Feb. 28, 1928. 1,660,345

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WASHING MACHINE

Filed April 7, 1921

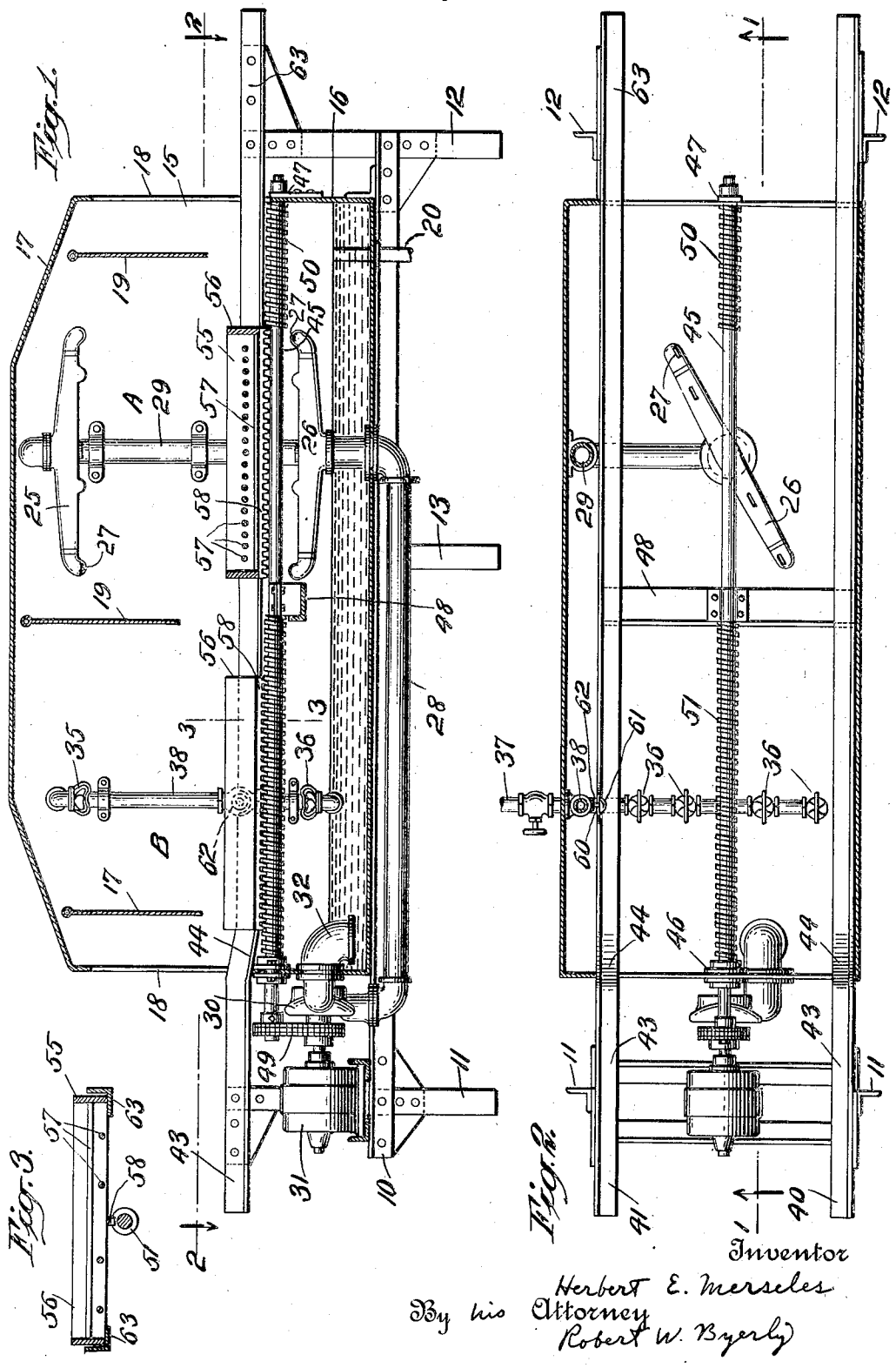


Fig. 1.

Fig. 2.

Fig. 3.

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Patented Feb. 28, 1928. 1,660,345

UNITED STATES PATENT OFFICE.

