

Jan. 25, 1944.

A. W. ARNOLD

2,339,832

DRINKING GLASS WASHER CONVEYER

Filed Nov. 25, 1940

2 Sheets-Sheet 1

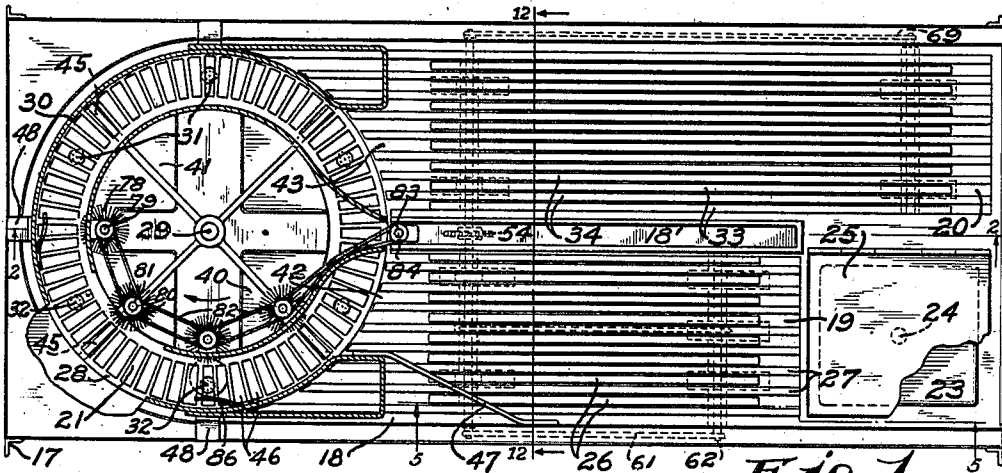


Fig. 1.

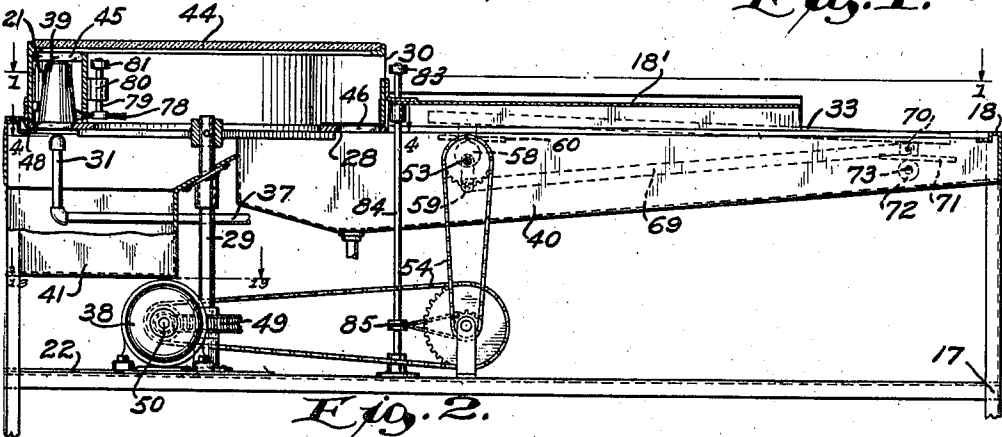


Fig. 2.

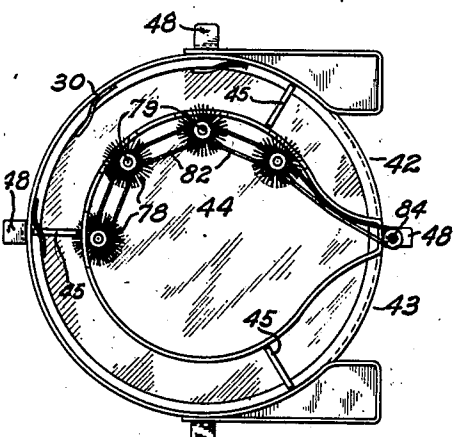


Fig. 3.

