

April 4, 1939.

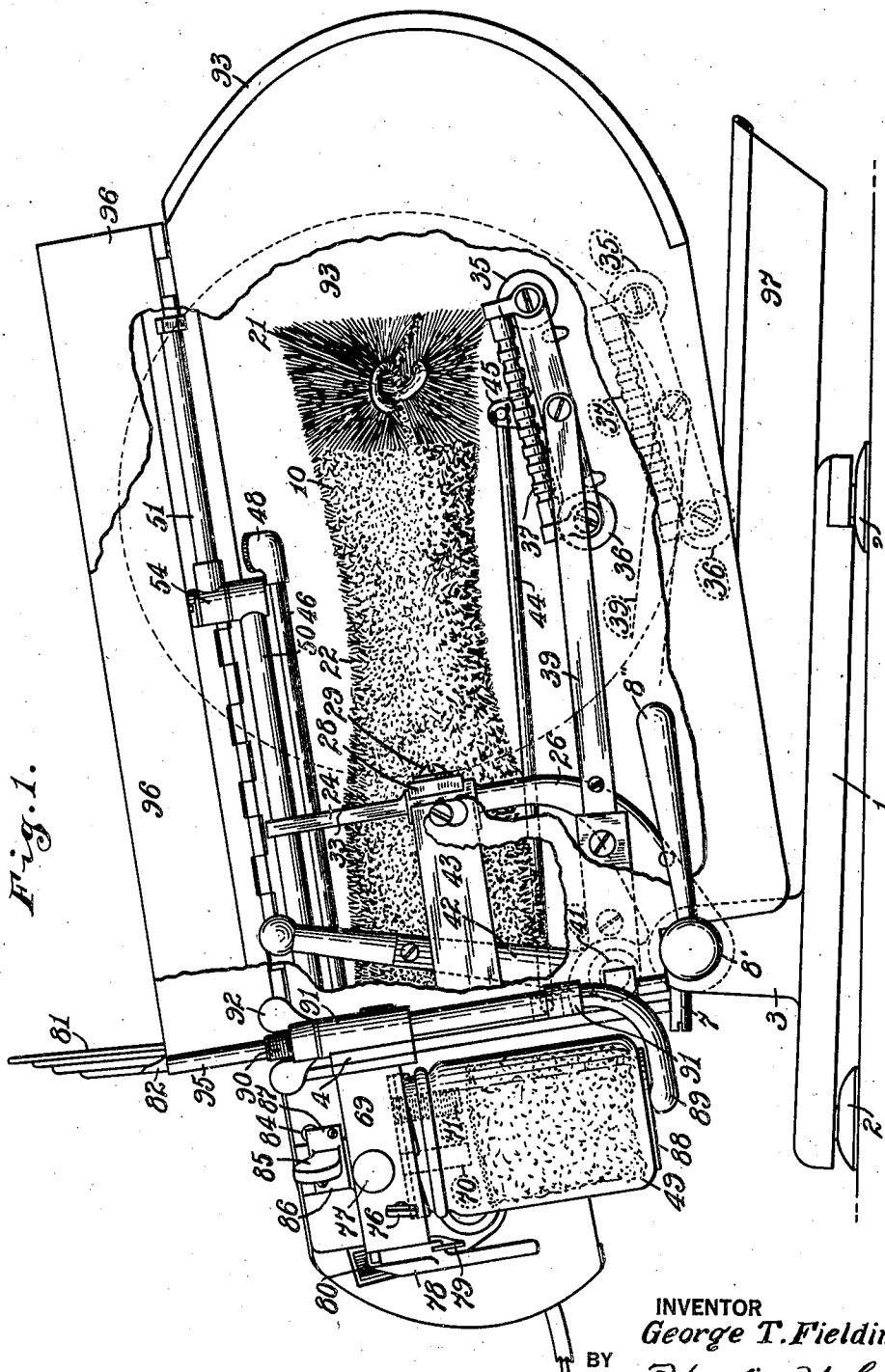
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2,153,303