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WASHING MACHINE.

Application filed April 7, 1921. Serial No. 459,299.

This invention relates to washing machines and has for an object to make the operation of a machine of this class automatic so that it may be rapidly, efficiently and economically used by unskilled attendants.

In carrying out the invention the washing machine is provided with an interrupted conveyer which is arranged to move the articles to be washed into washing position, and, after permitting them to remain there for an indefinite period, to move them forward through, and out of, the machine.

While the invention is susceptible to numerous other applications, it is of particular advantage when applied to the type of dish washing machine in which the articles are cleansed by the impact of a washing liquid which is used over and over again and thereafter rinsed by a clean liquid which is used only once. When applied to a washing machine of this character the invention comprises a conveyer which moves the carriers in which the dishes, or other articles, are placed to the point at which the washing operation takes place and permits them to remain there for an indefinite period. When the carrier is forced out of the washing position by the action of the conveyer upon a carrier subsequently placed in the machine the first carrier is picked up by the conveyer, carried through the position where the rinsing takes place and out of the machine. The supply of the rinsing liquid is automatically controlled by the position of the carrier so that it is turned on only while a carrier is passing through the position where the rinse is applied to the articles in it.

Before pointing out other objects and advantages of the invention, I will describe in detail the dish washing machine embodying the invention which is illustrated in the accompanying drawings, in which

Fig. 1 is a sectional elevation of the machine taken upon the line 1—1 of Fig. 2 showing two dish carriers in the machine, one of which is shown in section;

Fig. 2 is a plan view of the machine illustrated upon the line 2—2 of Fig. 1; and

Fig. 3 is a transverse section upon the line 3—3 of Fig. 1 showing one of the dish carriers and the rails and screw of the conveyer.

The frame of the machine illustrated comprises longitudinal beams 10 supported by two pairs of end legs 11, 12 and a pair of intermediate legs 13. The body 15 of the machine which may conveniently be constructed of sheet metal forms a tank 16 which rests upon the beams 10 and a hood 17 above the tank. The tank 16 is provided with an overflow pipe 20. The hood 17 is in the form of a tunnel having a large aperture 18 at each end to permit access to the interior of the hood and tank. Within the hood 17 are suspended three curtains 19 which form in the hood the washing chamber A and the rinsing chamber B.

While the particular form of apparatus which may be used to effect the washing in the chamber A is immaterial so far as the present invention is concerned, a convenient form of washing apparatus is illustrated in the drawing. It consists of an upper revolving spray arm 25 and a lower revolving spray arm 26. Each of the spray arms 25, 26 is provided with nozzles 27 which are inclined in such a way that the reaction of the liquid forced out through them causes the spray arms to rotate. The washing liquid which fills the tank 16 to the level indicated in Fig. 1 is forced into the revolving spray arms 25, 26 through the pipes 28, 29 by a rotary pump 30 driven by a motor 31. It is apparent that the liquid which is emitted by the nozzles 27 of the spray arms 25, 26 will fall into the tank 16 whence it will be sucked up by the intake pipe 32 of the pump 30 and forced again through the spray arms.

In the rinsing chamber B are a set of upper spray nozzles 35 and a set of lower spray nozzles 36 which are supplied with clean hot water through the pipe 37. The admission of water to the sprays from the pipe 37 is controlled by a whistle valve 38, the operation of which is hereinafter described.

The means for supporting the carriers in which the articles to be washed are carried through the machine comprise two rails 40, 41 which may conveniently consist of angle irons attached to the upper ends of the end legs 11, 12. The rails 40, 41 extend through the hood 17 and project at each end of it. In the form shown, the portion 43 of the

rails projecting at the discharge end of the machine is at a slightly higher level than the rest of the rails and connected therewith by an inclined portion 44.

An interrupted conveyer is provided for moving the carriers for articles to be washed along the rails 40, 41. This conveyer comprises a shaft 45 extending the entire length of the tank 16 just below the level of the rails 40, 41 and journalled in the ends of the tank at 46, 47 and upon a cross-bar 48 at the middle of the tank. The shaft 45 is continuously rotated by the motor 31 which drives the pump 30 by a friction drive connection which, in the form shown, consists of a belt 49 passing over a pulley upon the shaft 45 and a pulley upon the motor shaft. A worm or screw 50 is formed upon the portion of the shaft 45 which lies in the washing chamber A near the intake end of that chamber. A similar worm or screw 51 is formed on the portion of the shaft which extends through the rinsing chamber B.

