Nov. 14, 1933. J. W. DIES 1,934,916

DISHWASHING MACHINE

Filed Jan. 22, 1931 2 Sheets-Sheet 1

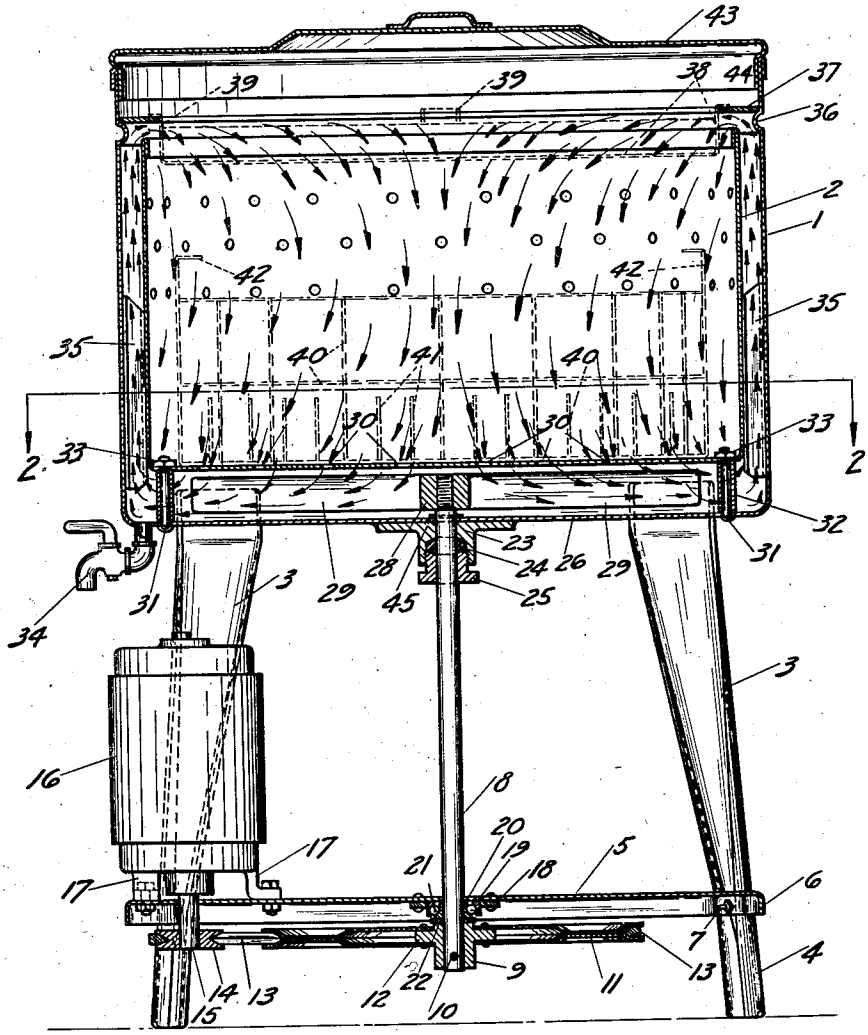


FIG-1



FIG-6

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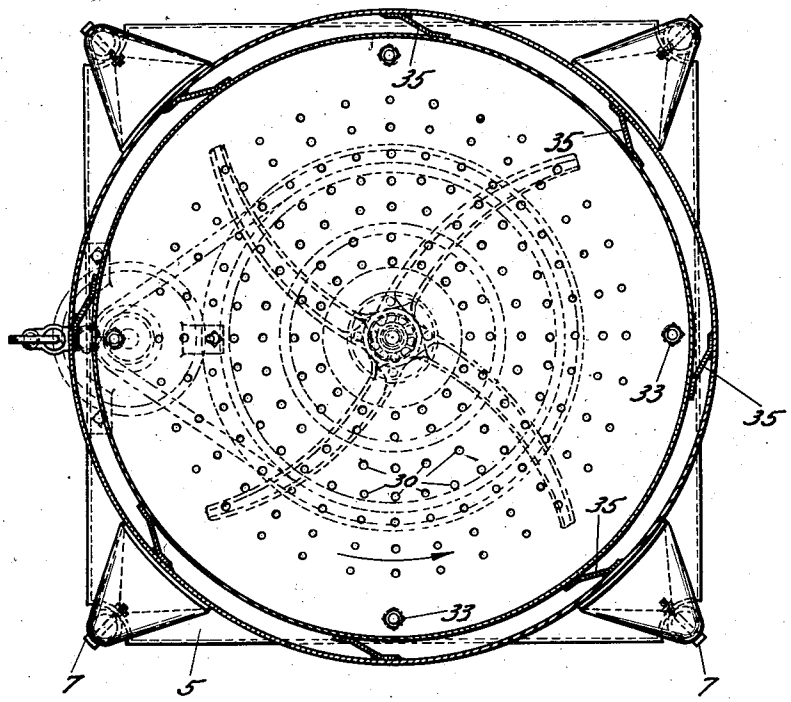