DISHWASHING APPARATUS

Filed June 27, 1934

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

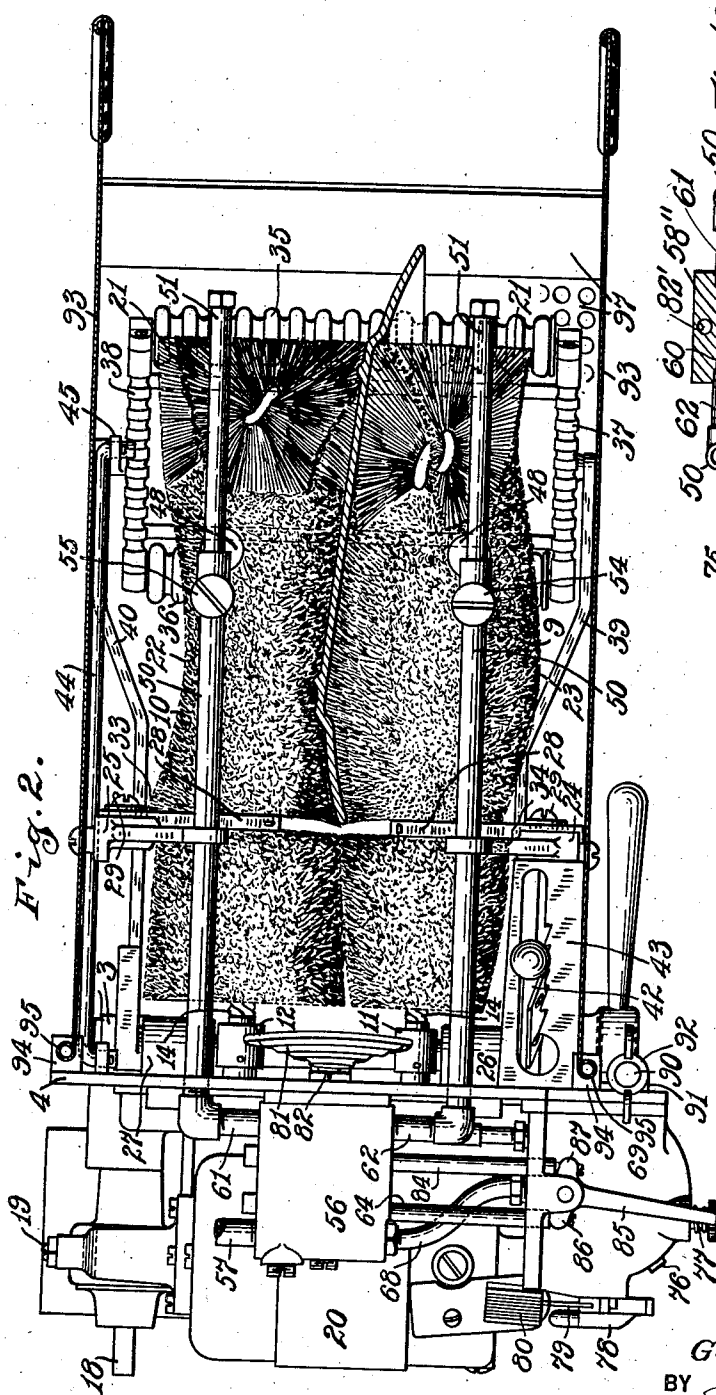


Fig. 2.

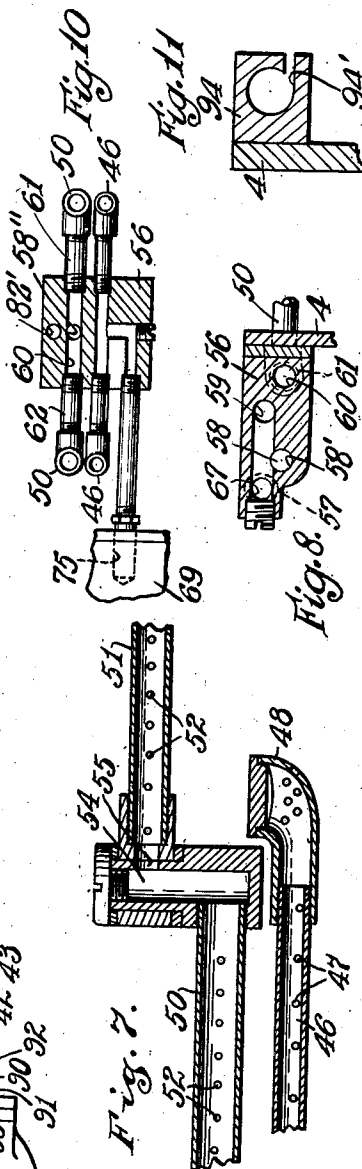


Fig. 7.