The carriers 55 for the dishes or other articles to be washed may conveniently be made in the form of shallow receptacles comprising wooden frames 56 provided with transverse rods 57 for the support of the articles placed in them. The width of the carriers 55 is such that they may be seated across the rails 40, 41 as shown in Fig. 3. Just sufficient clearance is allowed between the sides of the carriers and the vertical portions of the rails to permit the carriers to slide upon the rails. Each carrier is provided with a rack 58 which extends longitudinally of the carrier along the middle of its bottom surface. The teeth of the racks 58 are spaced and inclined so as to engage the threads of the worms 50, 51. The length of each rack 58 is less than the distance between the worm 50 and the worm 51.

Controlling means for the valve 38 are so located as to be actuated by the carriers when passing through the rinsing chamber. In the form illustrated in the drawings, such controlling means comprise a controlling plunger 60 extending from the whistle valve 38 and a cam 61 at the outer end of the plunger. When the valve is closed this cam projects through a cut 62 in the vertical portion of the rail 41 into the position indicated in Fig. 2. The plunger is normally held in this position by a spring not shown in the drawings.

The operation of the machine described is as follows:—The tank 16 is filled with soapy water to the level indicated in Fig. 1, and the pipe 37 is connected with a source of clean hot water. The motor 31 is then placed in operation. The motor drives the pump 30 which continuously draws the soapy water in the tank up through the pipe 32 and projects it through the spray arms 25, 26. The motor also causes the shaft 45 to rotate continuously. A carrier 55 containing articles to be washed is then placed upon the portion 63 of the rails 40, 41 which projects at the intake end of the machine and pushed forward until the front end of its rack 58 is engaged by the worm 50. The carrier is then moved forward by the worm 50 until it reaches the washing position between the spray arms 25 and 26. At this point the rear end of the rack 58 runs off the worm 50 so that the carrier remains between the spray arms and the articles in it are subjected to the impact of the water which is constantly forced through the nozzles of the spray arms. Meanwhile another carrier is being filled with articles by the attendant, and as soon as the second carrier has been filled it is placed upon the portion 63 of the rails and pushed in so that its rack is engeged by the worm 50 and carried forward into the machine by the worm. Its front end engages the rear end of the first carrier and pushes that carrier forward until the front end of the rack of the first carrier is engaged by the worm 51. The first carrier is then carried forward by the worm 51, while the second carrier is moved forward by the worm 5 until it reaches the washing position where it remains until a third carrier has been filled and inserted in the machine. Meanwhile the first carrier is carried through the rinsing chamber B by the worm 51. In this movement, the side of the carrier is brought into engagement with the cam 61 of the plunger 60 and forces the plunger inwardly, opening the valve 38 so that hot water enters through the pipe 37 and is projected upon the articles in the carrier through the sprays 35, 36. The rinse continues until the rear end of the carrier has passed by the cam 61 when the plunger 60 reassumes the position shown in Fig. 2 and automatically cuts off the rinsing water. The first carrier is continuously carried forward by the worm 51 and is moved up the incline 44 to the discharge portion 43 of the rails 40, 41. When it reaches this position its rack 58 is disengaged from the worm 51 and the carrier remains stationary upon the portion 43 of the rails. From this position it is removed and after it has been emptied of the washed articles and refilled with articles to be washed it is placed again upon the portion 63 of the rails and pushed into the machine.

The many advantages secured by the invention are apparent from the above description. A thorough cleansing is secured as each carrier remains in washing position for the greatest length of time possible without delaying the operation of the machine, that is to say, each carrier is allowed to remain in washing position during the entire time which must necessarily be consumed in filling the next carrier with soiled dishes or other articles. The rinsing is secured with

the greatest possible economy in fresh water as each carrier is moved through the rinsing chamber without a pause, and the rinsing water is turned on only during the time when the carrier is between the rinsing sprays. The machine does not require the employment of skilled operators as the work of the attendants is confined to filling and emptying the carriers, and they are not required to exercise any supervision or control of the movement of the carriers, the washing, or the rinsing. Dishes, or other fragile articles, may be washed in the machine without danger of breakage because of the steady movement given to the carriers by the worm conveyer. If because of an accident any carrier becomes jammed in the rails, the friction drive of the conveyer slips so that no injury to the machine or the articles results.

