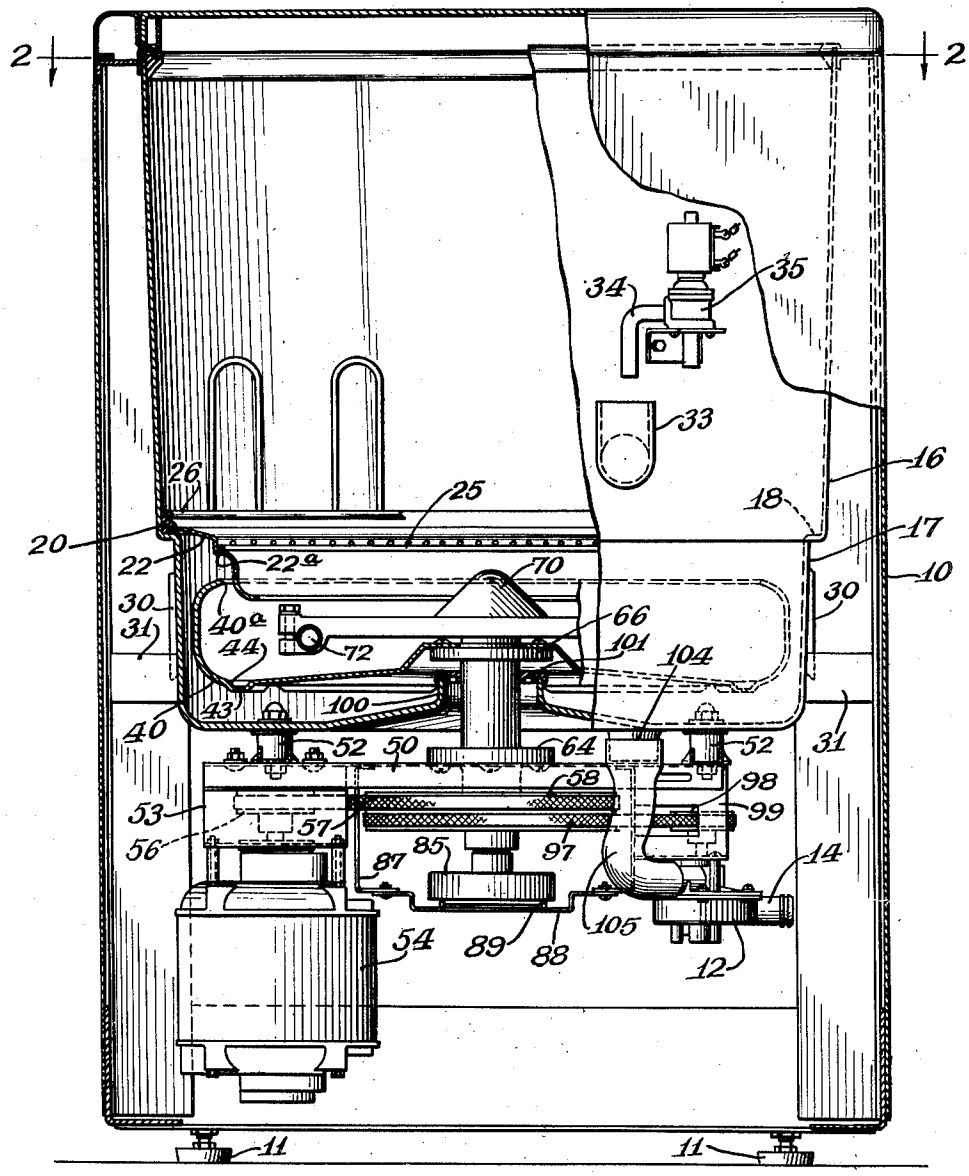
June 9, 1953 J. T. HELLYER 2,641,268

DISHWASHING MACHINE

Filed May 4, 1951 5 Sheets-Sheet 1

FIG. 1.



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DISHWASHING MACHINE

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FIG. 2.

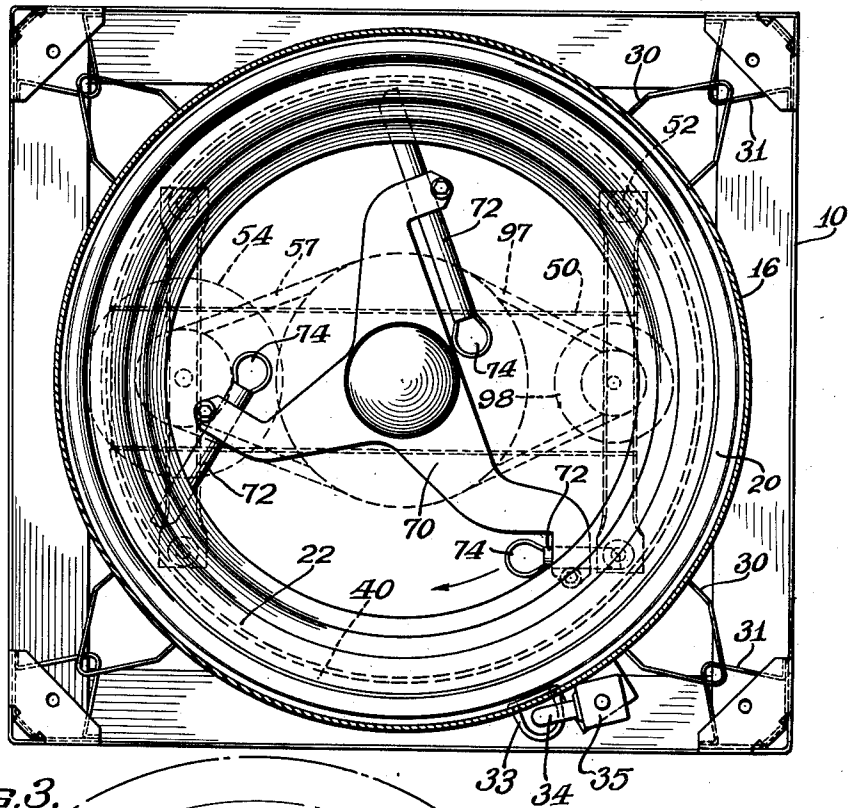
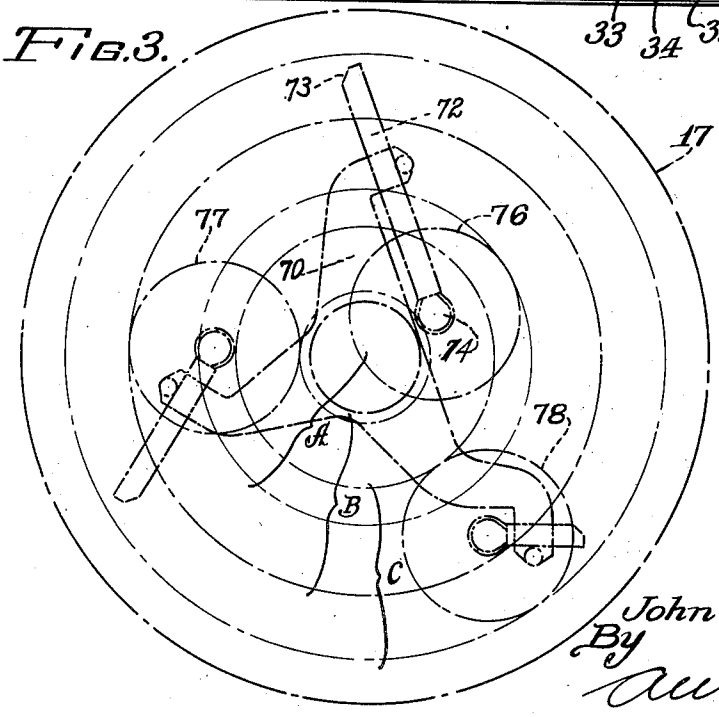