Fig. 8.

Fig. 10.

Fig. 11.

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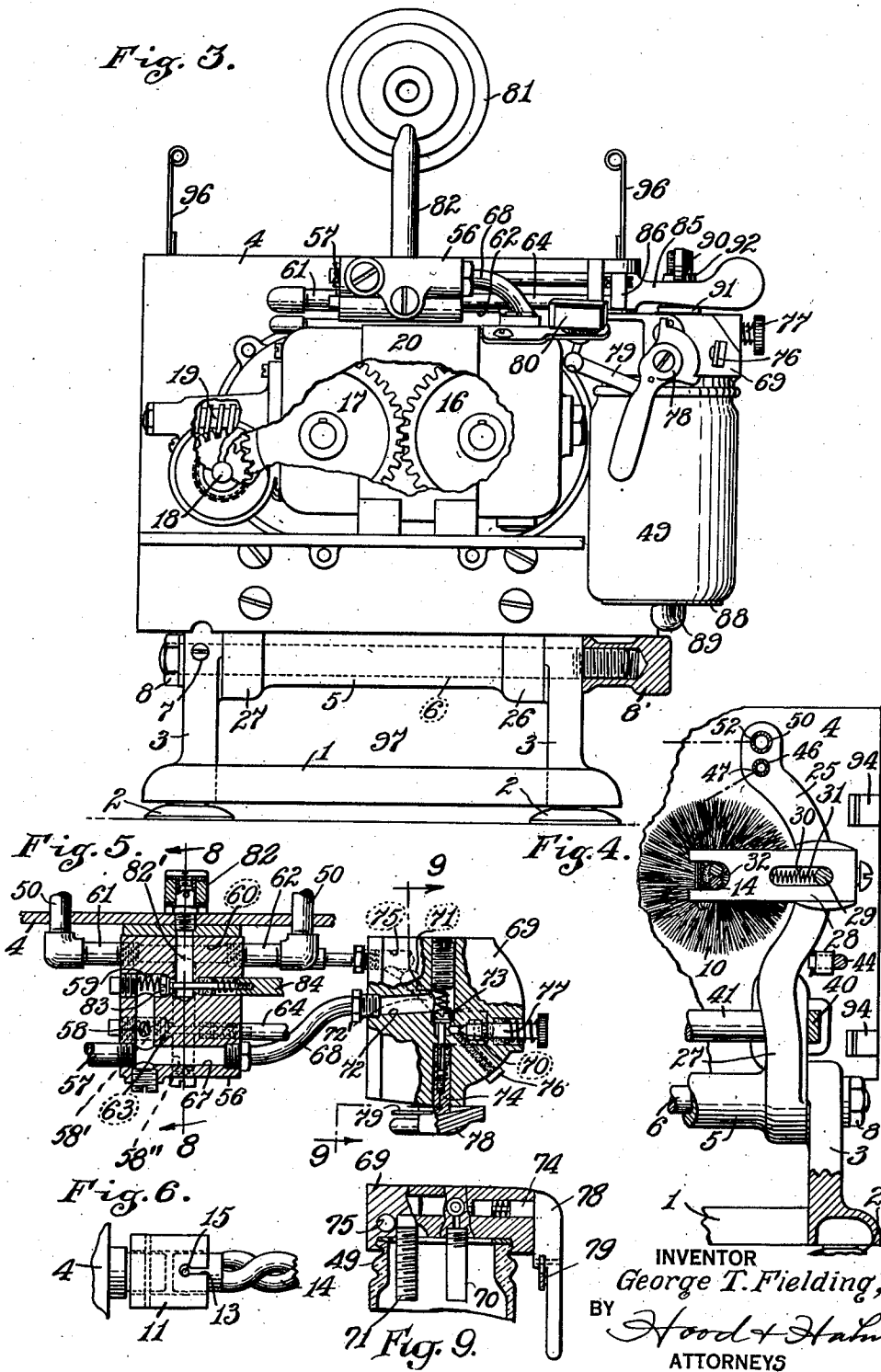
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Fig. 3.



