

April 27, 1937.

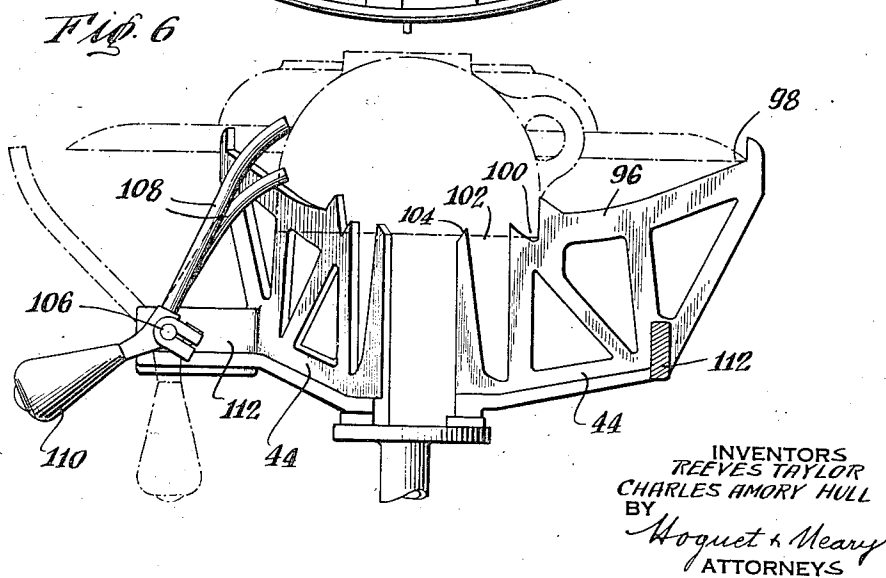
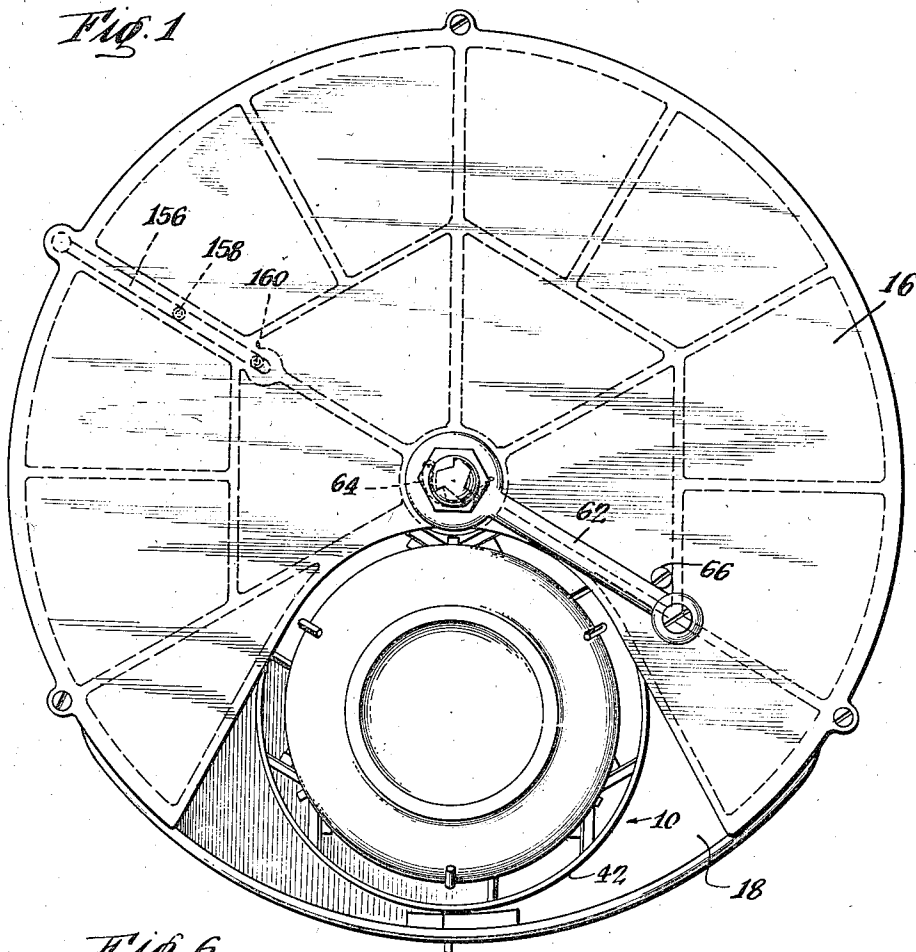
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2,078,699