FIG-2

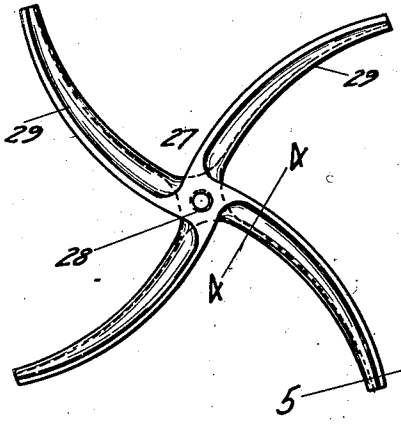


FIG 3



FIG-4



FIG-5

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Patented Nov. 14, 1933 1,934,916

UNITED STATES PATENT OFFICE

1,934,916

DISHWASHING MACHINE

James Wesley Dies, Cedar Rapids, Iowa, assignor, by mesne assignments, to Modern Maid Company, Fairfield, Iowa, a corporation of Delaware

Application January 22, 1931. Serial No. 510,474

4 Claims. (Cl. 141—9)

The present invention relates to a dish washing machine for actuation by a motor and comprises among its objects the provision of a simple machine which is inexpensive and yet has sufficient capacity for the handling of a large number of dishes in a short time, as well as the handling of the dishes for a single family; the provision of effective means for washing all tableware, including chinaware, glasses and silverware; the provision of an apparatus which will deliver the washing water in large volume and with considerable velocity against the dishes being washed; the provision of an apparatus which can be easily disassembled and reassembled for cleaning, when the same is necessary; and such further objects, advantages and capabilities as will hereafter appear and as are inherent in the construction disclosed herein. My invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying drawings and, while I have shown therein what is now considered the preferred embodiment of this invention, I desire the same to be understood as illustrative only and not to be interpreted in a limiting sense.

In the drawings annexed hereto and forming a part hereof, Fig. 1 is a vertical, substantially central section through a machine embodying my present improvement; Fig. 2 is a horizontal section substantially along the plane indicated by the line 2—2, Fig. 1; Fig. 3 is a plan view of an impeller used in my machine for giving the requisite velocity to the wash water; Fig. 4 is a transverse section through one of the arms of the impeller substantially along the plane indicated by the line 4—4, Fig. 3; Fig. 5 is a similar section substantially along the plane indicated by the line 5—5, Fig. 3; Fig. 6 is a perspective view of one of the vanes located between the inner and outer tubs as shown in Fig. 2.

Reference will now be made in greater detail to the annexed drawings wherein like reference numerals designate like parts in all of the figures. The outer tub is designated by the numeral 1, the inner tub by the numeral 2, and the supporting legs therefor by the numeral 3. These legs are secured to the lower part of the outer tub by any suitable means, such as spot welding or brazing. It will be apparent from Figs. 1 and 2 that the upper portion of each of these legs spreads outwardly and that the edges thereof are curled inwardly toward the bottom to form a bottom tubular portion 4. This can either be left in the form illustrated in Fig. 1 or each of the legs may have a caster mounted therein in order to make it easier to move the machine from place to place. Near the bottom of the legs is located a plate 5 which has a flange 6 turned downwardly around the edge thereof and this plate is secured to the legs 3 by suitable means, shown as bolts 7. This plate is substantially centrally apertured for the passage of the shaft 8 having a hub 9 secured adjacent its lower end. In Fig. 1 the hub 9 and shaft 8 are shown as secured together by means of a pin 10. A belt wheel 11 is shown as secured to a flange 12 projecting laterally from the hub 9. This belt wheel has its edge grooved for the reception of a driving belt 13 which passes around a pulley 14 secured adjacent the end of motor shaft 15 of the motor 16. This motor is provided with legs 17 by means of which it is mounted on the plate 5. A ring 18, surrounding the opening in plate 5, is secured to said plate and serves to give lateral support to a bearing ring 19. A bearing ring 20 mounted on the shaft 8 cooperates with ring 19 and balls 21 in forming a friction-reducing bearing for the shaft. Between the ring 20 and the hub 9 is a washer 22 which serves as an end-thrust bearing between the hub 9 and ring 20. The need for this will be brought out hereinafter in connection with the description of the impeller and its operation.