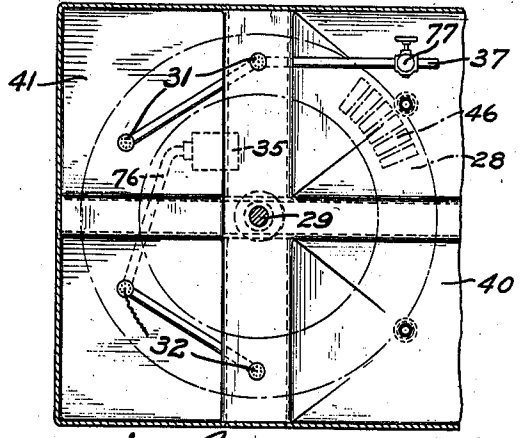


Fig. 4.

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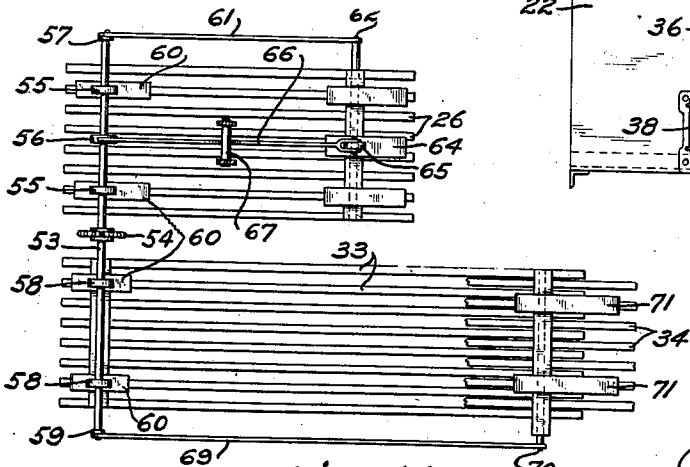
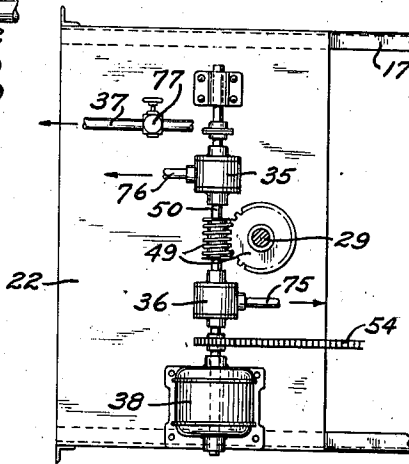
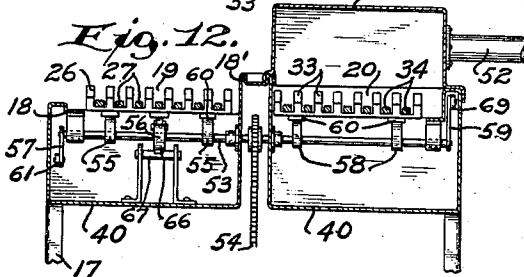
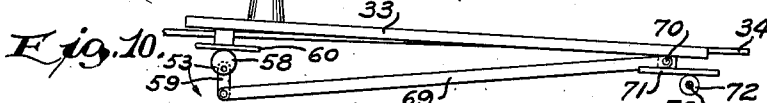
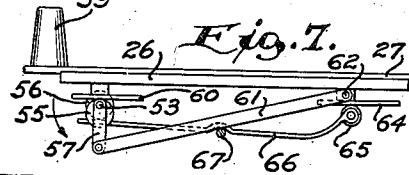
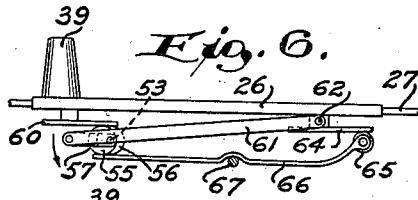
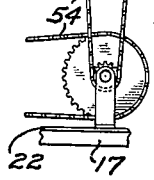
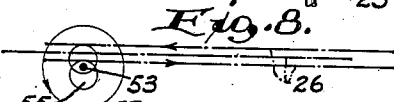
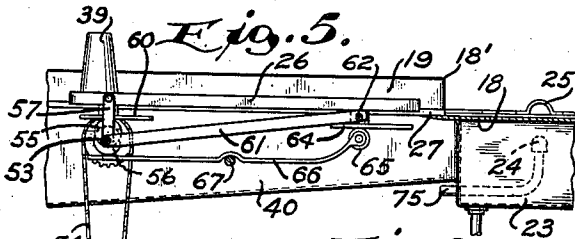
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2 Sheets-Sheet 2