APPARATUS FOR CLEANSING RECEPTACLES

Filed Dec. 3, 1931

4 Sheets-Sheet 1



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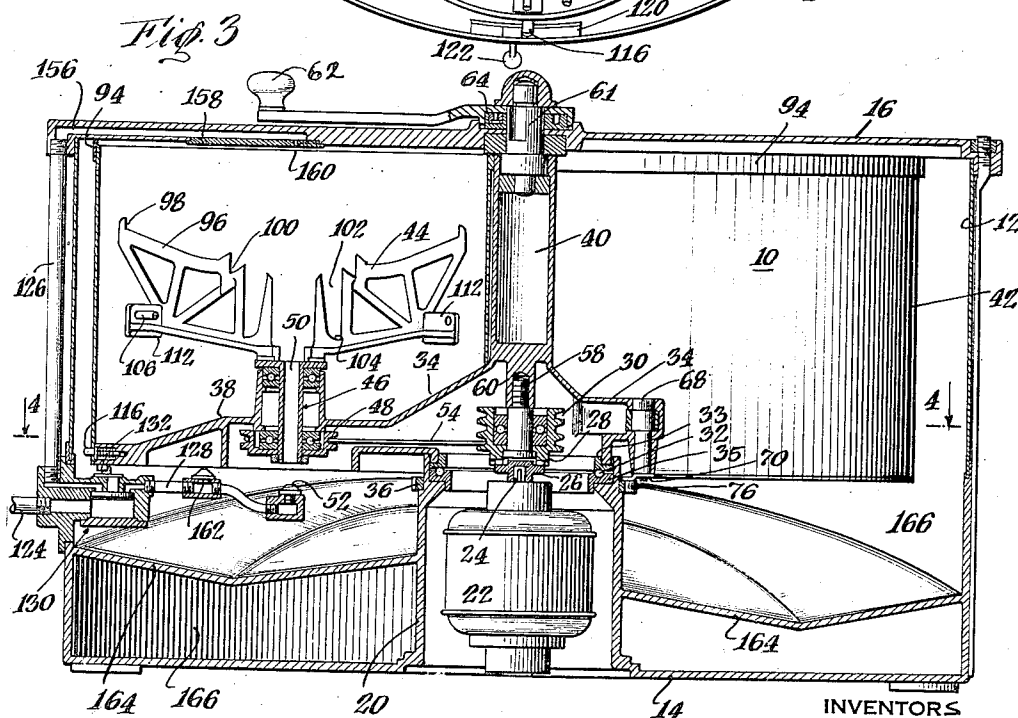
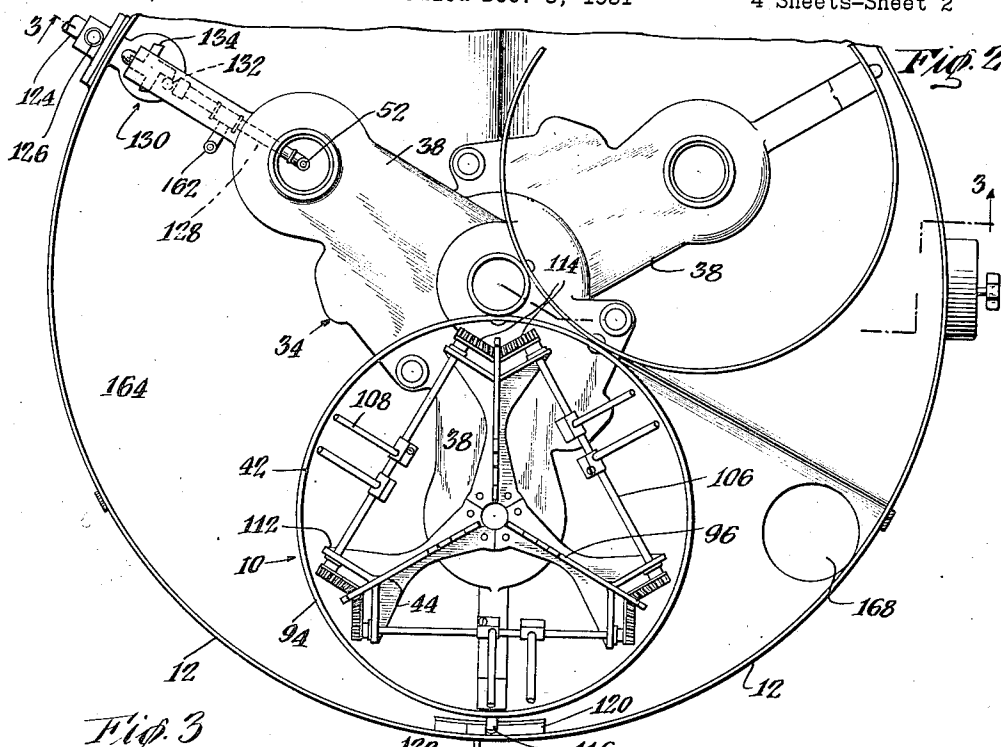
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**2,078,699**