FIG. 3.



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DISHWASHING MACHINE

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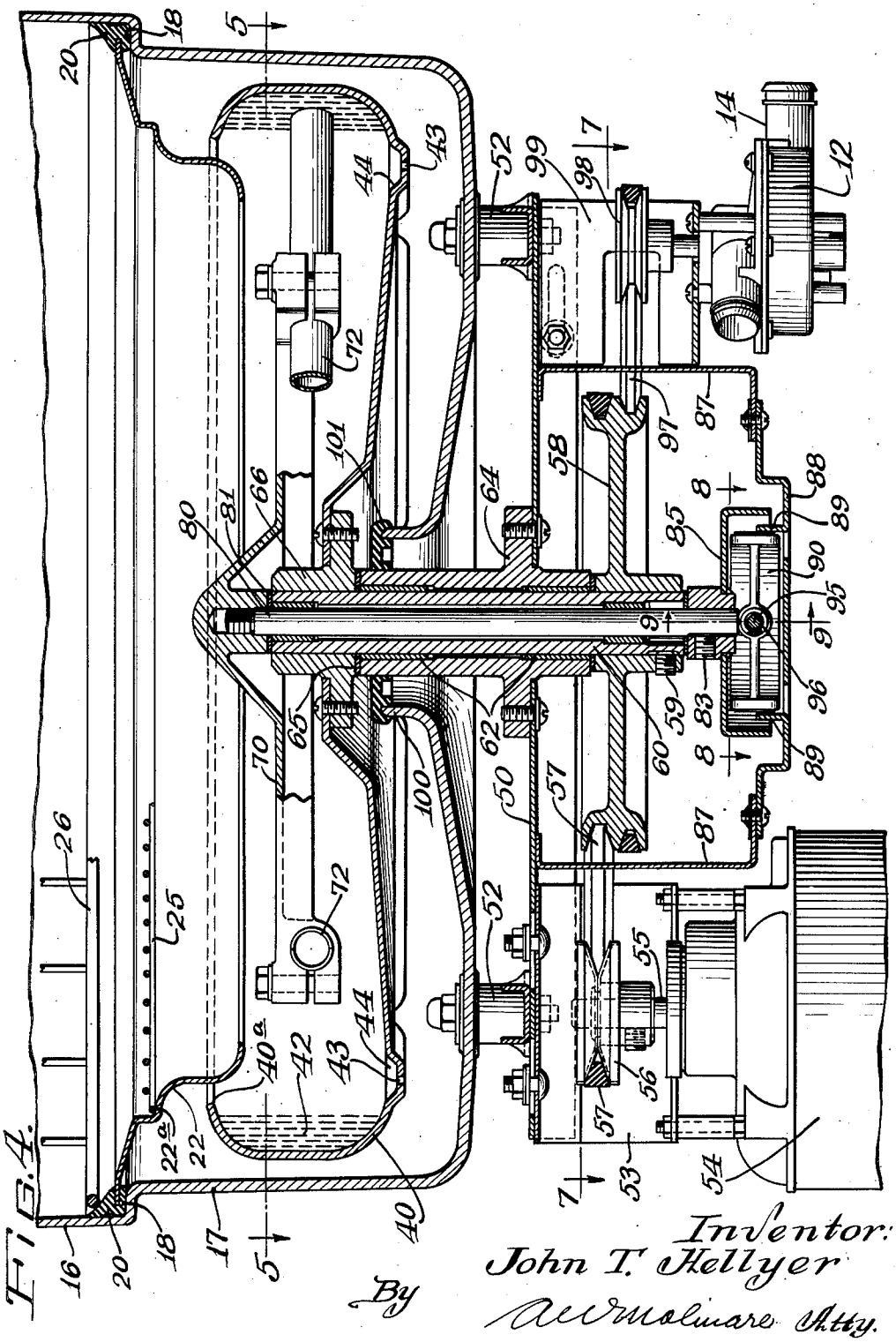

FIG. 4.

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DISHWASHING MACHINE

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FIG. 5.