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2,339,832

DRINKING GLASS WASHER CONVEYER

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Application November 25, 1940, Serial No. 367,053

10 Claims. (Cl. 198—107)

My invention relates in general to improvements in the art of cleansing objects in succession, and relates more specifically to improvements in the construction and operation of washing mechanisms for washing and sterilizing drinking glasses, cups or the like.

Generally defined, an object of the present invention is to provide an improved cleansing mechanism for drinking glasses or the like, which is simple and compact in construction and highly efficient in use.

A more specific object of my invention is to provide a new and useful drinking glass washer equipped with improved mechanism for transporting the glasses to, through and from the machine en masse and without danger of breakage.

Another specific object of this invention is to provide an improved glass cleansing machine adapted to rapidly and effectively wash and rinse a succession of relatively brittle receptacles of various sizes, and with minimum effort and attention on the part of the operator.

A further specific object of my present invention is to provide simplified structure for transporting cup-shaped objects such as inverted drinking glasses along a definite path, both gently and rapidly, and without danger of chipping the mouth engaging rims of the receptacles.

Still another specific object of the invention is to provide a relatively simple, durable and reliable machine for thoroughly washing or cleansing a succession of drinking glasses of various sizes and shapes, which may be manufactured and operated at moderate cost and readily installed as a unit in restaurants, drink dispensaries and the like.

An additional specific object of my invention is to provide an improved object advancing mechanism operable from a single rotary driving shaft to advance the successive objects in one lane in a direction opposite to that of the objects in an adjacent parallel lane.

These and other specific objects and advantages of my present improvement, and of the mode of constructing and of operating drinking glass washers built in accordance with the invention, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a part sectional top view of one of my improved drinking glass washers, the section having been taken along the line 1—1 of Fig. 2, and the discharge lane enclosure having been omitted;

Fig. 2 is a longitudinal central vertical section through the washing unit of Fig. 1, taken along the line 2—2 and showing the drive and other normally concealed details of construction, the discharge lane enclosure likewise having been omitted;

Fig. 3 is a bottom view of the enclosure which normally houses the washing, sterilizing and rinsing zone;

Fig. 4 is a fragmentary horizontal section through the rotor portion of the unit, the section being taken beneath the rotor and the latter being shown in dot-and-dash lines;

Fig. 5 is a fragmentary longitudinal section through the machine taken along the line 5—5 of Fig. 1, and showing the transporting bars in the supply lane elevated to the maximum extent;

Fig. 6 is another fragmentary section through the supply lane, showing the transporting bars in medial foremost position;

Fig. 7 is still another fragmentary section through the glass supply lane, showing the transporting bars in lowermost position;

Fig. 8 is a motion diagram depicting the movement of the transporting racks or bars in the supply lane;

Fig. 9 is a motion diagram illustrating the movement of the transporting bars or racks in the tumbler discharge lane;

Fig. 10 is a fragmentary section taken longitudinally through the object discharge lane, and showing the transporting bars in uppermost tilted position;

Fig. 11 is a similar section showing the transporting bars in lowermost tilted position;

Fig. 12 is a transverse vertical section through the glass or tumbler washer, taken along the line 12—12 of Fig. 1;

Fig. 13 is a transverse horizontal section through a lower portion of the machine taken along the line 13—13 of Fig. 2, showing the motor drive and pumps; and

Fig. 14 is a bottom view of the supply and discharge racks and of a portion of the driving mechanism therefor.