# APPARATUS FOR CLEANSING RECEPTACLES

Filed Dec. 3, 1931

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APPARATUS FOR CLEANSING RECEPTACLES

Filed Dec. 3, 1931

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Fig. 4

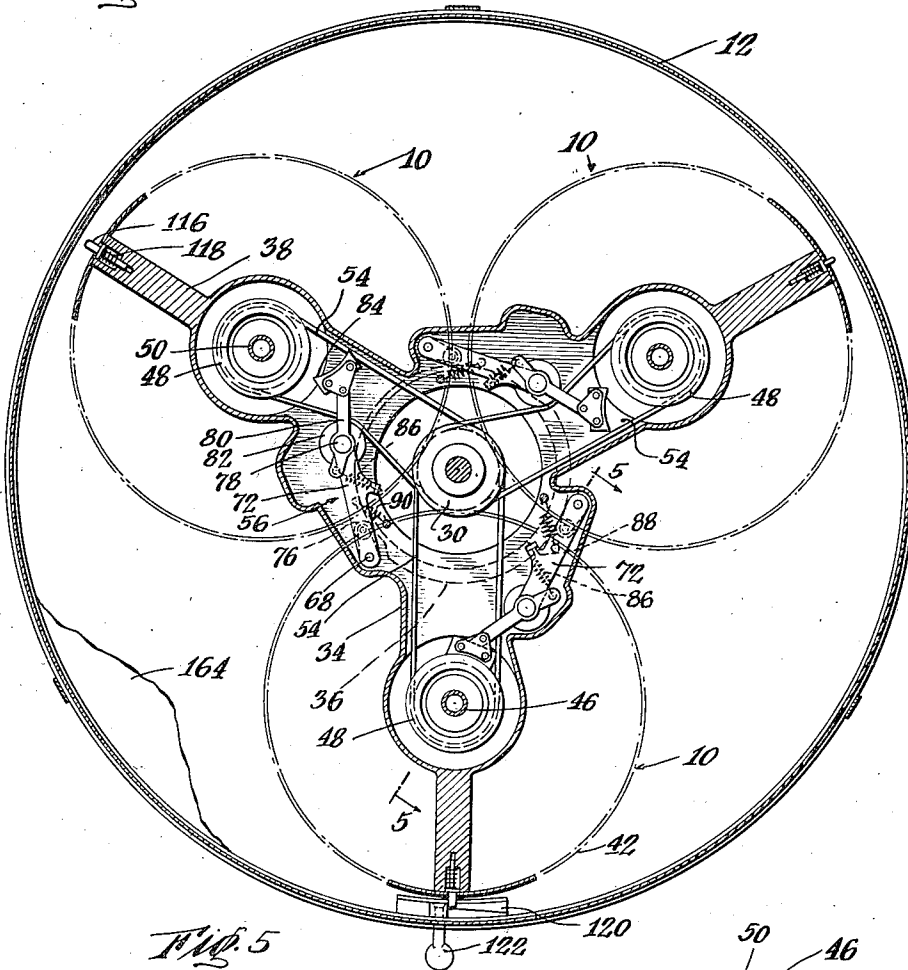
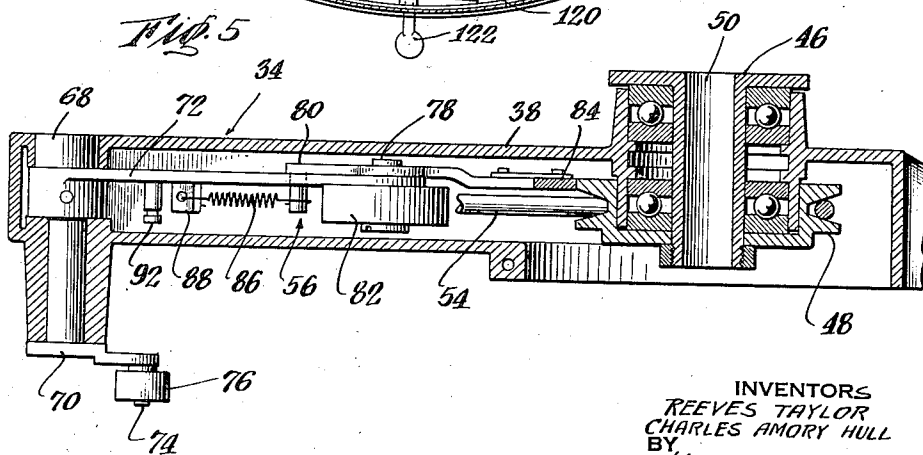