UNITED STATES PATENT OFFICE

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DISHWASHING APPARATUS

George Thomas Fielding, Stamford, Conn.

Application June 27, 1934, Serial No. 732,697

16 Claims. (Cl. 15-74)

The present invention relates to apparatus for washing dishes and the like and has for one of its objects that of providing a dish washing machine which will thoroughly cleanse and wash the dishes through the scrubbing action of a pair of rotary brushes and through the medium of a suitable cleansing fluid applied to the dishes during the scrubbing action, and which will rinse the dishes as they are removed from under the sphere of the brush bristles and to accomplish the above result in a rapid and efficient manner.

Another object of my invention is to provide an apparatus having the above characteristics which will accommodate itself to various types of dishes, bowls, and glassware, and the like and which shall be economical to manufacture and to operate.

For the purpose of disclosing the invention I have illustrated one embodiment thereof in the accompanying drawings in which

Fig. 1 is a side elevation of the washing machine embodying my invention;

Fig. 2 is a plan view thereof;

Fig. 3 is an end elevation thereof with certain of the shields removed;

Fig. 4 is a detail view showing the supporting means for the front end of the brushes;

Fig. 5 is a detail sectional view of the liquid, both cleansing and rinsing, control;

Fig. 6 is a detail view of the drive mounting for the brushes;

Fig. 7 is a detail sectional view showing the valve control for a portion of the rinsing tubes;

Fig. 8 is a detailed section on line 8-8 of Fig. 5;

Fig. 9 is a detailed section on line 9-9 of Fig. 5;

Fig. 10 is a detailed section showing the entry ports for the soap fluid to the soap delivery nozzle; and

Fig. 11 is a detailed section of the supporting posts for the splash plates.

In the embodiment of the invention I provide a base 1 which may be in the form of a rectangular frame having suction feet 2 at each corner thereof. Extending upwardly from this frame near one end thereof is a pair of standards 3 on which is pivotally mounted a substantially vertically extending support plate 4. This plate at its lower end is provided with a hollow bearing 5 adapted to receive the bearing rod 6 extending between the standards 3, which rod, at one end, is held against rotation by a pin 7 extending through one of the standards and into the rod. The rod at one end is provided with a nut head 8 and at its opposite end is provided with a clamping nut 8' having an operating lever 8''. By pulling the

nut 8' up tight it will be seen that the two standards 3 are pulled into tight frictional engagement with the spindle portion 5, the spring of the metal of the standards 3 permitting this. This arrangement permits the adjustment of the supporting plate 4 to any desired angle, even to the extent of permitting the plate to be thrown to a position in a plane substantially parallel with the plane of the base.

This plate provides a support for practically the entire working mechanism of the washing apparatus which includes brushes for scrubbing, simultaneously, both sides of the article to be cleaned, means for delivering a cleansing fluid to the article to be cleaned during the scrubbing action and means for delivering a rinsing fluid to the articles after they have been cleansed and scrubbed.

The brushes 9 and 10 for scrubbing the articles extend substantially at right angles to the face of the supporting plate 4 and to this end I provide a pair of rotating shafts having brush receiving socket members 11 and 12 preferably provided with axial slots 13. Each of the brushes preferably consists of a bristle brush, the bristles of which are intertwined with twisted wires 14, forming the core of the brushes and in effect a shaft. The rear end of this wire is provided with a pin 15 adapted to engage in the slots 13 whereby a drive is established between the shafts and their respective brushes. Each of the shafts extends through to the opposite face of the plate 4 and each of the shafts carries a driving gear, respectively, 16 and 17. These gears intermesh so that the driving of one gear will drive the other and the relation of the gears is such that while one of the brushes is driven in a clockwise direction the opposite brush is driven in a counter-clockwise direction; the direction of drive being such that the brushes, when in a horizontal position, rotate in a direction to draw the plates inserted therein towards the base member. One of the gears 17 is driven from a pinion on a shaft 18, which shaft is provided with a worm gear meshing with a worm on the shaft 19 of an electric motor 20. This motor 20 is bolted or otherwise secured to the rear face of the plate 4. A suitable cover is provided for the worm drive as well as a cover for the gears heretofore described.

