Dec. 31, 1929. F. A. WALKER 1,741,173

MECHANICAL DISHWASHER

Filed July 14, 1926

FIG. 1.

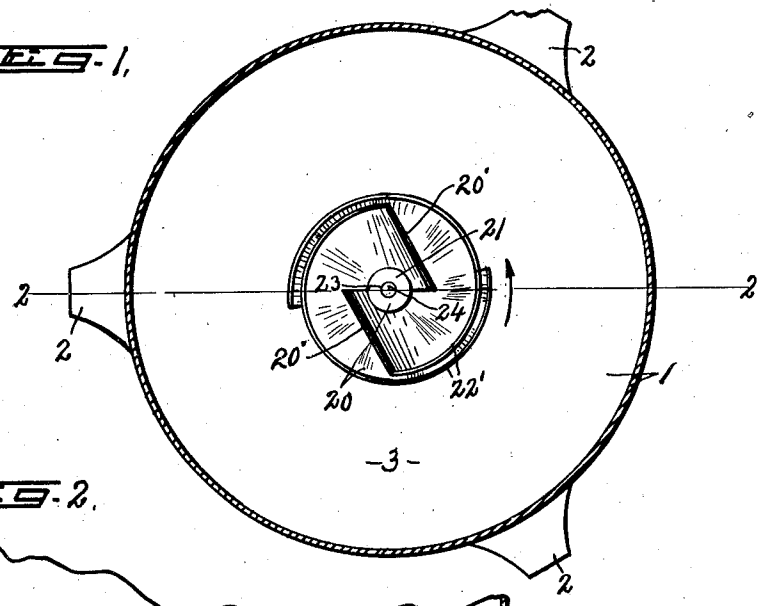


FIG. 2.

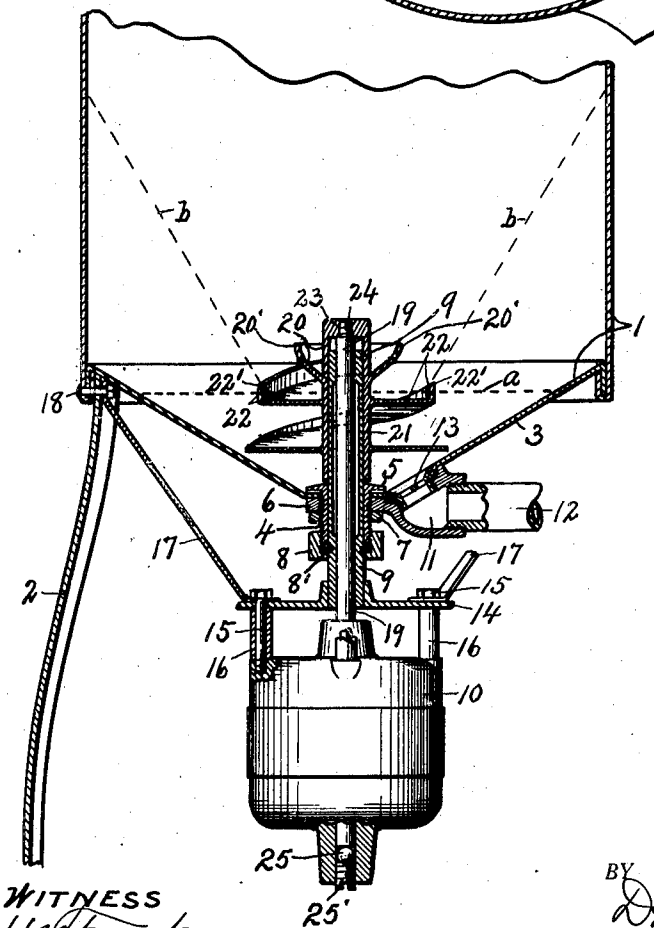
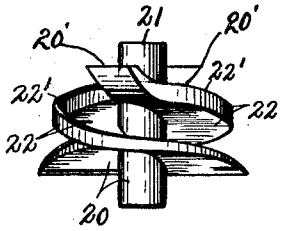


FIG. 3.



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UNITED STATES PATENT OFFICE

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MECHANICAL DISHWASHER

Application filed July 14, 1926. Serial No. 122,277.

This invention relates to a mechanical dish washer of the class commonly known as the Walker dishwasher in which a limited quantity of the washing fluid in the bottom of the vat is regulated by an overflow is impelled upwardly and centrifugally with a whirling motion by means of a motor driven rotary impeller, the water being brought into contact with the dishes in a superimposed open-work tray or basket.

In dishwashers of this type the bottom of the vat is preferably made in the form of a hopper or inverted cone and the level of the amount of the washing fluid is limited by the overflow to a level between the apex and top of the conical bottom, the object of which is three-fold, viz, first, to conserve the water, second, to prevent overload upon the impeller and its actuating motor, third, to enable practically the entire body of water to be displaced upwardly by a centrifugal force due to the rotation of the impeller and to continually maintain this upward displacement with a whirling motion as the fluid falls back into the conical bottom thereby establishing a continuous impact of the washing fluid against the dishes in at least three directions, upwardly, downwardly and circumferentially.