Fig. 5



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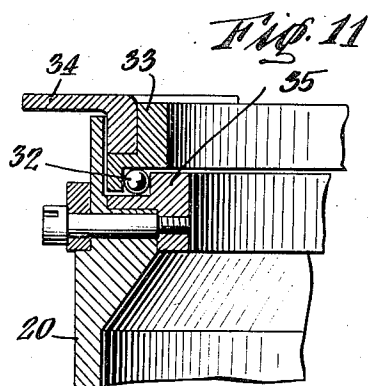
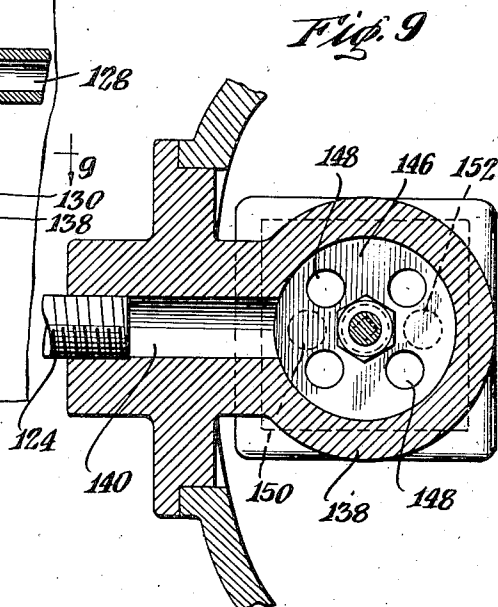
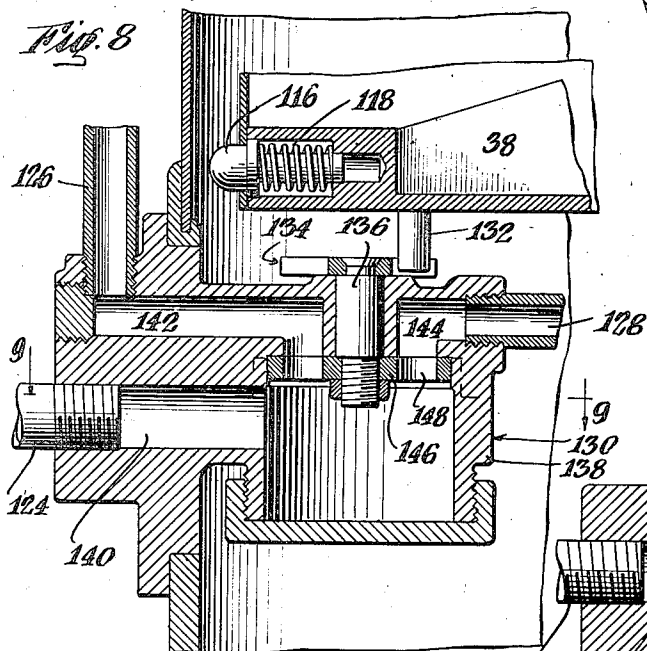
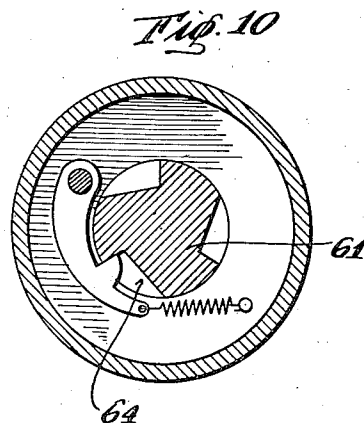
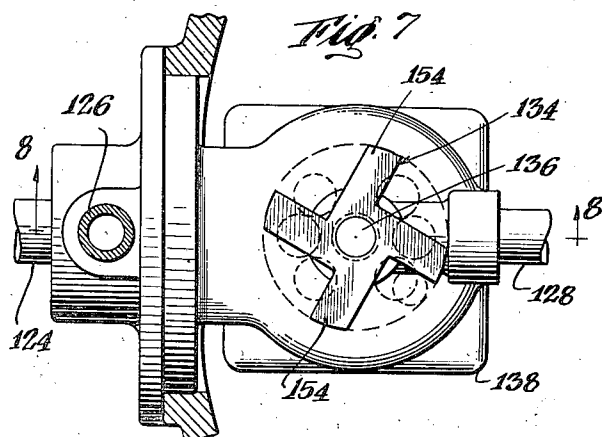
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APPARATUS FOR CLEANSING RECEPTACLES