The brushes are formed of fiber, care being taken to select the fiber construction of the brushes so that there will be at least sufficient animal bristles among the vegetable fiber bristles to tend to strengthen the whole mass of bristles or prevent them from becoming unduly crushed.

At the end of each brush I preferably provide a set of tufted bristles such as 21 which preferably consist of animal bristles twisted in the wires and the wires then bent back and turned upon themselves to present a tufted arrangement substantially as is shown.

The advantage of this construction will appear more fully hereinafter. It will also be noted that the brushes are of irregular configuration. The brush 10, for instance, is provided with a concaved periphery 22 and the brush 9 having a convex portion 23 coinciding and mating with the portion 22 so that the brushes at all times will rotate in contiguous relation and the brushes will contact with the irregular faces, both back and front, of dishes to be cleansed. In order to support the brushes at a distance beyond their rear ends, to give rigidity to the same, I provide a pair of supporting arms 24 and 25, one for each brush, which extend upwardly from forwardly extending brackets 26 and 27 mounted on the supporting plate 4. Extending inwardly from these arms are bearing members 28, one for each brush, which are secured in guide channels on the arms by means of pins 29 extending through slots 30 in the bearing members. These pins prevent the removal of the bearing members from the arms 24 but secure them in position to permit a sliding movement thereof and, to maintain the bearing arms 28 in their advanced position, I interpose between the screws 29 and the end walls of the slot 30 coiled springs 31. The forward ends of these bearing arms have bearing openings such as 32 to receive the cores or shafts 14 of the respective brushes, and to accommodate these bearing arms the fibers of the brushes at this point are cut out to a certain extent. However, a certain portion of the fibers which remain twisted in the shafts 14, in the shortened condition, provide frictionless bearing for the shafts at this point. Due to the springs 31 and the slotted mounting of the bearing arms 28, the brushes are maintained in contiguous relation at all times while when articles to be cleansed are inserted therebetween a certain amount of give or spread is permitted. The cutting away or cutting out of the fibers to accommodate the bearing arms 28 leaves a spaced portion in the brushes and in order that, during the scrubbing operation, there may be no portions untouched the fibers of the brush on one side of this cut out portion are made longer to make the brushes larger in diameter as at 33 and 34. By this arrangement, when the article is interposed between the brushes the higher portion will lay over the cut out portion and there will be no blank spaces in the brushes. Furthermore, it will be noted that the bearing arms 28 extend very slightly beyond the shafts 14 of the brushes so that a clear throat will be left between the brushes.

For supporting the articles between the brushes during the scrubbing operation I provide a supporting frame which preferably consists of a rectangular frame member having front and back ribbed rollers 35 and 36, the rollers preferably having their surfaces corrugated as illustrated and the side rollers 37 and 38, which are preferably of smaller diameter, are ribbed like the front and back rollers. This frame is pivotally supported between the outer end of a pair of arms 39 and 40 extending forwardly from the supporting plate 4 and pivotally mounted at 41 on the plate, whereby the frame may be adjusted towards and away from the brushes. This adjustment is accomplished by an adjusting lever 42 which is

adapted to engage a rack on an arm 43. In order to maintain the plane of the frame in substantially the same relation to the brushes irrespective of the adjustment of the frame I provide a link arm 44 connected to an upwardly extending arm 45 on the frame, at one end, and to the supporting plate 4 at its other end.

The cleansing fluid is directed onto the article to be scrubbed and towards the throat of the brushes by means of a pair of directing tubes 46, one above each brush, extending forwardly from the supporting plate 4 and provided on their inner sides with spray openings 47. At their forward ends these tubes are provided with rounded heads 48 having spray openings extending radially inwardly so that the fluid will be directed clear to the tip end of the brushes, the tubes stopping short of the brushes at about the point where the tufted portion 21 commences. The cleansing fluid tubes extend through the supporting plate and communicate with a soap container 49 preferably in the form of a glass container. The construction and arrangement of this portion will be more fully described hereinafter.