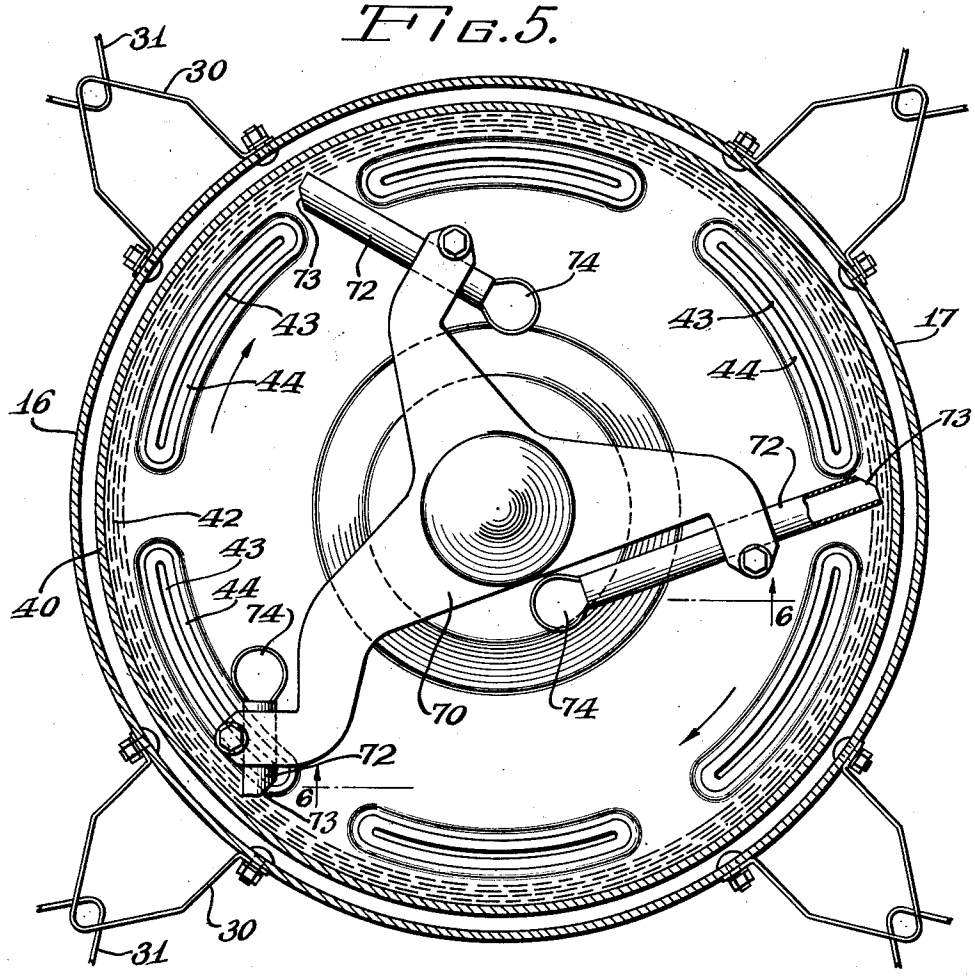
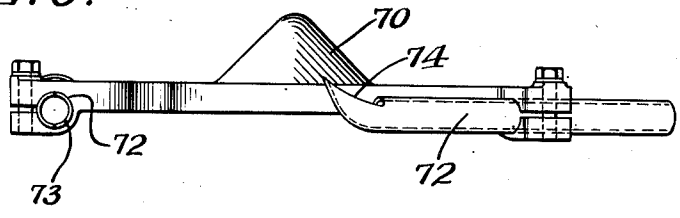


FIG. 6.



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DISHWASHING MACHINE

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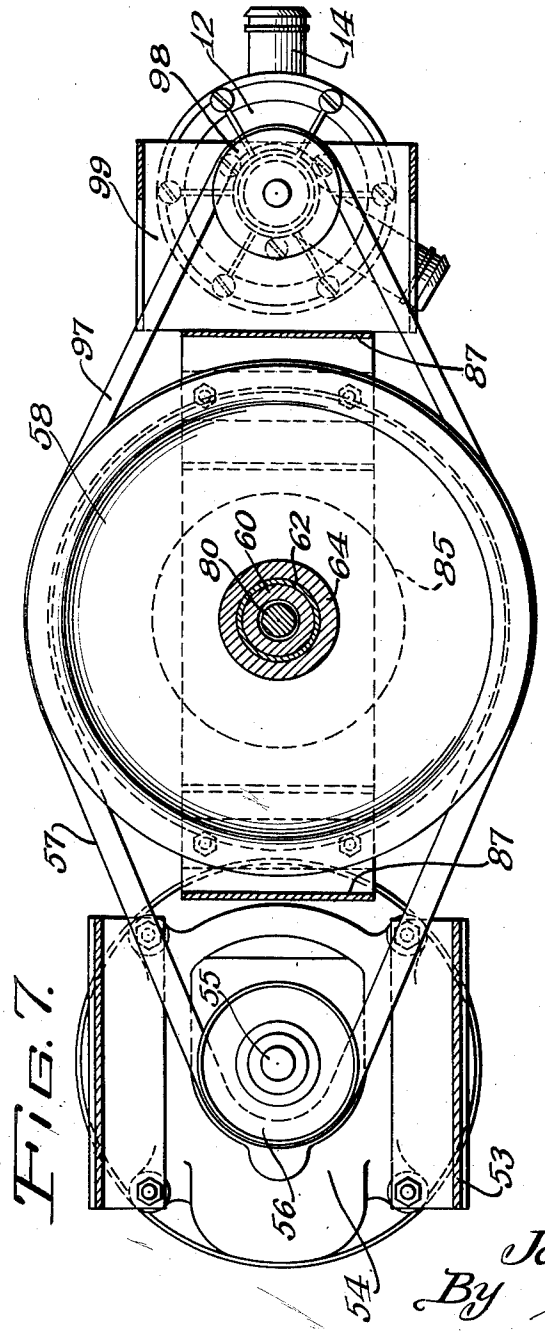

FIG. 7.

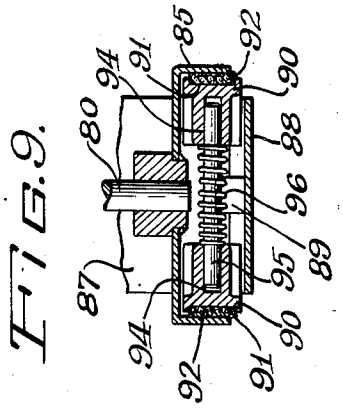

FIG. 9.

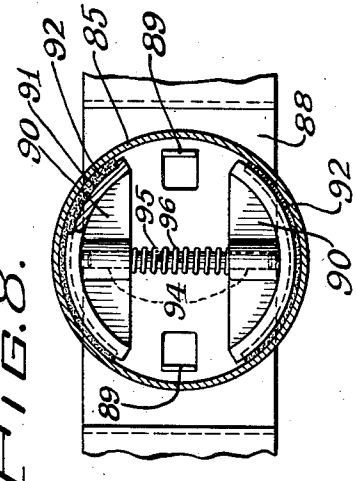

FIG. 8.

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Patented June 9, 1953 2,641,268

UNITED STATES PATENT OFFICE

2,641,268

DISHWASHING MACHINE

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Application May 4, 1951, Serial No. 224,478

15 Claims. (Cl. 134—112)

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This invention relates to dishwashing machines of the type especially adapted for use in homes and apartments and which is also capable of embodiment in suitable form for use in restaurants, hotels and various institutions.

The machine embodying the present invention is provided with mechanism utilizing centrifugal force to effect high velocity projection of washing liquid against and around dishes and other articles to be washed, supported in the dish holder or rack. More specifically, the machine includes liquid circulating mechanism, comprising an upwardly open washing liquid reservoir or receptacle, rotatable at high speed about an upright axis, for building up against the inner wall thereof an annulus of washing liquid, together with liquid diffusing scoops or nozzles for delivering high velocity jets or sprays or streams of washing liquid, of considerable force, against the dishes and articles supported in the dish holder or rack. The scoops or nozzles are mounted for rotating about the same axis of rotation as the receptacle and have their inlet ends positioned so as to project into the annulus of washing liquid in the receptacle, and having their outlet ends terminating at different radial distances with respect to said axis, so that said scoops or nozzles are caused to be driven in the same direction of rotation as said receptacle and annulus of liquid. By such an arrangement, the annulus of liquid serves as the driving force for effecting rotation of said scoops or nozzles, and by virtue of which the jets or sprays or streams of washing liquid discharged from said scoops or nozzles continuously move rotatively about said axis for insuring complete coverage of the entire area of the dish holder or rack.