Under these conditions the dishes are thoroughly and expeditiously cleansed with a minimum consumption of water and power and after drawing off the washing fluid a clean rinsing fluid may be introduced and acted upon by the impeller in the same manner as the washing fluid for rinsing the dishes which after stopping the motor and impeller driven thereby may be allowed to drain and dry in the baskets before removal from the vat.

The basket or baskets with the cleansed and dried dishes therein may then be removed by hand to any desirable locality for storing.

The main object of the present invention is to construct the impeller in such manner as to increase the rapidity of upward displacement and whirling motion of the water with less power than has heretofore been practised and thereby to greatly expedite the thorough washing and cleansing of the dishes in the basket or baskets and incidentally to increase the output of the work.

Other objects and uses relating to specific parts of the machine will be brought out in the following description.

In the drawings:—

Figure 1 is a horizontal sectional view of the vat showing the impeller in top plan.

Figure 2 is a vertical sectional view of the same taken in the plane of line 2—2, Figure 1, the upper portion of the vat being broken away.

Figure 3 is a side elevation of the detached impeller.

As illustrated, the machine comprises a vat —1— mounted upon suitable supporting legs —2— and provided with a bottom hopper —3— in the form of an inverted cone having its upper marginal edge returned downwardly and secured to the inner walls of the lower end of the vat —1— by any suitable fastening means to form a watertight joint therewith.

The apex of the conical bottom —3— is co-axial with the axis of the vat and provided with a central opening for receiving an externally threaded bushing —4— having a flange —5— adapted to engage the upper face of the apex of the bottom —3— around the central opening to form a watertight joint therewith, said vat being preferably made of non-corrodable sheet metal.

The bushing —4— extends some distance below the apex of the bottom —3— for receiving a cast metal section —6— and clamping nut —7— and also serves to receive a coupling member —8— and a post —9— for supporting an electric motor as —10— in a manner presently described.

The hub of the cast metal section —6— is applied to the under side of the apex of the conical bottom —3— and is secured in place by the nut —7— engaging the externally threaded portion of the bushing —4—, Figure 2.

The conical bottom —3— is also provided near its apex with an outlet opening just at one side of the flange —5— of the bushing —4—, the walls of the oulet opening be-

ing pressed downwardly into registering opening in the adjacent portion of the section —6— which is extended laterally from the bushing and is provided with an outlet —11— communicating with a drainage pipe —12—.

A suitable screen —13— is secured in the outlet in the conical bottom —3— to protect the outlet —11— against being clogged by insoluble matter.

The post —9— extends through the tubular bushing —4— and some distance beyond the lower and upper ends thereof and is clamped to said bushing against relative rotation by means of the coupling —8— and packing —8'— which latter is seated in an annular groove in the periphery of the post —9— and in addition to supporting the post against vertical movement relatively to said bushing also forms a water-tight joint with the bushing.

A cross bar or plate —14— is secured by brazing or otherwise to the lower end of the post —9— and is clamped to the upper end of the motor —10— by means of bolts —15— and spacing members —16— for supporting the motor endwise vertically with the axis of its armature shaft co-axial with the axis of the vat.

The pate —14— and motor —10— are placed against lateral vibration by braces —17— having their lower ends secured by the bolts —15— to the plate —14— and their upper ends together with the upper ends of the legs —2— firmly secured to the marginal rim of the bottom —3— and lower end of the vat —1— by bolts —18— which also clamp the rim of the bottom —3— to the lower ends of the side walls of the vat as shown in Figure 2.

The upper end of the post —9— extends above the upper end of the conical bottom —3— of the vat and therefore above the normal water level as —*a*— and serves as a journal bearing for the armature shaft —19— of the motor —10—.

That is the motor shaft extends vertically entirely through and above the tubular post —9— so-axial with the axis of the vat —1— and has its upper end reduced and threaded for receiving and supporting an impeller —20—.

This impeller comprises a central vertically elongated hub —21— and spiral blades —22— rigidly secured to the hub in vertically spaced relation.

The tubular hub —21— extends from the upper end of the bushing —4— above the post —9— and is provided at its upper end with a threaded aperture —23— engaging the reduced threaded upper end as —24— of the motor shaft —19— in such manner as to tighten upon the shaft and the resistance of the water against the blades —22— when the shaft with the impeller thereon is rotated.

The interior diameter of the hub —21— is about the same as the external diameter of the post —9— with just sufficient clearance to allow the impeller to rotate freely relatively to the post, said hub being extended some distance above and below the normal water level —*a*— and when secured upon the upper end of the shaft —19— forms a substantially water-tight joint with the post to reduce the liability of leakage of the washing fluid downwardly along the shaft and through the post.