Filed Dec. 3, 1931

4 Sheets-Sheet 4



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## UNITED STATES PATENT OFFICE

2,078,699

## APPARATUS FOR CLEANSING RECEPTACLES

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Application December 3, 1931, Serial No. 578,660

3 Claims. (Cl. 141—9)

This invention relates to a method of and apparatus for cleansing receptacles such as dishes, glasses, cups, and the like. More particularly the invention is concerned with the utilization of centrifugal force to effect both washing and drying in an operation further characterized by the individual cleansing of each receptacle.

The majority of dish washing machines in use today provide a basket-like dish supporting structure, a casing adapted to receive the basket carrying the dishes to be cleansed, and means for surrounding the group of dishes with a body of cleansing liquid such as a soap and water solution. In dish washing machines of this type, the dishes are cleansed as a group and the washing is effected by the agitation of the soap and water solution in contact with the group of dishes, either by revolving the basket in which the dishes are supported or by agitating the solution, or both. After washing the dishes are agitated with pure water for rinsing and finally dried by evaporation in the air.

According to the present invention, the receptacles to be cleansed are washed individually by rotating a receptacle about its axis while streams of cleansing liquid are projected against the upper and lower surfaces of its base. The centrifugal force produced by such rotation effects a vigorous cleaning of the receptacle by the liquid contacting therewith as it is thrown violently outward along the surfaces thereof. The cleansing action of the liquid under the influence of the centrifugal force of the spinning receptacle is extremely effective and it is unnecessary to supply liquid at pressures greater than that necessary to effect contact with the surfaces of the base of the receptacle. The cleansing liquid may, however, be supplied at any pressure desired.

The receptacle, when washed, is dried by continuing the rotation thereof after shutting off the supply of liquid thereto. The centrifugal force produced by such continued rotation induces a very rapid and complete drying, the liquid adhering to the surfaces of the receptacle being completely removed therefrom in a very few seconds.

The present invention has general utility in the cleansing of various receptacles and may be used with equal advantage in homes, hotels, restaurants, and similar establishments. Each receptacle is subjected to an individual cleansing action and the danger of breakage is less than with the present type of dish washing machine

while the speed and effectiveness of the cleansing is as great or greater. The time required for each operation is so short that a number of dishes and plates may be thoroughly washed and dried in rapid and continuous succession, enabling a plurality of receptacles to be completely cleansed in a very brief period of time. The effectiveness of this method of cleansing receptacles has been demonstrated in an experimental machine adapted to carry out the method of the invention. With the aforesaid machine very dirty and greasy dishes, plates, cups, and glasses have been completely washed and dried at the rate of approximately ten receptacles per minute. The rotational speed of the receptacles was 1100 R. P. M. but the invention is not limited to operation at this speed.

It will be apparent that a number of different machines may be designed to carry out the method of the present invention. The particular type best adapted to any specific use of the invention will depend both upon the character of the work which is to be performed and upon the personal ideas of the designer as regards the most suitable combination of mechanical elements for carrying out the cleansing method herein presented.

The drawings forming a part of this specification illustrate one type of apparatus which may be used advantageously in connection with the method of the invention. As will appear more fully hereinafter, the apparatus shown comprises three operating units, but it is to be understood that the number of such units in this particular type of apparatus is not limited to three. It is also to be understood that the invention, insofar as the method is concerned, is not intended to be limited by the particular structure shown since other apparatus than the type described may be used in carrying out the method.

In the accompanying drawings, in which like reference characters denote like parts:

Figure 1 is a top plan view of an apparatus which may be used in carrying out the method of the invention, showing one operating unit in loading position with a dish in place;

Figure 2 is a similar view of the apparatus with the cover plate and portions of two of the operating units removed;

Figure 3 is a section taken on the line 3—3 of Figure 2;

Figure 4 is a section taken on the line 4—4 of Figure 3;

Figure 5 is a section taken on the line 5—5 of Figure 4;

Figure 6 shows the details of construction of one receptacle supporting element;

Figure 7 is a top plan view of the liquid supply valve mechanism;

5 Figure 8 is a section taken on the line 8—8 of Figure 7;

Figure 9 is a section taken on the line 9—9 of Figure 8;

10 Figure 10 is a detail cross section of the handle operating mechanism; and,

Figure 11 is an enlarged detail section of the casting support on the motor housing.