By virtue of the construction employed, it is possible to perform a highly satisfactory and efficient dishwashing operation, utilizing a minimum quantity of hot water for the washing liquid, that is, just sufficient to create a water annulus of substantial thickness and which is found to be in the general range of two (2) quarts of liquid. The rotatable receptacle is so designed as to automatically measure and retain the proper quantity of washing liquid for use and reject any excess liquid, so that it is not necessary to provide mechanical means for measuring liquid, nor is it necessary for the operator of the machine to measure the predetermined quantity of water to be introduced or to carefully observe the filling operation.

The dishwashing mechanism is constructed so as to be self draining at the termination of each

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cleansing and rinsing operation. The mechanism is such that it eliminates the necessity of employing drain cocks or equivalent devices which must be opened in order to discharge liquid from the liquid reservoir. As is well known when drain cocks or valves are employed in machines of this type, they frequently become clogged with food particles and are rendered ineffective. In the present construction such drain cocks or valves are dispensed with and at the same time the possibility of clogging of the drain conduits or outlets by food particles is totally eliminated. Thus, by virtue of such a construction, the machine is self cleansing and is rendered sanitary automatically as a result of discharging and reuse of washing liquid, and therefore eliminates the necessity of scouring or cleansing of the machine after each use. More specifically one of the objects of this invention is to provide a dishwashing mechanism which produces a rotating annulus of liquid at relatively high speed, together with water diffusing means in the form of scoops or nozzles, having portions extending into the annulus of liquid and driven thereby in the same direction, but at a lower rate of speed, whereby washing liquid is picked up from the liquid annulus and forcibly projected in an upwardly direction in the form of a jet, spray or stream, against and around the articles supported in a rack above the water diffusing means.

Another object is to provide improved dishwashing mechanism of the character indicated, wherein the scoops or nozzles are driven rotatively by the rotating liquid annulus and wherein speed retarding means is provided for insuring rotation of the scoops or nozzles at a speed substantially less than the speed of rotation of the liquid annulus.

A further object is to provide a dishwashing mechanism of the character indicated, wherein a plurality of scoops or nozzles have their discharge ends located at different radial distances with respect to the axis of rotation thereof, so that upwardly projecting jets, sprays or streams of washing liquid are continuously rotated and thereby define a series of overlapping annular areas, completely covering the cross-sectional area of the article supporting rack.

Still another object is to provide an improved dishwashing mechanism of the character indicated, wherein the operating mechanism is totally supported from the bottom of the tub of the machine, independently of any enclosing cabinet structure.

A still further object is to provide an improved dishwashing mechanism of the character indicated, which is relatively simple in construction, highly efficient in operation and which is capable of being economically manufactured.

And a still further object is to provide a novel brake mechanism for controlling the speed of rotation of said water diffusing mechanism.

Other objects and advantages of this invention will be apparent from the following description, taken in connection with the accompanying drawings in which:

Figure 1 is a vertical sectional view through the dishwashing machine embodying the present invention.

Figure 2 is a horizontal sectional view through the machine, taken substantially as indicated at line 2—2 on Figure 1.

Figure 3 is a diagrammatic view of the water diffusing means.

Figure 4 is an enlarged axial section through the lower portion of the machine, including the driving mechanism.

Figure 5 is a horizontal sectional view, taken at line 5—5 on Figure 4.

Figure 6 is a side elevational view of the water diffusing means, comprising scoops and supporting spider, taken substantially as indicated at line 6—6 on Figure 5.

Figure 7 is a horizontal sectional view through the driving mechanism, taken at line 7—7 on Figure 4.

Figure 8 is a horizontal section through the brake mechanism or retarder device, taken as indicated at 8—8 on Figure 4.

Figure 9 is a vertical section through the brake mechanism or retarder device, taken as indicated at line 9—9 on Figure 4.

In the drawings, I have shown a dishwashing machine embodying my present invention, having a suitable cabinet structure, indicated generally at 10, provided with adjustable supporting feet 11, for convenient installation in the kitchen of a home or apartment. As shown, the machine includes a power driven pump, designated generally at 12, having a discharge conduit 14, to which may be connected a suitable hose for discharging the used washing liquid into a drain. It is to be understood that the machine embodying the present invention may be produced without the cabinet 10, and may be mounted directly within the cabinet structure of a kitchen sink, in which case the pump 12, and drive therefor, may be dispensed with and the conduit for draining the used washing liquid could be connected into the usual drainage conduit of the sink, for discharging such fluid by gravity.

Mounted within the cabinet, as illustrated in the drawings, is a tub 16, of circular cross-section, the lower end of which is of reduced diameter, as indicated at 17, forming an annular shoulder 18 within the interior thereof, and upon which shoulder is seated a resilient ring 20 of suitable material, such as rubber, in sealing relation to said shoulder. The ring 20 surrounds the outer marginal edge of a water deflector 22, of annular form, which extends in an inwardly and downwardly direction, as clearly shown in Figure 4 of the drawings. The purpose of this annular deflector will hereinafter be described in detail. Seated in an offset annular shoulder, 22a, of the deflector is a circular, reticulated member or screen 25, and seated upon the resilient ring 20, as seen in Figure 4, is a wire basket or rack 26, which, it is to be understood, is formed with suitable wire forms and abutments, constituting pockets and holders for various dishes, plates, glasses, and the like, to be washed. This particular dishwashing rack does not constitute a part of the present invention and will accordingly not be described in further detail.

The tub 16 has resiliently and firmly suspended from its bottom all operating and driving mechanism and is totally supported in the cabinet 10 by a plurality of brackets 30, interconnected with and supported upon brackets 31, carried by the corner posts of cabinet 10. Mounted on the outer wall of the tub and in open communication with the interior thereof, above the deflector ring 22, is a funnel-like device 33, through which a supply of washing liquid is admitted to the interior of the tub. A water supply conduit 34 is mounted on the outer wall of the tub with the discharge end thereof above and in registration with the funnel-like device 33, and the water supply conduit being subject to control by a solenoid operated valve 35, by virtue of which water may be admitted into the machine under electrical control. It is to be understood, however, that the water may be admitted into the machine under manual control without in any way affecting the operation of the machine embodying the present invention.

