig. 8 is a vertical section through one extremity of the housing looking in the direction of the arrows 8—8, Fig. 4;

Fig. 9 is a detail, vertical, enlarged section through the jack screw of the device;

Fig. 10 is an enlarged, fragmentary, detail view of the valve and switch operating mechanism;

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Fig. 11 is a fragmentary, vertical section, taken on the line 11—11, Fig. 10.

Fig. 12 is a vertical section, taken on the line 12—12, Fig. 10;

Fig. 13 is a detail section illustrating the drain spout of the machine, taken on the line 13—13, Fig. 10;

Fig. 14 is a detail face view of the drain valve employed in the improved washer; and

Fig. 15 is a cross section through the drain valve, taken on the line 15—15, Fig. 14.

The improved dish washing machine employs an outer housing 15 within which a dish washing tub 16, provided with a depending skirt 17, is vertically movable. The housing 15 is provided with suitable caster wheels 18, which makes it readily portable, and with hinged table leaves 19 which may be raised from a depending position, as shown in Fig. 2, to horizontal alignment with a table top 96 with which the machine is provided, as shown in Fig. 1. When raised, the leaves 19 are supported by means of suitable sliding braces 20.

The tub 16 is supported upon struts 21 from a rectangular tub frame 22. A roller bracket 23 projects diagonally outward from each corner of the top and bottom of the tub frame 22. These brackets are secured in place by means of clamp bolts 24 which pass through slotted openings 25 in the brackets. This arrangement allows the brackets to be moved outwardly and inwardly around the frame 22 as well as to be turned angularly for adjustment purposes. Each bracket carries a sheave type roller 26 which rides against a vertical guide tube 27.

The tubes 27 are fixedly supported within each corner of the outer housing 15. The adjustable brackets eliminate all machine work since they allow the rollers to be brought tightly against the guide tubes regardless of any irregularities in placement of the latter. They also admit of "take-up" in case of wear. Tilting of the tub is prevented since both the top and bottom of the tube frame 22 carry the rollers 26 so that the tub is always maintained in accurate horizontal position.

The tub frame 22 is raised and lowered by means of a long nut 28 threaded on a telescoping jack screw consisting of an outer tube 29, which is threaded on its interior and exterior, and a fixed threaded shaft 30 mounted on a cross member in the housing 15. The tube 29 is threaded on the shaft 30 and the nut 28 is threaded on the tube 29. Terminal stops 31 are formed on the tube 29 to prevent the nut from leaving the tube.

The nut 28 carries a friction wheel 32 which is driven from an electric motor 33. The motor is fixedly secured to the tub frame 22 and carries a guide bearing 34 which surrounds and perpendicularly and rotatably supports the long nut 28.

The power transmission between the motor and the frictional wheel 32 is more fully described in applicant's Patent No. 2,200,574. Briefly, it comprises a friction drive pulley 35 mounted on the motor shaft in spaced relation to the friction wheel 32. A rotatable yoke 36, pivoted above the motor shaft, carries a forward idler pulley 37 at one side and two rearward idler pulleys 38 at the other side. If the yoke is rotated in one direction, it presses the forward pulley 37 between the drive pulley 35 and the wheel 32 to rotate the latter in one direction. If the yoke is shifted in the other direction, it presses both reversing idler pulleys 38 between the drive pulley 35 and the wheel 32 to rotate the latter in the opposite direction. Therefore, the tub can be raised or lowered in the outer housing 15 by shifting the yoke 36 to the left or right.

The yoke is shifted through the medium of a shifting lever 39 which is pivoted intermediate its extremities on the frame 22. One extremity of the shifting lever receives a connecting rod 40 carrying two compression springs 77, one spring being positioned on each side of an arm on the yoke 36. Therefore, when the shifting lever 39 is moved in one direction, it compresses one of these springs against the arm for forward movement and when moved in the other direction, it compresses the other spring against the arm for rearward movement. The other extremity of the shifting lever 39 carries a roller 42.

The movement of the lever 39 is accomplished by means of a vertical, laterally movable, shifting channel 41 into which the roller 42 projects and in which the roller travels vertically as the tub raises and lowers. Thus, referring to Fig. 8, if the shifting channel 41 is moved to the right, it causes the idler pulleys 38 to engage to move the tub upwardly. If shifted to the left, it causes the pulley 37 to engage to move the tub downwardly.

When the tub reaches its uppermost position, the roller 42 enters an upper enlargement 43 in the channel 41 to bring the rollers or pulleys 37 and 38 to the neutral position and stop further rising. When the tub reaches its lowermost position, it similarly enters an oppositely extending enlargement 44 to stop downward movement. The enlargements 43 and 44 are adjustably mounted on the channel 41 so that the extreme limits of movement can be pre-set to any desired points.