The use of the machine described is not limited to the washing of dishes or other food receptacles. It may be used for washing articles of any sort, and the liquids used in the machine may be varied to suit the particular article operated upon. Thus, the machine may, for example, be used for cleaning metal parts with dilute acid, or other cleaning agent.

Many modifications may be made in the specific washing machine described without departing from the scope of the invention. It is evident that should it be desired to provide for a plurality of washings or rinsings of the articles carried through the machine, or to subject the articles to an additional operation the conveyer may be extended so as to move the carriers into any desired number of different operative positions and may be interrupted so as to permit each carrier to remain for an indefinite period in each of the operative positions.

Furthermore, the use of the invention is by no means confined to the particular type of washing machine in connection with which it has been illustrated and described, nor to the particular form of conveyer shown in the drawings. It is not essential that the operative or engaging portions of the conveyer be mounted upon the same shaft nor that they be driven by the same means, and the term "interrupted conveyer" used in the claims which follow should be understood not to import either of these limitations. While, for reasons above pointed out, the use of a screw conveyer has been found to possess peculiar advantages, the invention may be carried out by the use of other types of continuously moving conveyers. While the entire apparatus described forms a unitary automatic washing machine, it is apparent that various features of the invention may advantageously be used independently of the others.

What is claimed is:

1. In a washing machine having washing and rinsing apparatus, the combination of rails extending through the machine, carriers for the articles to be washed adapted to slide upon said rails, and an interrupted screw conveyer extending through the machine in the same direction as the rails and having a threaded portion adapted to engage successive carriers and move them into washing position and release them there and a spaced threaded portion adapted to engage each carrier when pushed out of washing position by the succeeding carrier and to move it to rinsing position.

2. In a washing machine having washing and rinsing apparatus, the combination of a valve controlling the admission of water to the rinsing apparatus, rails extending through the machine, carriers for the articles to be washed adapted to slide upon said rails, an interrupted screw conveyer extending through the machine in the same direction as the rails and having a threaded portion adapted to engage successive carriers and move them into washing position and release them there and a spaced threaded portion adapted to engage each carrier when pushed out of washing position by the succeeding carrier and to move it to rinsing position, and controlling means for said valve normally projecting between the portion of said rails in the rinsing position of the machine and adapted to be actuated by contact with each carrier when moved into rinsing position to open said valve.

3. In a washing machine, the combination with washing apparatus, of a plurality of carriers for the articles to be washed, each provided with a longitudinal rack, and an interrupted continuously moving screw conveyer having a threaded portion extending to one side of the washing apparatus and a spaced threaded portion extending from the other side of the washing apparatus, the distance between said threaded portions being greater than the length of the racks of the carriers.

4. In a washing machine, the combination with washing apparatus, of a plurality of carriers for the articles to be washed, a pair of parallel longitudinal rails adapted to support the carriers and guide them to the washing apparatus, a screw conveyer located between said rails with its axis parallel to the rails, and a longitudinal rack projecting from the bottom of each receptacle, extending parallel to the sides of the receptacle, and having teeth adapted to engage the screw conveyer.

5. In combination with a machine adapted to operate upon objects placed in a certain position in it, an interrupted worm conveyer having a threaded portion arranged to engage successive objects, carry them into operative position and release them there,

and a spaced threaded portion adapted to engage each object when pushed out of operative position by the succeeding object and move it forward.

6. In a machine, the combination of a plurality of carriers each provided with a longitudinal rack, and a screw conveyer having threaded portions each adapted to engage the racks of the carriers and separated by a distance greater than the length of the racks.

7. In a machine, a combination of a plurality of carriers each provided with a longitudinal toothed rack, and a continuously moving interrupted conveyer having a plurality of portions each adapted to engage the teeth of the racks of said carriers and move the carriers forward, successive portions of said conveyer being separated by a distance greater than the length of the racks.

In testimony whereof I have hereunto set my hand.

HERBERT E. MERSELES.