Mounted within the lower portion of the tub 16, below the screen 25 and racks 26, is my novel water action mechanism, which comprises an annular, upwardly open receptacle or spinner rim 40, the side wall of which is of curved or U shaped conformation, as clearly seen in the drawings. The upwardly open receptacle or spinner rim 40 is adapted to be rotated at high speed, preferably in the range of 500 or 600 R. P. M., to build up against the outer wall thereof an annulus of washing liquid, as indicated generally in dotted lines at 42. As shown, the cross-sectional dimensions of the liquid annulus, at the outset of operation of the machine, is predetermined and limited by the extent of inward projection of the upper terminal edge 40a of the rotatable receptacle, with respect to the extreme outer wall thereof. The bottom of the rotatable receptacle or spinner rim tapers upwardly towards the center thereof, as clearly seen in Figure 4 of the drawings, and said bottom is formed with a plurality of circumferentially spaced-apart arcuately extending orifices 43, located slightly inwardly of the upper terminal edge 40a of the rotatable receptacle, as clearly seen in Figures 4 and 5 of the drawings. The bottom wall of the receptacle, immediately adjacent and surrounding each of the arcuately formed discharge orifices, is depressed, as indicated at 44, to form a sump around each of said orifices, to facilitate drainage of the washing liquid therethrough upon cessation of rotation of said receptacle 40. It will be noted that the lower terminal edge of the deflector ring 22 extends a short distance inwardly beyond the sumps 44, as clearly seen in Figure 4 of the drawings, so as to make certain that when water is admitted to the tub 16, or when used washing liquid is to be returned to the diffusing mechanism, it is deflected by the deflector ring 22, so as to strike the bottom of the receptacle 40, inwardly of the sumps 44. In this connection, it is to be understood that washing liquid is initially admitted to the tub after the receptacle 44 commences to rotate so that the liquid admitted, upon striking the bottom of the receptacle, is thrown by centrifugal force across the bottom of the receptacle, span-

ning the sumps 44, so as to accumulate in the outer rim portion of the receptacle 40, and build up into a rotating annulus of liquid, as indicated at 42.

The driving mechanism for rotating the receptacle 40 is totally and resiliently suspended from the bottom of the tub 16. An inverted channel member 50, extending in horizontal direction, is supported in spaced-apart relation to the bottom of the tub 16 by means of a plurality of resilient connectors 52, which serve to dampen and absorb vibration incident to the operation of the drive mechanism. Suspended from the main supporting channel 50, through the medium of suitable brackets 53, is an electric motor 54, disposed in a vertical position. Mounted on the upwardly extending portion of the motor shaft 55, is a pulley 56, around which is trained a V belt 57, and which belt likewise is trained around the upper portion of a double pulley 58. The pulley 58 is rigidly secured by means of a set screw 59 to a sleeve 60, journaled in a pair of vertically spaced bearings 62, in a bearing bracket 64, which is rigidly attached to the channel member 50, as seen in Figure 4 of the drawings. The bearing bracket 64 is provided with a tubular portion which extends upwardly through the bottom wall of the tub, and seated against the upper end of said tubular portion is a thrust washer 65, upon which is seated a hub 66, which is rigidly connected to the bottom wall of the upwardly open receptacle 40. It is to be understood that the hub 66, of the upwardly open receptacle, is press fitted upon the upper end of the sleeve 60, so as to rotate therewith. Thus as the motor is driven, rotation is transmitted from pulley 56 to pulley 58, thence to the sleeve 60 and to the hub 66 of the upwardly open receptacle 40, and due to the speed reduction attained by the differential of diameters of the pulleys 56 and 58, said receptacle 40 is caused to be rotated at high speed, preferably but not necessarily limited to the range of 500 or 600 R. P. M.

Supported within the upwardly open receptacle 40 is the liquid pick-up and dispersing means comprising, as shown in the drawings, a three (3) armed spider 70, with the arms located preferably in equal angular spaced-apart relation. Supported on the outer ends of each of said arms is a scoop or nozzle element 72, of generally tubular form, with their outer ends projecting into the outer rim area of the rotatable receptacle 40, and terminating at a position within the liquid annulus 42, as seen in Figures 4 and 5 of the drawings. The tubular scoops, as may be seen in Figure 5 of the drawings, each extend at a slight angle to radial, and have their outer ends formed with an inclined mouth, as indicated at 73, extending in a direction directly opposite to the direction of rotation of the open receptacle 40, as indicated by the arrows in Figure 5 of the drawings. These scoops have their inner ends, that is, opposite the inlet ends, formed to constitute discharge outlets, terminating in the form of upwardly open spoons, as indicated at 74. As may be seen in Figure 5 of the drawings, the discharge ends of the tubular nozzle or scoops 72 are located at different radial dimensions with respect to the axis of rotation of the receptacle 40.

If the spider 70, and the scoops 72, were journaled for free rotation, it is apparent that said spider and scoops, after a water wall or annulus of liquid has been built up in the receptacle, would be caused to rotate at a speed substantially the same as the speed of rotation of the liquid annulus, by reason of the friction drive created by the liquid being in direct contact with the inlet end portion of the respective scoops or nozzles 72. Under such a condition, no liquid would be picked up from the liquid annulus. Accordingly, I provide, and as will hereinafter be described, suitable retarding means by virtue of which the spider and its scoops are subjected to a braking action, for retarding the rotation thereof to a speed substantially less than the speed of rotation of the liquid annulus. By virtue of the speed differential between the scoops and the liquid annulus, the liquid of the annulus is driven through the open ends 73 of said scoops at high velocity, and discharged through the outlet ends 74 in the form of jets or sprays or streams of liquid, in an upward direction, into contact with and around the dishes and other articles supported in the wire basket 26. The liquid discharged by the scoops is at relatively high velocity, due to the high speed of rotation of the liquid annulus, so that the liquid is caused to forcibly impinge upon the dishes and other articles supported in the basket 26, for insuring a proper and efficient cleansing thereof.

Because the discharge ends 74 of the respective scoops are so located at different radial dimensions with respect to the axis of rotation of the receptacle and due to the continuous rotation of said scoops, said scoops or nozzles produce jets, sprays or streams in the form of a series of annular areas, which annular areas overlap each other and insure complete coverage of the entire cross-sectional area of the article receiving basket or rack 26. By way of diagrammatic illustration, I have shown in Figure 3 of the drawings, circular areas 76, 77 and 78, representing a cross-sectional area of the jet or spray produced by the respective scoops or nozzles. As said sprays are caused to rotate about the axis of the receptacle, they thereby respectively produce a series of circular and annular areas designated at A, B and C in Figure 3 of the drawings, which areas overlap each other and thereby insure complete coverage of the cross-sectional area of the dish holder or basket 26. It is to be understood that because the jets or sprays of washing liquid produced by the scoops or nozzles taper outwardly in an upwardly direction, it will be clear from Figure 4 of the drawings that the sprays will come in close proximity to the upper surface of the deflector ring 22, and a portion thereof will impinge against the inner wall of the tub 16.