While my invention has been shown and described herein as being embodied in a machine especially adapted to handle and wash drinking glasses or tumblers formed of relatively brittle material, it is not my desire or intention to thereby unnecessarily limit or restrict the scope or utility of the improvement for other purposes.

Referring to the drawings, the improved drinking glass cleanser shown therein comprises in general a rigid main frame 17 adapted to rest

either on the floor or upon a bench or shelf, and having an upper deck 18 divided by a central partition 18' into glass supply and discharge lanes 19, 20 respectively, with a washing zone 21 5 connecting the corresponding ends of the two lanes 19, 20, and also having a lower deck 22 for supporting operating mechanism; an initial tumbler rinsing basin 23 associated with the upper deck 18 near the inlet end of the supply lane 19 and having a rinsing water supply nozzle 24 10 therein and a removable cover 25 therefor; an object advancing rack consisting of a series of parallel interconnected longitudinally and vertically movable transporting bars 26 movable between parallel fixed bars 27, located within the supply lane 19; a glass supporting and revolving rotor or slotted disk 28 mounted upon a drive shaft 29 with its upper surface in horizontal alignment with and in close proximity to the delivery ends of the fixed bars 27, the disk 28 being normally covered by an annular removable hood 30 20 and having a series of liquid spray nozzles 31, 32 therebeneath; an object discharge rack consisting of a series of parallel interconnected tilttable and longitudinally movable transporting bars 33 25 movable between parallel fixed bars 34, located within the discharge lane 20; a pair of liquid pumps 35, 36 mounted on the lower deck 22, and a hot liquid supply pipe 37, for delivering liquid to the nozzles 24, 31, 32; and an electric motor 38 30 mounted on the deck 22 and cooperating with the transporting racks, rotor and pumps to drive these elements.

The main frame 17 which provides a durable but portable support for the washing unit, may be 35 formed of standard bar and sheet metal, and the upper deck 18 with which the transporting mechanism for the tumblers or drinking glasses 39 is associated, may also be provided with suitable drainage pans 40, 41 disposed beneath the lanes 19, 20 and below the washing zone 21, respectively. The removable housing or hood 30 is provided with inlet and discharge openings 42, 43 which 40 normally communicate with the supply and delivery lanes 19, 20 respectively when the hood is in proper position, and the hood 30 may also be provided with a transparent top closure 44 and with pliable division and wiping partitions 45 45 depending from the closure 44. These partitions 45 must however provide sufficient clearance to permit passage therebeneath, by the tallest tumblers or glasses 39 which are to be cleansed, and the rotor disk 28 is provided with a series of narrow slots 46 disposed either radially or circumferentially relative to the shaft 29, for permitting liquid from the nozzles 31, 32 to strike the advancing objects carried by the rotor. The delivery end of the glass supply lane 19 may be provided with a guide plate 47 for conducting the glasses 39 en masse into the hood receiving opening 42, and the fixed bars 27, 34 of the desk 18 50 extend into close proximity with the periphery of the revolving disk 28. The removable housing 30 may be supported from the deck 18 centrally of the shaft 29 by means of lugs 48, and the conveying disk 28 is normally rotatable at rather slow speed, by means of worm gearing 49 or the like, which drivingly connects the motor shaft 50 with the upright shaft 29. The discharge lane 20 may also be provided with an enclosure 51 70 which may be connected by a conduit 52 with an exhaust fan or stack in order to remove steam and vapors and thereby enhance the drying effect, see Fig. 12.