The shifting channel 41 is fixedly mounted on a horizontal guide head 45 which rides on a horizontal guide member 46. The head 45 is moved to the right or left through the medium of a connecting rod 47 and operating crank 48. The operating crank is secured on an operating shaft 49 terminating on the exterior of the housing 15 in an operating handle 50. Thus, by swinging the handle 50 upwardly or downwardly, the tub can be caused to raise or lower in the housing 15.

The shaft of the motor 33 terminates above the drive pulley 35 in any suitable coupling device through which it drives a blower rotor 51. The blower rotor 51 is mounted in a blower housing 52 below the bottom of the tub 16. The blower intakes through an intake opening 53 above the motor and discharges through a removable air

riser 54 on the exterior of the tub 16. The riser carries the air from the blower to an air intake through the wall of the tub adjacent the top thereof, the opening of which is controlled by means of a "mushroom" type intake valve 55. The incoming air is heated by means of a heating element 58 positioned in the air riser 54.

The blower rotor shaft passes through a sealed bearing in the bottom of the tub and terminates, within a depressed portion thereof, in a gyrating impeller 56. The detail construction of this impeller is described more completely in applicant's prior Patent No. 1,934,970. Briefly, the impeller is mounted on a flexible extremity of the motor shaft and this flexible extremity is gyrated by means of a gyrating arm 57 positioned in the path of the water being thrown upwardly and outwardly by the impeller.

The current for operation of the machine is received through a flexible twin conductor cord 59, one lead of which, indicated at 60, leads directly to the motor 33 and to the heating element 58, and the other lead of which, indicated at 61, leads to a double throw, double pole toggle switch 62. The switch 62 is normally open but, when moved upwardly, it closes the circuit to both the heating element 58 and the motor 33 and when moved downwardly closes the circuit to the motor 33 only. The switch 62 is operated from a control shaft 63 carrying a control handle 64 and a face cam 65. A connecting rod 66 is secured on a crank pin 67 on the cam 65 and extends to the handle of the switch 62 to operate the latter. Thus, when the control handle 64 is horizontal, the switch 62 is open. Movement of the handle upwardly or downwardly will operate the switch handle upwardly or downwardly.

The tub is drained through a drain sleeve 68 extending through one end and at the lowermost point thereof. A "butterfly" valve 69, of rubber molded about an inner metallic disc 84, is mounted in the drain sleeve 68 on a horizontal valve shaft 70. A valve spring 71 constantly tends to rotate the shaft 70 to urge the butterfly valve 69 to the open position.

The valve shaft 70 terminates in a crank 72 having a crank pin 73, against which, a rocking lever 74 engages. The lever 74 is pivoted intermediate its extremities on a bracket 75 and, at its upper extremity, it carries a cam follower 76 which engages one rising cam face on the face cam 65. Thus, as the control handle 64 is moved downwardly, the follower 76 will be forced outwardly by the cam face of the cam 65 causing the lower extremity of the rocking lever 74 to engage the crank pin 73 so as to rotate the valve shaft 70 to turn the butterfly drain valve 69 to the closed position.

The air intake valve 55 is operated from a rocker arm 78 which in turn is actuated by a lever 79 pivoted on a bracket 80 adjacent the cam 65. The lower extremity of the lever 79 carries a cam follower 81 which also rides against a second rising cam face on the cam 65. Thus, when the control handle 64 is raised, the cam engages the follower 81 to force the lower extremity of the lever 79 outwardly and the upper extremity inwardly, so as to exert a prying action on the rocker arm 78 to pull the air intake valve 55 from its seat. The valve is constantly urged toward its seat by means of a valve spring 82. The entire switch and cam mechanism is enclosed within, and is accessible by removing, the air riser 54. The latter is secured in place upon suitable threaded studs 83.

Normally, the cam disc strikes the followers 76 and 81 to prevent rotation of the shaft 70. The cam can be forced inwardly against the action of a cam spring 103 to release it for rotation.

The butterfly valve 69 is slidably mounted in a clip 85, which is secured on the shaft 70, by means of screws 86 which may travel in slotted openings 87 in the clip.

The water discharging from the sleeve 68 is received in a drain spout 88 which is hinged on suitable hinge pins 89 at each side of the drain sleeve 68. The spout seals by gravity, assisted by a pair of tension springs 91, against a sealing gasket 90 on the drain sleeve. The springs 91 are passed beneath the sleeve 68 and constantly draw the spout downwardly. The spout is raised by means of a striker arm 92 which strikes the upper edge of the housing 15 as the tub descends into the housing. The bottom of the striker arm is rounded so that it may slide freely over the edge of and within the housing 15.

Water is admitted to the tub through a supply hose 93, which may be detachably secured against the end of the tub in suitable hose clips 94. The hose terminates in a nozzle 95 which extends through the wall of the tub to the interior thereof thence outwardly into the drain sleeve 68. This particular placement of the nozzle serves to prevent hot water from directly striking the dishes and also serves to direct a stream outwardly through the drain sleeve and spout to cleanse them. The amount of water in the tub is determined by the position of an overflow elbow 101 which discharges into the drain sleeve 68 beyond the valve. This elbow also serves as a vent for the expanding air within the tub.