Referring now to the drawings, the apparatus comprises three operating units 10 disposed within a cylindrical casing 12 having a closed base 14 and a removable cover plate 16 adapted to be bolted down while in operation. The cover plate 16 has a cutaway segment 18 forming a permanent opening therein through which loading and unloading of the machine is effected. A cylindrical housing 20 concentric with the casing 12 and integral with the base 14 is provided to surround a motor 22, which is mounted on the base 14 at the center thereof. The drive shaft 24 of the motor 22 carries a clutch member 26, which engages a corresponding clutch member 28 integral with a pulley unit 30 disposed above said motor. The upper rim of the housing 20 carries a ball-bearing 32 having upper and lower ball races 33 and 35 and forming a rotatable support for a casting 34 resting and turning thereon. The housing 20 is also provided with a stationary cam 36, the function of which will be described hereinafter.

35 The casting 34 is substantially hollow and has three arms 38 extending radially and a central shaft 40 projecting upwardly to the cover plate 16. The angle between the center lines of adjacent arms 38 is 120°. Each arm 38 carries one of the operating units 10 which comprise open cylindrical casings 42 enclosing receptacle supporting elements 44 mounted on shafts 46 carrying pulleys 48 adapted to turn therewith. The shafts 46 have central bores 50 extending throughout their length to provide for the projection of streams of water therethrough from the nozzles 52 as hereinafter described. Slack belts 54 connect the pulleys 48 with the pulley unit 30 through the hollow arms 38 of the casting 34. The hollow arms 38 also have disposed therein mechanisms 56 (Figures 4 and 5) which cooperate with the cam 36 carried by the housing 20 to regulate the operation of the units 10.

55 The central shaft 40 of the casting 34 supports the pulley unit 30 by a bolt 58 screwed into a stud 60 projecting downwardly from the lower portion of the shaft 40. The upper end of the shaft 40 has an upwardly projecting stud 61 adapted to engage the handle 62 through a ratchet device 64 (Figure 10). A pin 66 set in the cover plate 16 limits the counter-clockwise movement of the handle 62.

65 Referring now more particularly to Figures 4 and 5, the mechanism 56 comprises a shaft 68 adapted to turn about a fixed axis in the casting 34 and carrying a short arm 70 at its lower end and a link 72 at its upper end. The arm 70 and the link 72 are rigidly affixed to the shaft 68 and move as a unit during the operation of the mechanism. A stud 74 passes through the free end of the short arm 70 and carries a roller 76 adapted to ride on the outer surface of the cam 36. A pin 78 passes through the free end of the link 72 and connects thereto a bell crank lever 80 and an idler 82. The bell crank lever 80 carries a brake shoe 84 at the end of one arm

while the free end of the lever is attached to a spring 86 connected at its other end to a knob 88 projecting from the inner side of the link 72. The idler 82 contacts with the belt 54 and regulates the tension therein during the operation of the apparatus, while the brake shoe 84 is adapted to contact with the hub of the pulley 48 when the particular operating unit involved is in the loading and unloading position. The action of the brake is clearly shown in Figure 4 of the drawings, where in one position the brake shoe 84 is shown in contact with the pulley 48, this position being assumed by the action of the roller 76 moving the arm 72 as the roller 76 follows the cam 36, and in this manner the rotation of the shaft 46 is stopped during the loading and unloading positions. A spring 90 is connected at one end to a pin 92 carried by the link 72 at a point intermediate its length and at the other end to the casting 34 and serves to press 20 the idler 82 firmly against the belt 54 when the unit 10 is in operation.

The open cylindrical casing 42 of each operating unit 10 is bolted to the central shaft 40 of the casting 34 and is adapted to revolve about the axis of said shaft when the arms 38 are moved by the handle 62. The casing 42 has, however, no rotational movement and functions merely as a shield to limit side-splashing during the washing and drying stages. A rubber ring 94 encircles the upper rim of the casing 42 and makes a liquid-tight joint with the under surface of the cover plate 16 to keep liquid from splashing over the top of the shield or casing 42. The receptacle supporting element 44 consists of three supporting arms 96 extending outwardly from the shaft 46 and bolted thereto. The angle between adjacent arms 96 is 120° and the three arms cooperate to form a supporting element adapted to receive inverted receptacles of varying shapes and sizes, as shown in Figure 6. Thus plates and similar receptacles of substantial width are supported with the rim of the receptacle resting on the surfaces 98 while smaller dishes and cup-like receptacles are supported on the surfaces 100. The vertical slots 102 in the arms 96 are adapted to receive inverted receptacles of the nature of glasses while very small receptacles may be supported on the surfaces 104.