The conveying mechanisms which are located 75

within the lanes 19, 20 and which are adapted to transport the objects or inverted glasses 39 en masse along these lanes to and from the washing zone 21, are of special and improved construction, as shown in detail in Figs. 5 to 10 inclusive, and in Fig. 14. Both of the transporting racks are simultaneously movable by means of a common transverse horizontal shaft 53 journaled in bearings carried by the upper deck 18, and adapted to be rotated at suitable relatively slow speed by the motor 38 through speed reducing chain gearing 54, see Figs. 2, 5, 12 and 13. The chain drive is applied to the medial portion of the shaft 53 near the central longitudinal partition 18', and the portion of the shaft 53 beneath the supply lane 19 is provided with two laterally spaced eccentrics 55 and an intermediate eccentric 56 and has a crank 57 at the extreme end thereof, while the portion of this shaft 53 beneath the discharge lane 20 is provided with only two laterally separated eccentrics 58 and with an end crank 59. While all of the eccentrics 55, 58 are fastened to the shaft 53 in the same position relative to the shaft axis, the cranks 57, 59 are disposed oppositely with respect to this axis, and the eccentrics 55, 58 coact with plates 60 secured to the corresponding ends of the bars 26, 33 respectively of the two transporting grates, so that when the shaft 53 rotates these corresponding bar ends are raised and lowered in unison by these particular eccentrics 55, 58. However, the tumbler supply bars 26 must feed the glasses 39 forwardly, while the bars 33 must convey the glasses rearwardly; and the bars 26 move parallel while the bars 33 swing about their delivery ends. Because of this difference in movement, the mechanisms for producing the desired actions of the bars 26, 33 will be described separately.

Referring particularly to the inlet feed mechanism shown in Figs. 5 to 8 inclusive and wherein the grate bars 26 are movable as shown in the diagram of Fig. 8, the crank 57 is connected by a connecting rod 61 with a pivot 62 secured to the bars 26 near the initial washing basin 23. A bearing plate 64 is secured to the bars 26 beneath the pivot 62 and coacts with a roller 65 carried by one end of a lever 66, and the medial portion of this lever 66 is fulcrumed upon a fixed pivot pin 67 while the opposite end thereof coacts with the central eccentric 56. The assemblage is therefore such, that when the eccentrics 55, 56 are revolved by rotation of the shaft 53, the eccentrics 55 will merely raise and lower the adjacent ends of the bars 26, and the central eccentric coacting with the lever 66 will swing this lever so as to cause the roller 65 to simultaneously raise and lower the opposite ends of the bars 26, while the crank 57 acting through the connecting rod 61 and pin 62 will reciprocate the bars 26 during their up and down movement. During this reciprocation the plates 60 ride on the eccentrics 55 and the plate 64 rides upon the roller 65, and as the bars 26 lift or move upwardly beyond the intervening fixed bars 27, the moving bars lift the inverted glasses 39, carry them forward toward the washing zone 21, and deposit them in advanced position upon the fixed bars 27 where the glasses remain while the bars 26 are moving downwardly and rearwardly beneath the supporting surfaces of the fixed bars. This step by step advancement proceeds until the glasses 39 within the lane 19 have all been delivered to the conveying disk 28, and the transportation is effected gently and entirely without shock. The diagram of Fig. 8 clearly shows the parallel and

advancing movement of the bars 26, and Figs. 5, 6 and 7 clearly illustrate the progress made by each glass 39 during one complete cycle of movement of the bars 26.