A combined packing and bearing comprising the parts 23, 24 and 25 surrounds the upper portion of the shaft 8 and is secured to the under side of the bottom 26 of the outer tub. By tightening the nut 25 and compressing the packing material 24 about the shaft 8 leakage of water through this bearing is prevented. An impeller for the wash water is illustrated in detail in Figs. 3, 4 and 5. This impeller comprises a central body member 28 which is centrally apertured and screw threaded for attachment to the upper end of the shaft 8. From this central body portion 28 extend the arms 29 which are curved in a direction receding away from the direction of rotation of the impeller. In other words, the outer extremities of the arms 29 lag considerably behind a tangent to the curve of the arms at their inner end. This forces the water laterally against the vertical wall of the tub with considerable force. These arms have their faces inclined laterally to a plane parallel to the axis of the shaft. Consequently, the upper edge of each of the arms extends considerably forwardly from the location of the lower edge of such arm. As a result of this, the water is sucked downwardly through the perforations 30 in the bottom of the inner tub. The result of this is that a strong

circulation of water is maintained, the same passing downwardly through the bottom of the inner tub, laterally to the vertical wall of the outer tub and upwardly along this to the top thereof. Before leaving the impeller attention is called to the fact that the arms thereof have a greater inclination at their inner portions than at their outer portions as indicated in Figs. 4 and 5. The reason for this is that there must be strong suction at the central part of the tub, while such strong suction is not needed toward the outer portion thereof. However, a greater lateral driving force is needed near the outer ends of these arms and, for this reason, the outer portions thereof stand more nearly vertical than the inner portions.

Bolts or studs 31 are secured to the bottom 26 of the outer tub by brazing or soldering, and rise some distance from said bottom. These bolts or studs are surrounded by spacing sleeves 32 which serve to space the bottom of the inner tub from that of the outer tub. The bolts or studs 31 pass through openings in the bottom of this inner tub and have nuts 33 thereon for detachably securing the inner tub in place. Therefore, if it is desired, for any reason, to remove the inner tub, as for cleaning purposes, the nuts 33 can be removed and the inner tub lifted out. Perhaps it should be stated that it is preferred to make the direction of the thread connecting the shaft 8 and the impeller 27 of such a direction that the normal rotation of the shaft by the motor tends to screw the shaft into the impeller. This prevents any tendency toward unscrewing the impeller from the shaft during the normal operation of the machine. While the faucet 34 for draining the wash water from the tub is illustrated as being attached to the tub directly over the motor 16, this faucet will preferably be attached at some other point so that there will be no danger of spilling wash water on the motor when withdrawing same from the tub.

A plurality of fins or blades 35 are spaced around between the inner and outer tubs and such blades are secured to the latter, though substantially the same result may be attained by securing these to the outside of the inner tub. These blades 35 as illustrated in Fig. 6 are shown in elevation in Fig. 1 and in horizontal section in Fig. 2. As I have constructed this machine, I have these blades secured to the inside of the outer tub with their inner portions substantially in contact with the outer surface of the inner tub. The water being propelled outwardly by the impeller 27 has a tendency toward a rotary motion in the same direction as the impeller. However, the rotary motion is broken up by these blades 35 against which the water strikes and along which it passes upwardly in a vertical direction to the top of the inner tub, as illustrated in Fig. 1. Only the upper portion of the upright wall of the inner tub is perforated and the number of perforations therein is insufficient to detract greatly from the volume of water being forced upwardly by the impeller. The lower portion of this upright wall of the inner tub is entirely imperforate so that there will be no cross currents of water in the lower part of this tub, all of the water travelling in a generally downward direction as illustrated by the arrows in Fig. 1. It is preferred to have the blades or vanes 35 extend only approximately half way up the walls of the tubs.