50 Shafts 106 extending between the ends of adjacent arms 96 carry locking arms 108 having in bent upper portions and carrying weights 110 at their lower ends. The ends of the shafts 106 pass through and turn in openings in the wing portions 112 integral with and extending outwardly from the supporting arms 96. Bevelled gear segments 114 are provided at the ends of the shafts 106 and form journaled connection therebetween to prevent movement of said arms independently of each other. The locking arms 108 are operable by the centrifugal force resulting from rotation of the element 44 and may be fixedly attached to the shafts 106 in any desired manner. In the embodiment shown in the drawings two locking arms 108 are provided on each shaft 106, one of said arms being located midway between the ends of the shaft and the second arm being offset. It will also be noted that the weights 110 are carried by one only of the two locking arms on each of the said shafts. The invention is not intended to be limited, however, by the number of locking arms provided nor by the number and distribution of the weights 110.

Water or other cleansing liquid is supplied to the apparatus through line 124 and the distribut- 75

ing pipes 126 and 128. The flow is controlled by a valve mechanism 130 (Figures 7, 8 and 9) operated automatically by studs 132, projecting downwardly from the end of each of the arms 38 on the casting 34, which act on a trigger 134 carried by a valve stem 136. The valve mechanism 130 has a valve casing 138 provided with an inlet opening 140, adapted to receive the supply line 124, and two outlet channels 142 and 144 connected with the distributing pipes 126 and 128, respectively. The rotatable valve stem 136 passes through the upper portion of the valve casing 138 and carries a circular plate or disc 146 secured to its lower end. Four openings 148 are disposed radially at intervals of 90° in the disc 146 with the centers of the openings 148 lying on a circle passing through the centers of openings 150 and 152 in the outlet channels 142 and 144. The trigger 134 has four arms 154 corresponding to the openings 148 in the disc 146 so that the valve will open and close once during each 90° movement of the valve stem 136.

Snap pins 116 acted upon by springs 118 project from the outer end of each of the arms 38 and are adapted to engage an extension on a lock 120 located on the inner wall of the casing 12. The lock 120 has a hand lever 122 for disengaging the pins 116 and cooperates with said pins to limit the free clockwise movement of the casting 34 to 120°.

The distributing pipe 126 extends upwardly along the side of the casing 12 and connects with a tubular opening 156 extending partially through the cover plate 16 toward the center thereof. Two nozzle openings 158 and 160 are provided in the lower side of the tubular opening 156 to project cleansing liquid downwardly upon a receptacle supported on the element 44. The nozzle 160 is aligned with the center of the element 44 while the nozzle 158 is offset therefrom. The remaining distributor pipe 128 extends horizontally toward the center of the casing 12 and is provided with two upwardly projecting nozzles 52 and 162, the nozzle 52 being in line with the center of the element 44 and the nozzle 162 being offset therefrom. The two center nozzles 160 and 52 are best adapted to project vertical streams of liquid upon the receptacle as is indicated in the drawings. The offset nozzles 158 and 162 may advantageously be adjustable as to direction of the streams projected therefrom in order to insure liquid-receptacle contact when very small receptacles are being cleansed. The invention is not limited, however, to any specific adjustment of the offset nozzles.

A drip pan 164 is provided in the annular space 166 between the inner wall and the casing 12 and the outer wall of the motor housing 20, forming a trough-like false bottom fixedly attached to the two said walls. Waste material and used cleansing liquid collecting in the pan 164 are discharged through the opening 168 located in the pan adjacent the entrance to the loading stage, as indicated in Figure 2. To facilitate the discharge from the opening 168, the pan 164 may advantageously be inclined circumferentially, sloping both clockwise and counterclockwise from a high point at the entrance to the drying stage to a low point at the location of the opening 168.

When the apparatus is adapted to its intended use the line 124 is connected to a source of cleansing liquid supply and the motor 22 is connected with a source of electric current. The handle 62

is turned in a clockwise direction until one of the operating units 10 is positioned at the loading stage of the apparatus directly beneath the opening 18 in the cover plate 16. The snap pin 116 then engages the lock 120 while the mechanism 56 operates to release the tension on the belt 54 and to force the brake shoe 84 against the hub of the pulley 48, thereby inhibiting all movement of the unit in this position. Since the element 44 is not in rotation the weights 110 carried by the locking arms 108 raise the upper portions thereof so that a receptacle to be cleansed may be placed upon the supporting element 44.