In the present machine two of the blades —22— are employed on the hub of the sleeve —21— and each blade extends spirally around the sleeve to incline from the top downwardly and circumferentially in the direction of rotation of the motor shaft and impeller carried thereby.

The bottoms of the blades —22— are substantially flat radially while the marginal edges thereof are substantially cylindrical and are provided with upturned flanges —22'— extending from end to end thereof but gradually reduced in vertical depth at their ends.

The object in making the bottoms of the blades substantially flat radially and spirally inclined upwardly from their lower ends is to gradually lift the washing fluid as the impeller is rotated with a minimum resistance of the water while the flanges —22'— serve to resist the centrifugal displacement of the water from the bottoms of the blades and also to deflect the water upwardly due to its centrifugal motion.

In other words, the bottoms of the blades constitute circular inclined planes which are disposed circumferentially at relatively sharp acute angles to a horizontal plane passing through said particular portion thereof so as to effect a gradual but positive lifting of the water from the bottom of the vat upwardly and against any dishes which may be supported in open-work trays some distance above the impeller, the dishes and support therefor being omitted.

The securement of the impeller —20— directly to the motor shaft —16— assures the rotation of the impeller at the same rate of speed as the motor shaft which speed is sufficient to cause the impeller blades to displace the water from the conical bottom of the vat upwardly and circumferentially with a whirling motion tending to draw the entire body of water from the center toward the periphery of the vat but owing to the circumferential flanges —22'— upon and around the marginal edges of the bottoms of the blades this centrifugal motion directly from the bottoms of the blades is rotated by the flanges —22— against which the water is thrown by centrifugal force and by which it is deflected upwardly and laterally in the form of an inverted cone, the outlines of which are indicated by dotted lines —*b*—, Figure 2, so that

the upward displacement of practically the entire body of the water previously within the bottom of the vat will be whirled within the cones outlined by the lines —*b*— so that by placing the dish supporting baskets within the whirling body of water and arranging the dishes so that the centrifugal motion of the water will impinge against the dishes with a glancing impact and thereby produce a rapid and thorough cleansing of the dishes.

The upper ends of each blade —20— are given a sharp turn upwardly at —20′— to impart to the water which may follow along the bottoms of the plates a more direct vertical movement as it leaves the impeller blades thereby assisting in distributing the upward whirling motion of the water throughout the interior area of the vat from the bottom to the top thereof.

As the water falls back into the bottom of the vat it is immediately picked up and thrown upwardly again by the impeller, this operation being practically continuous to produce the three motions of the water previously mentioned, namely the upward motion, the downward motion and the circular centrifugal motion, all of which contributes to the expeditious and thorough cleansing of the dishes with a minimum amount of water and a relatively small consumption of the current for the motor.

The lower end of the motor shaft is stepped upon a ball-bearing —25— in the lower end of the motor case to take the downward thrust of said shaft due to the lifting load upon the impeller, said ball-bearing being adjustable by a screw —25′— to take up wear.

What I claim is:—

1. In a mechanical dishwasher, an impeller having spiral blades extending laterally from the periphery thereof and having their outer marginal edges provided with upturned flanges, the upper ends of said blades being deflected upwardly at a greater inclination from a horizontal than the remaining portions of the blades.

2. In a mechanical dishwasher of the character described, a vat having an inverted conical bottom provided with a tubular post extended upwardly from the apex thereof, a shaft extending from the underside upwardly through and above the post, means for rotating the shaft, an impeller having a hub surrounding the post and having its upper end secured to the shaft above the post, said hub being provided with a spiral blade extending from a level some distance below the top of the post to a level some distance above the top of the post, said blade being gradually reduced in radial width from bottom to top.

3. In a mechanical dishwasher of the character described, a receptacle for the dishes and washing fluid having an opening centrally in the bottom thereof, a tubular post secured in said opening and extending some distance above the bottom of the receptacle, a shaft extending from the underside upwardly through and above the tubular post, means for rotating the shaft, and an impeller secured to the upper end of the shaft above the post and provided with a spiral blade extending some distance above and below the upper end of the post and gradually reduced in radial width from its lower end to its upper end.

4. In a mechanical dishwasher of the character described, a receptacle for the dishes and washing fluid having an inverted conical bottom provided with an opening in the apex thereof, a tubular post secured in said opening and extended upwardly some distance above said apex, a shaft extending from the underside upwardly through and above the post, means for rotating the shaft, and an impeller having a hub surrounding the post and extended some distance below and above the top of the post and having its upper end secured to the shaft, said hub being provided with a plurality of spiral blades projecting from the periphery thereof and gradually reducing in radial width from their lower ends to their upper ends.

In witness whereof I have hereunto set my hand this 26th day of June, 1926.

FORREST A. WALKER.