Referring more specifically to the discharge mechanism shown in Figs. 9 to 11 inclusive, and in which the grate or transporting bars 33 are movable as shown in the diagram of Fig. 9, the crank 59 is connected by a connecting rod 69 to a pin 70 secured to the bars 33 near the tumbler delivery ends thereof. A pair of bearing plates 71 are secured to the bars 33 beneath the pivot pin 70 and coast with rollers 72 journalled on a stationary pin 73, so that when the crank 59 revolves, the bars 33 will be moved longitudinally without causing their delivery ends to raise and lower. The tumbler or glass receiving ends of the bars 33 will however be raised and lowered above and below the top surfaces of the intervening fixed bars 34, when the eccentrics 58 are rotated, but by virtue of the opposite disposition of the cranks 57, 59 with respect to the shaft 53 and to the eccentrics, 55, 56, the bars 33 will move in a direction opposite to that of the bars 26 when these bars are disposed above the stationary intervening bars 27, 34. During reciprocation of the bars 33 by the crank 59 the plates 71 ride upon the fixed rollers 72, and the plates 60 ride upon the revolving eccentrics 58, and as the forward ends of the bars 33 move upwardly above the top surfaces of the intervening fixed bars 34, they lift the adjacent inverted glasses 39 and carry them rearwardly along the lane 29. When the bars 33 are subsequently lowered beneath the fixed bars 34, the glasses 39 are deposited upon the upper surfaces of the stationary bars 34 where they remain while the moving bars 33 are moved forwardly to complete the cycle. This step by step advancement of the inverted glasses 39 continues until the tumblers have been thoroughly drained, dried and delivered from the discharge end of the lane 20 and enclosure 51, and the transportation is again effected gently and without shock. The diagram of Fig. 9 clearly indicates the oscillatory motion of the bars 33 and the direction of longitudinal displacement of these bars along the lane 20.

The washing and cleansing liquid may be applied to the glasses 39 in several stages, and when the dirty tumblers or objects are first delivered to the washing unit, they may be initially rinsed in the basin 23 with the aid of the nozzle 24 to which rinsing liquid may be supplied from the pump 36 through a pipe 75. The pump 36 may be operated by the motor shaft 50; and the pump 35 which is likewise operable by the shaft 50, may be caused to deliver chlorinated liquid or the like to the nozzle 32 through a pipe 76. The pipe 37 which is provided with a control valve 77 and communicates with the nozzles 31, may be connected to a suitable hot water supply source or to a third pump mounted on the motor shaft 50, and these three sources of cleansing fluid will ordinarily suffice to clean glasses and tumblers subjected to ordinary use. The rinsing nozzles 31 are located in one zone formed by the partitions 45, while the chlorinating nozzles 32 are disposed in a preceding zone likewise defined by these partitions, so that cleansing is in fact effected in segregated zones.

It may in some cases also be desirable to provide means for thoroughly brushing at least portions of the glasses 39 while they are being transported through the washing zone 21, and such mechanism is shown in Figs. 1, 2 and 3, and com-

prises a series of rotary bristle brushes 78 each mounted for rotation at the lower end of a spindle 79 journalled in a bearing 80 carried by the inner wall of the hood 30, and having a sheave or pulley 81 at its upper end; a series of driving belts 82 drivingly connecting the successive sheaves 81 with each other, and with a driving pulley 83 carried by a vertical shaft 84 which may be driven from the main drive shaft 50 by means of a belt drive 85; and a series of leaf springs 86 carried by the outer wall of the hood 30 and coacting with the successive tumblers or glasses 39 resting upon the conveyer disk 28, to urge the mouth portions of the tumblers into the zone of action of the brushes 78. With the aid of this brushing mechanism, the successive tumblers or glasses 39 which are deposited in inverted position upon the conveying disk 28, will be rotated about their own axes and simultaneously thoroughly scrubbed at their mouth portions, as they are being transported by the revolving disk 28, and the leaf springs 86 will function to urge the glasses 39 against the rotating brushes 78. While the brushes 78 may be widened to cause them to cooperate with the entire outer side surfaces of the glasses 39, this is unnecessary in most cases, and it is ordinarily sufficient to merely scrub the rims of the glasses which are brought in contact with the lips of the users. Since the use of the scrubbing brushes 78 is optional, and their operation should be clearly apparent from the foregoing description, they will not be further described in the description of the normal use of the machine.