After loading one of the units 10 in the manner described above, the snap pin 116 of the loaded unit is released by operation of the hand lever 122. The handle 62 is turned counter-clockwise through the ratchet device 64 until it strikes the pin 66 in the cover plate 16 and is then moved in a clockwise direction for 120°, thus positioning the loaded unit at the washing stage of the apparatus which is defined by the location of the cleansing liquid supply line 124. As the loaded unit leaves the loading stage, the mechanism 56 cooperates with the cam 36 to withdraw the brake shoe 84 from the hub of the pulley 48 and to increase the tension on the belt sufficiently to occasion rotation of the loaded supporting element 44 by the pulley and belt connection between the said element and motor 22. The centrifugal force produced by such rotation then causes the weights 110 to move outwardly bringing the upper portions of the locking arms 108 down upon the receptacle supported on the element 44 to hold the same firmly in place. Since all of the locking arms 108 operate as a unit the receptacle held in place by the said arms is automatically centered thereby. As the loaded unit 10 approaches the washing stage the stud 132 moves the trigger 134 to bring two diametrically opposite openings 148 in the disc 146 in line with the openings 150 and 152 of the outlet channels 142 and 144, thus rendering the valve mechanism 130 operative to pass cleansing liquid to the distributing pipes 126 and 128. The cleansing liquid flowing through the pipe 126 projects downwardly, through the nozzles 158 and 160, against the upper surface of the base of the receptacle supported on the element 44, in two streams normal to the plane of the said base. At the same time two streams of liquid are projected upwardly in a similar manner from the nozzles 52 and 162 in the distributing pipe 128 against the under surface of the receptacle base. The liquid thus brought into contact with the surface of the receptacle base is subjected to the action of the centrifugal force resulting from the rotation of the receptacle and effects a vigorous cleaning thereof.

Since the operating units 10 are 120° apart the positioning of a loaded unit 10 at the washing stage of the apparatus automatically brings a second unit 10 to the loading stage, directly beneath the opening 18 in the cover plate 16, where it is locked in position and rendered inoperative as hereinbefore described. With one operating unit 10 at the washing stage and one at the loading stage the remaining unit 10 is at the drying stage where it is rotationally operative but removed from the source of cleansing liquid supply. The loading operation is repeated with the unit 10 now positioned at the loading stage and the handle 62 again turned counter-clockwise to the pin 66 and then clockwise for 120° bringing

a second loaded unit 10 to the washing stage and moving the first loaded unit 10 from the washing stage to the drying stage. The initial movement of the unit leaving the washing stage causes the stud 132 to move the trigger 134 sufficiently to close the valve 56, the said valve remaining closed until a second loaded unit 10 approaches the washing stage. The first loaded unit 10 while at the drying stage effects a complete drying of the receptacle carried thereby due to the centrifugal force produced by the continued rotation of the receptacle and its supporting element 44 out of contact with water or other cleansing liquid. The remaining operating unit 10 is now at the loading stage and, after receiving a receptacle to be cleansed, is moved to the washing stage. This causes the second loaded unit to move to the drying stage and brings the first loaded unit back to the loading stage. The cleansed receptacle carried thereby is removed, another receptacle to be cleansed is placed in the unit, and the cycle of operations repeated.

We claim:

1. Apparatus for cleansing and drying dishes, comprising a cylindrical casing, an axial hollow upright manually rotatable therein, a series of spaced hollow arms extending radially from said upright, article containers rotatably mounted at the ends of said arms within said casing, a vertical drive shaft projecting into said upright, means for rotating said shaft, endless belt driving connections extending through said upright and arms from said shaft to said containers, and

means for adjusting said belts whereby one of said driving connections is rendered inoperative by the reduction of the tension therein.

2. Apparatus for washing and drying dishes, comprising a cylindrical casing, an axial upright rotatable therein, a series of spaced arms extending radially from said upright, article containers mounted at the ends of said arms within said casing, guard casings surrounding each container carried by said arms, a liquid supply means having spray nozzles above and below one of the containers, and means to control the flow of liquid therethrough actuated by the rotation of said upright.

3. Apparatus for washing and drying dishes, comprising a casing, a series of article containers movable in a circular path therein, an upright having equally spaced radial arms in which said containers are rotatably mounted, their axes being equidistant from the axis of said upright, said containers being progressively movable about said upright into loading, washing and drying positions, a motor vertically disposed in said casing beneath said upright and having a pulley on its shaft for each container, a pulley on each container, belts trained over each motor pulley and the corresponding container pulley, and means for rendering each belt as it assumes the loading position inoperative to stop the rotation of the container.

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