A bead 36 is formed in the wall of the outer tub 1 at substantially the top of the inner tub 2. This bead serves the dual purpose of directing the water inwardly over the top of the inner tub and of furnishing a support for the horizontally arranged flat ring 37. This ring has two purposes, the major one being to direct the water inwardly toward the center of the washing machine to strike the dishes placed therein and the secondary purpose is to support a tray 38 which is provided with arms 39 by means of which it may be suspended from the ring 37. The function of this tray or basket is to support the silverware above the tops of the plates and other dishes which may be placed in the tray 40. This dish tray 40 comprises a bottom, a lateral wall, and supporting brackets 41 for supporting the dishes in upright position, and is provided with handles 42 whereby it may be lifted out of the machine. A cover 43 is provided which has a downwardly extending flange 44 which fits inside of the outer tub wall to prevent water from running down the outside of the tub. This cover has no further function than to retain heat within the washing machine, if the machine is being used without the silverware tray. However, if the silverware tray 38 is being used and has a quantity of silver therein, it is found that the water has a tendency to splash out of the washing machine on account of the high velocity at which the same is delivered.

While the ring 37 may be secured in place in the tub 1 by soldering, brazing, or the like, if desired, I prefer to make the same of such a size that it can be shoved into the tub when being put in place but will fit the tub tightly enough so that the upward force of the water will not cause detachment thereof. However, when it is desired to remove the inner tub 2, the ring 37 may be slipped out of the tub 1 and it will then be possible to lift the tub 2 out after the nuts 33 have been removed. Replacement of the parts is just the reverse of this and it is just as easy. Attention is called to the fact that the inclination of the driving faces of the impeller blades causes a lifting force to be exerted on the impeller so that the shaft 8 is drawn upwardly thereby. This is what necessitates the provision of the thrust washer 22. Spacing washer 45 surrounds the shaft 8 and supports the impeller out of contact with the tub bottom during starting and stopping of the machine, thus preventing wear on the tub bottom and the impeller blades. It will of course be understood that the structure disclosed herein may be departed from without departing from the spirit of the invention as set forth in the appended claims.

Having now described my invention, I claim:

1. A dish washing machine comprising inner and outer tubs having their walls spaced from each other, means for maintaining the walls in spaced relation rigidly with respect to each other, said means comprising bolts secured to the bottom of the outer tub and passing through openings in the bottom of the inner tub, sleeves surrounding the bolts, resting on the bottom of the outer tub and having the inner tub resting thereon, and securing means to fasten the inner tub in place upon the bolts and sleeves, the bottom of the inner tub being perforate for the passage of water therethrough, and rotary impeller means between the bottoms of the tubs to draw water through the bottom of the inner tub and force it upwardly between the lateral walls of said tubs.

2. A dish washer having in combination a pair of tubs, one within the other and spaced apart, an impeller between the bottoms of said tubs and

out of contact with both of them, means for rotating said impeller, the arms of the impeller inclining backwardly from the top toward the bottom in a direction away from the direction of rotation of the impeller, the angle of inclination of the faces of the impeller arms with respect to a horizontal plane increasing from the inner portions of the arms toward the outer extremities thereof, and the bottom of the inner container being perforated.

3. A structure of the character described having a pair of tubs, one within the other, the inner tub being removable from the outer one, a basket within the lower part of the inner tub to contain dishes to be washed, a basket within the upper part of said inner tub to support silverware to be washed, the outer tub having an inwardly projecting bead adjacent its top, a ring resting on said bead upon which the upper basket is suspended, the ring projecting inwardly at least to the inner face of the inner tub to direct water upon the dishes, said ring being removable to permit removal of the inner tub, and means for causing water in said outer tub to move upwardly between said tubs to said ring.

4. A dish washing machine having in combination an outer water-confining and an inner removable tableware holding tub, the inner tub cooperating with the outer tub in confining and directing water, said inner tub having a perforated bottom and its top below the top of the outer tub, the outer tub having a bead formed in its lateral wall at about the elevation of the top of the inner tub, an inwardly extending ring resting on said bead, spaced upwardly from the inner tub, extending inwardly past the wall of the inner tub, and directing inwardly toward the center of the tubs any water rising between the tubs and above the top of the inner tub, said ring being free from attachment to the tubs so that it may be readily removed, and means between the tubs for compelling the rising water to travel in a substantially vertical path, said means comprising strips of metal secured to one of the adjacent faces of the two tubs and extending approximately tangentially to the lateral wall of the inner tub and substantially into contact with the tub to which it is not secured.

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