While the normal use and operation of my improved drinking glass washer should be apparent from the foregoing description, a short resume of this operation will again be given. The dirty glasses presented to the washing unit may, if necessary, be initially washed by subjecting the same to liquid discharged by the nozzle 24, after which the glasses 39 may be set in inverted position upon the bars 26, 27 in the supply lane 19. The moving bars 26 will then cooperate with the glasses to advance them step by step and en masse, toward the inlet opening 42 of the automatic washing zone. As the successive inverted glasses are delivered upon the rotating disk 28, they are advanced over the chlorinating nozzles 32 and over the hot water rinsing nozzles 31, and are thus subjected to thorough washing action while revolving about the axis of the shaft 29. Upon reaching the opening 43, the washed and rinsed inverted glasses 39 are removed from the disk 28 by the fixed nose of the housing 39 disposed adjacent to the opening 43 and extending toward the partition 43'. The glasses are subsequently pushed rearwardly into the zone of action of the discharge bars 33, and are thereafter gently advanced by successive steps until they are ultimately delivered from the machine. The feeding bars 33 cooperate with the inverted glasses to produce smooth transition of the mass, and the rotating disk 28 will remove the glasses in rows from the ends of the bars 27 and will likewise deliver the cleansed glasses in a continuous row upon the adjacent ends of the fixed bars 34. In passing through the discharge lane 20, the washed and rinsed glasses 39 will have the liquid drained therefrom and will be dried by removal of vapors from the enclosure 51, and the operation of the machine after the initially washed glasses are once placed in the zone of action of the bars 26, is continuous and entirely automatic. In constructing a machine of this type, the bars

26, 27, 33, 34 should be made of such width that small glasses will not tilt into the crevices between these bars, and the slots 46 in the disk 28 must also be of a width which will prevent such undesirable tilting. The machine may be utilized to wash glasses or tumblers of various heights and diameters, and while the slots 46 and spaces between the transporting bars have been shown relatively wide for the sake of clearness in illustration, these gaps should necessarily be reduced to a minimum.

From the foregoing detailed description it will be apparent that my present invention provides an improved washing unit for drinking glasses, tumblers or the like, which is simple and compact in construction, which has enormous capacity and wherein relatively brittle objects may be most effectively cleansed without danger of chipping or breaking the glasses. The improved washing unit may be utilized to advantage in various places where glasses ordinarily accumulate, such as restaurants, drink dispensaries or the like, and the unit may either be supported from the floor or disposed upon a shelf within a drink dispensing bar. The assemblage can be operated at relatively low cost and the rotor and conveying bars are operable with minimum power by a relatively small motor, and while the revolving disk 28 is operating at a relatively low speed and the bars 26, 33 are preferably operable at moderate speed, it has been found that machines of this type will effectively handle large numbers of glasses without in any manner damaging the containers.

It should be understood that it is not desired to limit this invention to the exact details of construction, or to the precise mode of operation of machines such as herein shown and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

I claim:

1. In combination, a rotor for transporting articles in succession through a definite zone, parallel feed and discharge lanes leading to and from said rotor, a series of vertically and longitudinally parallel movable bars for feeding the articles along said feed lane, another series of vertically and longitudinally tiltably movable bars for transporting the articles along said discharge lane, and a common rotary shaft for simultaneously moving both of said bar series in opposite directions.

2. In combination, means for transporting articles in succession along a curved path about an upright axis, laterally adjacent feed and discharge lanes leading to and from said path and having spaced parallel fixed bars therein, a series of bars movable to parallel positions above and below the upper surfaces of the fixed bars in said feed lane, another series of bars tiltably movable to positions above and below the upper surfaces of the fixed bars in said discharge lane, and means for simultaneously reciprocating said movable bars.