The spider for supporting the scoops is rigidly secured, as by threading, upon an upright shaft 80, journaled within the sleeve 60, and is supported on a thrust washer 81, seated against the upper end of said sleeve. The lower end of said shaft 80 projects below the lower end of the sleeve and has rigidly secured thereto, by means of set screws 83, a cup shaped brake drum 85, opening in a downwardly direction, as clearly seen in Figures 4 and 9. Connected to the channel 50, by brackets 87, is a horizontally extending plate 88, having a pair of up-struck lugs, or stops 89. Mounted within the drum 85 is a friction device, comprising a pair of brake shoes 90, the outer surfaces of which are of a contour corresponding to the curvature of vertical wall of the drum 85. The outer faces of said shoes are provided with grooves or recesses 91, as seen in Figures 8 and 9 of the drawings, and freely seated in said grooves are strips of friction, brake lining material 92. The ends of the grooves, in circular direction, as clearly indicated in Figure 8 of the drawings, con-

stitute stops for limiting lengthwise movement of the lining elements, with respect to the shoes, while the side walls of the grooves confine such lining elements against transverse movement. The two shoes are provided with aligned bores, as indicated at 94, in which is slidably mounted the end portions of a rod 95, permitting limited sliding movement of the shoes with respect to said rod. Mounted on said rod, intermediate the shoes, is a coil spring 96, which yieldingly urges the shoes apart and thereby urges the brake lining in direct frictional contact with the inner wall of the brake drum 85. It will, therefore, be apparent that the force exerted by the spring 96 determines the extent of torque transmitted through the brake lining to the drum for effecting a braking or retarding action upon the spider and its scoops, in opposition to being driven by the liquid annulus incident to rotation of the receptacle 40. As may be noted in Figure 3 of the drawings, the up-struck lugs 89 are positioned so as to constitute stops against which abut the ends of the brake shoes 90, and thus oppose a tendency for the shoes to rotate incident to rotation of the drum 85. Thus the compression spring 96 serves as the torque limiting factor in exerting a predetermined load upon the brake or retarding device and thus determines the relative speed of rotation of the spider and its scoops with respect to the speed of rotation of the liquid annulus. It is to be understood that, if desired, the brake shoes with their friction linings could be fixedly secured to and rotated by the shaft 89, and the brake drum held stationary by being mounted fixedly on the support 38, in which event the device would function substantially identically to that disclosed.

It will be apparent that the brake or retarding means, as above described, is of extremely simple construction and may be economically produced. As may be noted in Figure 9, the two shoes and their spring assembly are supported within the drum, out of contact with the supporting bracket 88. Even if the shoes do rest directly upon the bracket 88, there will be no appreciable wear or effect had upon the action of the brake, because of the limited extent of possible rotative movement of the shoes by reason of engaging the stop lugs 89.

Trained around the lower portion of the double pulley 53 is a V belt 97, which likewise is trained around a pulley 93, to drive the pump 12, for forcibly discharging the water from the tub 16. The pump is suspended by a U-shaped bracket 99 from the main supporting channel 50.

It will be noted that the bottom wall of the tub 16 tapers in an upward direction toward the center thereof and terminates in an upwardly projecting annular collar 100, in spaced-apart relation to and surrounding the tubular body of the bearing bracket 64. Seated on the upper end of said collar 100 is an annular seal member 101, preferably of resilient material, snugly surrounding the body of the bearing bracket 64, so as to prevent, in the event of some accidental clogging of the drainage system, water overflowing the upper marginal edge of the collar 100, and spilling over onto the driving mechanism. The bottom of the tub is formed with a suitable sump, not shown, having a downwardly extending annular discharge nipple 104, connected by a flexible hose 105 to the inlet side of the pump 12.

Operation

After the dishes and other articles to be washed have been properly positioned on the article supporting rack 26, the motor is then energized to cause the rotatable receptacle or spinner rim 40 to be rotated. During this period the spider and scoops remain stationary. Water is then admitted through the conduit 34 and funnel 33 to the interior of the tub and the water discharging over the deflector ring 22 spills onto the central portion of the bottom of the receptacle 40. At the time of introduction of washing liquid, or immediately after adequate liquid has been admitted to the machine, suitable detergent may then be introduced into the machine. Due to the high speed of rotation of the receptacle or spinner rim 40, the water impinging on the bottom of the receptacle 40, is thrown by centrifugal force in an outward direction, across the sumps 44, so as to collect, be trapped and be held in arcuate formation of the outer wall of the receptacle 40, and builds up to form an annulus of washing liquid. As the annulus of washing liquid builds up, and because it rotates at approximately the same speed as the receptacle, rotative force is transmitted from the liquid annulus to the scoops or nozzles, causing rotation thereof. Due to the retarding device or brake above described, the scoops and spider have a load imposed thereon and hence said scoops and spider are caused to be rotated at a speed substantially less than the speed of rotation of the liquid annulus, and by virtue of which the washing liquid, comprising the liquid annulus, is picked up at the inlet ends of the scoops and discharged through the outlet ends thereof at extremely high velocity. The water discharged from the scoops is projected in an upward direction in the form of jets, streams or sprays, and as above mentioned results in causing said jets, streams or sprays to forcibly impinge upon the dishes or other articles supported in the rack or basket 26, covering the entire cross-sectional area of the basket, and thereby insuring an efficient cleansing operation upon said dishes, etc. in a minimum period of time.

It will be apparent that the cross-sectional area of the outer rim portion of the receptacle 40, as determined by the extent of inward projection of the upper edge thereof, as indicated at 40*a*, automatically predetermines the amount of water to be trapped to form a liquid annulus and be utilized to perform a washing operation. Any excess water will spill out and around the upper marginal edge 40*a*, and be discharged into the tub 16. The construction illustrated is so designed that it requires approximately only two quarts of water to perform a proper and efficient washing operation, thus resulting in reducing to a practical minimum the amount of hot water required in the washing of dishes, etc. As the water is picked up from the liquid annulus and projected in the form of liquid jets, sprays or streams, up through and around, and in contact with dishes and other articles in the basket 26, the used water drains or drops back either directly on the bottom of the receptacle 40, or upon the deflector ring 22 and thence on the receptacle 40, so that the washing liquid is continuously used over and over again. There is no appreciable loss of the original quantity of washing liquid during the performance of the washing operation.

After the dishes have been washed, the machine is shut off and as the receptacle or spinner rim 40 comes to rest, the water wall or liquid annulus 42, breaks down and the water thereof is discharged through the orifices 43 in the bottom wall of said receptacle, into the bottom of

the tub 16, from whence it is discharged by the pump 12 to a suitable drain.