The top 96 serves as a lid for the tub and is hinged on hinge bolts 97 in brackets 98 projecting rearwardly from each side of one end of the tub. The weight of the lid is counter-balanced by means of counter-balance springs 99 which constantly act to urge connecting links 100 upwardly to support the weight of the lid.

It is believed that the use of the device is apparent from the above description. Briefly, the dishes are placed in suitable racks (not shown) in the tub 16, while the device is in its lowermost position where easy access may be had. Powdered soap or other cleansing agent may be placed in the tub. The top 96 is then closed and the device is wheeled to a kitchen sink, such as indicated at 102. It is then connected with a source of electricity which starts the motor 33. The operator then lowers the operating handle 50 causing the nut 28 to rotate and raise the entire tub to the position of Fig. 2, at which time the shifting channel 41 will release the friction mechanism.

The control handle 64 is now rotated downwardly to close the drain valve, the supply hose 93 is slipped over the hot water faucet and water is introduced into the tub to the pre-set level of the over-flow elbow 101. The water is then shut off and the motor continues to rotate the impeller to throw the water to wash the dishes.

The control handle 64 is now lifted to the neutral position which stops the motor and opens the drain valve 69 allowing the dirty water to flow into the sink. The handle is again depressed to close the drain and start the motor and clean hot water is introduced for rinsing. The rinse water is then discharged by moving the handle 64 to the neutral position.

The control handle 64 is now raised to its uppermost position to start both the motor and the heating element 58. This causes warm air to be

rapidly circulated through the dishes to dry them. The hose is now disconnected from the faucet and placed in the hose clips 94 on the tub. The operating handle 50 is now lifted to cause the tub to again descend into its housing. After a sufficient drying period the current is shut off and the motor and heating element cease to operate until again desired for use.

It will be noted that the control handle 64 is made sufficiently long to prevent it from entering the housing in its horizontal position but to allow it to enter in its raised or lowered positions. Therefore, the circuit to the motor is always closed, when the tub is down, through the switch 62 so that the motor is always ready to start whenever the current is supplied.

While a specific form of the improvement 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 is claimed and desired secured by Letters Patent is:

1. A dishwashing machine comprising: a dishwashing tub for receiving the dishes; an impeller in said tub for throwing water on said dishes; a motor operating said impeller; a supporting structure in which said tub is vertically movable; and means for employing the power of said motor when desired for raising said tub sufficiently in said supporting structure to allow it to drain by gravity into a sink of standard height.

2. In a dishwashing machine of the type having a dish receiving tub, a motor, and means operable by said motor for throwing water against the dishes in said tub, means for elevating said tub comprising: a supporting structure for supporting said tube above a floor; means for elevating said tub in said structure; and a clutch device for transmitting power from said motor to said last-named means when desired to operate the latter.

3. In a dishwashing machine of the type having a dish receiving tub; a motor; and means actuated by said motor for throwing water against the dishes in said tub, means for raising and lowering said tub comprising: a supporting structure; a vertically movable frame in said supporting structure supporting said tub; means for raising and lowering said frame in said structure to elevate said tub for gravity drainage purposes; and a reversible clutch device for transmitting power from said motor to said raising and lowering means.

4. In a dishwashing machine of the type having a dish receiving tub; a motor; and means operable by said motor for throwing water against the dishes in said tub, means for elevating said tub comprising: a supporting structure; a vertically movable frame in said supporting structure supporting said tub; vertical guide members in said supporting structure; means on said frame engaging said guide members to prevent tilting of the frame; a reversible power transmission device; and means for connecting said device with said motor when desired for raising said frame along said guide members so as to elevate said tub.

5. A dishwashing machine comprising: an outer housing; a vertically movable frame in said housing; a dishwashing tub supported from said frame; a blower housing below the bottom of said tub; a motor carried by said frame; a vertical shaft driven by said motor extending upwardly through said blower housing into said tub; a blower rotor mounted on said shaft within said

blower housing; an impeller mounted on said shaft within said tub; means for conducting the air from said blower housing into the upper part of said tub; elevating means for elevating said frame in said housing; and manually operated means for connecting said elevating means with said vertical shaft to actuate the former.

6. A dishwashing machine comprising: an outer housing; a vertically movable frame in said housing; a dishwashing tub supported from said frame; a blower housing below the bottom of said tub; a motor carried by said frame; a vertical shaft driven by said motor extending upwardly through said blower housing into said tub; a blower rotor mounted on said shaft within said blower housing; an impeller mounted on said shaft within said tub; means for conducting the air from said blower housing into the upper part of said tub; a vertical jack screw supported from said outer housing; a rotatable nut supported from said frame and being threaded on said jack screw; and manually controlled transmission means for transmitting power from said vertical shaft to rotate said nut in either desired direction for varying the elevation of said tub.

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