3. In combination, means for transporting articles in succession through a definite zone, laterally adjacent feed and discharge lanes leading to and from said zone and having spaced parallel fixed bars therein, a series of bars movable to parallel positions above and below the upper surfaces of the fixed bars in said feed lane, another series of bars tiltably movable to positions above and below the upper surfaces of the fixed bars in said discharge lane, and common

means for simultaneously reciprocating said movable bars in opposite directions in said lanes when disposed above the adjacent fixed bars.

4. In combination, means providing feed and discharge lanes having corresponding communicating ends and being disposed in the same approximately horizontal plane, a plurality of longitudinally extending parallel fixed bars in each of said lanes, a series of parallel bars movable in parallelism along and above the fixed bars in one of said lanes, a series of parallel tiltably swingably movable above and along the fixed bars in the other of said lanes, and common means for raising and lowering all of said movable bars in unison and for simultaneously moving the same longitudinally in opposite directions.

5. In combination, means providing feed and discharge lanes having corresponding communicating ends and being disposed in the same approximately horizontal plane, a plurality of parallel fixed bars extending along each of said lanes, a plurality of parallel simultaneously movable bars interposed between the fixed bars in each lane, and means for simultaneously imparting opposite longitudinal and vertical motion to the movable bars of both lanes.

6. In combination, means providing feed and discharge lanes having corresponding communicating ends and being disposed in the same approximately horizontal plane, a plurality of parallel fixed bars extending along each of said lanes, a plurality of parallel simultaneously movable bars interposed between the fixed bars in each lane, means for imparting simultaneous longitudinal and rocking motion to the movable bars in one of said lanes, and means for imparting simultaneous longitudinal and up and down motion to the movable bars in the other lane while maintaining said movable bars in approximately horizontal position.

7. In combination, means for guiding a succession of similar articles along a curved path about an upright axis, laterally adjacent feed and discharge lanes leading to and from the opposite ends of said path and each having laterally spaced fixed bars therein, a series of bars movable to parallel positions above and below the upper surfaces of the fixed bars in one of said lanes, another series of bars tiltably movable to positions above and below the upper surfaces of the fixed bars in the other of said lanes, and means for simultaneously reciprocating both sets of said movable bars.

8. In combination, means for guiding a succession of similar articles along a curved path about an upright axis, laterally adjacent feed and discharge lanes leading to and from the opposite ends of said path and each having laterally spaced fixed bars therein, a series of bars movable to parallel positions above and below the upper surfaces of the fixed bars in said feed lane, another series of bars tiltably movable to positions above and below the upper surfaces of the fixed bars in said discharge lane, and means for simultaneously reciprocating both sets of said movable bars in opposite directions.

9. In combination, means for guiding a succession of similar contacting articles along a definite arcuate path about a fixed upright axis, laterally adjacent parallel feed and discharge lanes lying in approximately the same plane as said path and leading respectively to and from the opposite ends of the path, each of said lanes having laterally spaced fixed bars therein provided with upper surfaces disposed in said plane, a series

of bars movable to parallel positions above and below the upper surfaces of the fixed bars in one of said lanes, another series of bars tiltably movable to positions above and below the upper surfaces of the fixed bars in the other of said lanes, and means for simultaneously reciprocating both sets of said movable bars.

10. In combination, means for guiding a succession of similar contacting articles along a definite arcuate path about a fixed upright axis, laterally adjacent parallel feed and discharge lanes lying in approximately the same plane as said

path and leading respectively to and from the opposite ends of the path, each of said lanes having laterally spaced fixed bars therein provided with upper surfaces disposed in said plane, a series of bars movable to parallel positions above and below the upper surfaces of the fixed bars in said feed lane, another series of bars tiltably movable to positions above and below the upper surfaces of the fixed bars in said discharge lane, and means for simultaneously reciprocating both sets of said movable bars in opposite directions.

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