It is to be understood that when the motor 54 is shut off, the drive to the pump 12 likewise ceases and hence it may happen that the pump may not operate for a period sufficiently long for effecting complete removal of all water from the tub 16. For this purpose, it may be desirable after the lapse of a short period of time, to again energize the motor 54, in order that the pump 12 may operate for a very short period of time to completely effect removal and discharge of any of the washing liquid remaining in the bottom of the tub 16. It is also to be noted that incident to such additional operation of the machine, after the completion of the washing operation, the rotation of the receptacle or spinner rim 40 causes limited forced circulation of air within the machine, which assists in expediting the drying of the dishes or other articles that have been washed.

Furthermore, in the larger percentage of installations of dishwashing machines of the type embodying the present invention, the mechanism may be further simplified by dispensing with the outer cabinet or casing and also the pump and drive therefor, because the machine may be directly housed in a cabinet structure for a sink, with the drain from the tub 16, connected directly to a conventional sink drain, so that all washing liquid will be conveniently discharged by gravity from the tub 16 to the drain.

While I have mentioned the operation of the machine insofar as concerns actual washing of dishes and the like, it is to be understood that the operation of the machine would be identical for a pre-rinse or final rinse, such as when it is desired to subject the dishes and other articles to an initial cold water rinse to facilitate the removal of certain food stuffs which tenaciously adhere to the dishes or the like, and when it is desired to have a final rinse of the dishes or the like after completion of the actual washing operation.

It is well known that in cleansing certain types of foods from dishes and the like presents no serious problem. It is also known that certain other types of foods, such as, for example, dried eggs, tenaciously adhere to the surface of the dishes and presents great difficulty in effecting dislodgment and removal from the dishes. In the dishwashing machine embodying the present invention, the jets or sprays of washing liquid are projected at high velocity and impinge with considerable force against the dishes and other articles supported in the rack or basket. By reason of the jets or sprays being directly upwardly, in a generally funnel-shape conformation, and due to the continuous movement of such jets or sprays, as well as the fact that the jets or sprays move in orbits overlapping each other, it is now possible to obtain complete coverage of the entire cross-sectional area of the supporting rack or basket in which the dishes are supported. The high velocity jets or sprays thus assume varying angular positions with respect to the individual dishes or other elements supported on the rack, so that said jets or sprays strike against all the surface areas of the dishes with considerable force and at varying angles. In general, it may be said that said jets or sprays forcibly impinge against all surfaces of the dishes, at an acute angle, and effects efficient dislodgment and removal of all of the food particles from the surfaces of the dishes, irrespective of the various angular positions assumed by the dishes while being supported in the basket. The construction thus insures proper and efficient cleansing of all surfaces of all of the dishes or other articles supported in the wire rack or basket in a comparatively short period of time, utilizing an extremely small quantity of washing liquid.

Although I have herein shown and described a certain preferred embodiment of my invention, manifestly it is capable of modification and rearrangement of parts without departing from the spirit and scope thereof. I do not, therefore, wish to be understood as limiting this invention to the precise embodiment herein disclosed, except as I may be so limited by the appended claims.

I claim:

1. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, an upwardly open liquid receiving receptacle mounted in the tub, below said rack, drive means for rotating said receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, a plurality of scoops mounted for rotation about said axis, and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on said rack, said scoops being mounted for free rotation about said axis so as to be rotated by the movement of and in the same direction as said liquid annulus, and means for retarding the rotation of said scoops to a speed less than the speed of rotation of said liquid annulus.

2. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, an upwardly open liquid receiving receptacle mounted in the tub, below said rack, drive means for rotating said receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, a spider journaled for free rotation about said axis, said spider having a plurality of radially projecting arms, a plurality of scoops mounted on said arms for rotation about said axis, and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on said rack, said scoops being mounted for free rotation about said axis so as to be rotated by the movement of and in the same direction as said liquid annulus, and means for retarding the rotation of said scoops to a speed less than the speed of rotation of said liquid annulus.

3. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, a tubular drive shaft, an upwardly open liquid receiving receptacle mounted on said shaft, within said tub and below said rack, drive means for rotating said shaft and receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, an upright shaft journaled in the tubular drive shaft, a spider mounted on the upper end of said upright shaft and having a plurality of radially projecting arms, a plurality of scoops mounted on said arms and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and

outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on the rack, said scoops and spider being mounted for free rotation about said axis by the movement of and in the same direction as said liquid annulus, and means for retarding the rotation of said spider and scoops to a speed less than the speed of rotation of said liquid annulus.

4. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, an upwardly open liquid receiving receptacle mounted in the tub, below said rack, drive means for rotating said receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, a plurality of scoops mounted for rotation about said axis, and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on said rack, said scoops being circumferentially spaced apart and having their outlet ends located at different radial distances from said axis, whereby liquid picked up from said liquid annulus is discharged through the outlet portions of said scoops, in the form of sprays covering the entire cross-sectional area occupied by the article receiving rack, said scoops being mounted for free rotation about said axis so as to be rotated by the movement of and in the same direction as said liquid annulus, and means for retarding the rotation of said scoops to a speed less than the speed of rotation of said liquid annulus.

5. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, an upwardly open liquid receiving receptacle mounted in the tub, below said rack, drive means for rotating said receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, a plurality of scoops mounted for rotation about said axis, and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on said rack, said scoops being circumferentially spaced apart and having their outlet ends located in such relation to each other, whereby liquid picked up from said liquid annulus is discharged through the outlet portions of said scoops, in the form of sprays defining a plurality of overlapping annular paths covering the entire cross-sectional area occupied by the article receiving rack said scoops being mounted for free rotation about said axis so as to be rotated by the movement of and in the same direction as said liquid annulus, and means for retarding the rotation of said scoops to a speed less than the speed of rotation of said liquid annulus.

6. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, an upwardly open liquid receiving receptacle mounted in the tub, below said rack, drive means for rotating said receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, including drive mechanism for the receptacle being connected to and totally supported from the underside of the tub and is operably connected to said receptacle for rotating it, a plurality of scoops mounted for rotation about said axis, and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on said rack, said scoops being mounted for free rotation about said axis so as to be rotated by the movement of and in the same direction as said liquid annulus, and means for retarding the rotation of said scoops to a speed less than the speed of rotation of said liquid annulus.

7. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, an upwardly open liquid receiving receptacle mounted in the tub, below said rack, drive means for rotating said receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, including drive mechanism for the receptacle being connected to and totally supported from the underside of the tub and is operably connected to said receptacle for rotating it, resilient means for supporting said drive mechanism from the tub, a plurality of scoops mounted for rotation about said axis, and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on said rack, said scoops being mounted for free rotation about said axis so as to be rotated by the movement of and in the same direction as said liquid annulus, and means for retarding the rotation of said scoops to a speed less than the speed of rotation of said liquid annulus.

8. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, an upwardly open liquid receiving receptacle mounted in the tub, below said rack, drive means for rotating said receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, the bottom of the receptacle, adjacent the area of formation of said liquid annulus, being formed with one or more drainage outlet, through which said liquid discharges by gravity upon cessation of rotation of the receptacle, a water deflector shield, of annular form, seated in the tub above said receptacle and having a downwardly inclined portion extending inwardly of the upper marginal edge of said receptacle, a plurality of scoops mounted for rotation about said axis, and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on said rack, said scoops being mounted for free rotation about said axis so as to be rotated by the movement of and in the same direction as said liquid annulus, and means for retarding the rotation of said scoops to a speed less than the speed of rotation of said liquid annulus.

9. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, a tubular drive shaft, an upwardly open liquid receiving receptacle mounted on said shaft, within said tub and below said rack, drive means for rotating said shaft and receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, an upright shaft journaled in the tubular drive shaft, a spider mounted on

the upper end of said upright shaft and having a plurality of radially projecting arms, a plurality of scoops mounted on said arms and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on the rack, said scoops and spider being mounted for free rotation about said axis by the movement of and in the same direction as said liquid annulus, and means for retarding the rotation of said spider and scoops to a speed less than the speed of rotation of said liquid annulus, said retarding means comprising a brake mounted on the lower end of said upright shaft.

10. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, a tubular drive shaft, an upwardly open liquid receiving receptacle mounted on said shaft, within said tub and below said rack, drive means for rotating said shaft and receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, an upright shaft journaled in the tubular drive shaft, a spider mounted on the upper end of said upright shaft and having a plurality of radially projecting arms, a plurality of scoops mounted on said arms and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on the rack, said scoops and spider being mounted for free rotation about said axis by the movement of and in the same direction as said liquid annulus, means for retarding the rotation of said spider and scoops to a speed less than the speed of rotation of said liquid annulus, said retarding means comprising a brake mounted on the lower end of said upright shaft, said brake comprising a drum member having a cylindrical braking surface, and a friction member having a friction lining operatively engaging said surface, one of said members being fixedly secured to and rotatable with the upright shaft, and the other member being held stationary.

11. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, a tubular drive shaft, an upwardly open liquid receiving receptacle mounted on said shaft, within said tub and below said rack, drive means for rotating said shaft and receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, an upright shaft journaled in the tubular drive shaft, a spider mounted on the upper end of said upright shaft and having a plurality of radially projecting arms, a plurality of scoops mounted on said arms and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on the rack, said scoops and spider being mounted for free rotation about said axis by the movement of and in the same direction as said liquid annulus, means for retarding the rotation of said spider and scoops to a speed less than the speed of rotation of said liquid annulus, said retarding means comprising a brake mounted on the lower end of said upright shaft, said brake comprising a drum member having a cylindrical braking surface, a friction member having a friction lining operatively engaging said surface, one of said members being fixedly secured to and rotatable with the upright shaft, and the other member being held stationary, said friction member comprising a plurality of shoes with friction facings on each shoe, and spring means acting on said shoes for urging said facings into engagement with said surface.

12. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, a tubular drive shaft, an upwardly open liquid receiving receptacle mounted on said shaft, within said tub and below said rack, drive means for rotating said shaft and receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, an upright shaft journaled in the tubular drive shaft, a spider mounted on the upper end of said upright shaft and having a plurality of radially projecting arms, a plurality of scoops mounted on said arms and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on the rack, said scoops and spider being mounted for free rotation about said axis by the movement of and in the same direction as said liquid annulus, means for retarding the rotation of said spider and scoops to a speed less than the speed of rotation of said liquid annulus, said retarding means comprising a brake mounted on the lower end of said upright shaft, said brake comprising a drum member having a cylindrical braking surface, a friction member having a friction lining operatively engaging said surface, one of said members being fixedly secured to and rotatable with the upright shaft, and abutment means positioned to be engaged by said other member for limiting movement of the latter in one direction of rotation of said upright shaft.

13. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, a tubular drive shaft, an upwardly open liquid receiving receptacle mounted on said shaft, within said tub and below said rack, drive means for rotating said shaft and receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, an upright shaft journaled in the tubular drive shaft, a spider mounted on the upper end of said upright shaft and having a plurality of radially projecting arms, a plurality of scoops mounted on said arms and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on the rack, said scoops and spider being mounted for free rotation about said axis by the movement of and in the same direction as said liquid annulus, means for retarding the rotation of said spider and scoops to a speed less than the speed of rotation of said liquid annulus, said retarding means comprising a brake mounted on the lower end of said upright shaft, said brake comprising a drum member having a cylindrical braking surface, a friction member having a friction lining operatively engaging said surface, one of said members being fixedly secured to and rotatable with the upright shaft, and the other member being held stationary, said friction member comprising a plurality of shoes with friction facings

on each shoe, spring means acting on said shoes for urging said facings into engagement with said surface, said drum member being secured to said upright shaft and having an internal cylindrical braking surface, the friction member being arranged within the drum and comprising a pair of brake shoes urged apart by said spring means so that the facings engage said braking surface, and a stationary abutment positioned to be engaged by one of said shoes for limiting rotative movement of said friction member.

14. A dishwashing machine comprising a tub, an article receiving rack mounted in the tub, a tubular drive shaft, an upwardly open liquid receiving receptacle mounted on said shaft, within said tub and below said rack, drive means for rotating said shaft and receptacle about an upright axis at a speed sufficient to create a rotating annulus of liquid against the interior wall of the receptacle, an upright shaft journaled in the tubular drive shaft, a spider mounted on the upper end of said upright shaft and having a plurality of radially projecting arms, a plurality of scoops mounted on said arms and having inlet portions positioned in the path of travel of the liquid annulus to pick up liquid therefrom and outlets for discharging the picked-up liquid in the form of a spray, in an upwardly direction against and around articles on the rack, said scoops and spider being mounted for free rotation about said axis by the movement of and in the same direction as said liquid annulus, means for retarding the rotation of said spider and scoops to a speed less than the speed of rotation of said liquid annulus, said retarding means comprising a brake mounted on the lower end of said upright shaft, said brake comprising a drum member having a cylindrical braking surface, a friction member having a friction lining operatively engaging said surface, one of said members being fixedly secured to and rotatable with the upright shaft, and the other member being held stationary, said friction member comprising a plurality of shoes with friction facings on each shoe, the outer face of each shoe being recessed to form a seat serving as the sole means for confining the facing between said shoe and said surface of the drum, and spring means acting on said shoes for urging said facings into engagement with said surface.

15. A mechanism according to claim 13, characterized by a pin loosely fitted into aligned openings in said shoes, and a coil spring surrounding said pin with its opposite ends reacting on said shoes to urge them apart with the lining members engaging said drum surface.

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