In addition to the cleansing fluid spray tubes I provide, above each of these spray tubes, a rinsing fluid spray tube 50 which at its forward end is provided with a pivoted extension 51. The tube and its extension are each provided with spray openings 52 on their inner faces to direct the fluid toward the article to be cleansed and the pivot portion 54 of each extension 51 is provided with a cutoff valve opening 55 whereby when the extension 51 is folded back the flow of water to this extension is likewise cut off. These rinsing spray tubes also extend forwardly from the plate 4 and are supported by said plate. They, like the cleansing fluid tubes, extend through the plate and are connected with a suitable control valve 56. The valve member 56 has a connection 57 with a water supply which in turn communicates through a suitable port 58, and passages 58' and 58'' with the rinse water supply delivery port 60. This port has a pair of branches 61 and 62 communicating respectively with the rinsing tubes 50 and interposed in the passage 58' is a control valve 63 operated by the stem 64 for controlling the flow of water through the rinsing tubes. The control valve 56 likewise has a by-pass port 67 connected by a pipe 68 with a control valve 69 controlling the admission of fluid to the soap container 49. This block or valve member 69 is provided on its under face with a delivery nozzle 70 for delivering the water into the soap container 49 and a receiving nozzle 71 through which the water, after having taken up a certain proportion of the soap, will be delivered to the cleansing fluid tubes. For controlling the flow of cleansing fluid the valve block 69 is provided with a port 72 communicating with the nozzle 70 and controlled by a valve 73 operated by a stem 74. A by-pass 72' extends from the ports 72 to the delivery port 75, which delivery port communicates with a receiving nozzle 71 so that, if desired, a certain portion of the water intended for the soap container may be by-passed whereby the soapiness of the cleansing fluid may be controlled. This by-pass is controlled by an adjusting valve 76, and the amount of water flowing through the nozzle 70 and thereby the force thereof, may be controlled by an adjustable valve 77. When the valve 74 is opened the water flowing from the inlet pipe 57 through the conduits 68 and 75

the port 72 is delivered to the soap container 49 and thence out of the soap container by the nozzle 71 and port 75 to the valve block 56 which has a pair of ports in communication with the tubes 46. The valve 74 is controlled by a cammed valve handle 78 and this valve handle is likewise connected by a link 79 with a snap switch 80 controlling the circuit through the electric drive motor 20 for the brushes. This arrangement is such that when the circuit through the motor is closed for the purpose of driving the brushes the flow of cleansing fluid through the fluid delivery pipes is also started.

An additional spray member in the form of a disc 81, perforated on its front face, is adapted to extend upwardly from the supporting plate 4 and this spray member communicates through a pipe 82 with a port 82' in the valve block 56, which port is controlled by a valve 83 having a stem 84. The two valve stems 64 and 84 are controlled by a swinging arm 85 T-shaped and adapted by its two opposite arms 86 and 87 to operate the valve stems whereby the operator can control the flow of rinsing water either through the rinsing tubes or the rinsing disc.

The soap container 49 is held in position by a clamping disc 88 mounted on the arm 89 which is offset from a stem 90 swiveled in socket guides 91 on the side of the supporting plate 4. The upper end of this stem is screw threaded and receives an adjusting nut 92 by which the stem may be lowered to release the soap container 49 or it may be raised sufficiently to clamp the soap container on the under side of the head 69.

In order to prevent splashing during the washing operation I provide a pair of side members 93, each of which is adapted to be supported on one side of the scrubbing apparatus from the supporting plate 4, and to this end this plate is provided with forwardly extending lugs 94 having openings and slots 94' therein to receive the beaded end 95 of each plate. This plate is also provided with hinged extension members 96 which may be folded inwardly to prevent upward splashing.

For catching refuse which may be scrubbed off of the plate or other article I preferably provide beneath the brushes a pan 97 preferably having a foraminous bottom. This pan is removable and in some instances it need not be used, it being supported on the bottom or base 1.

In operation the article to be cleansed is inserted between the rotating brushes which, it will be noted, rotate in opposite directions and in a direction to draw the plate downwardly. The plate, being drawn between the brushes eventually, is supported on the frame, this frame having been adjusted to a suitable height and it will be noted that the greater friction of the brushes on the plate is past the center of the plate, although a certain proportion of the brushes project beyond the vertical center of the plate. A part of this portion, however, of the brushes which projects beyond the vertical center is not as heavy and does not have the same frictional engagement with the plate as does that portion of the brush on the opposite side of the vertical center of the plate. Therefore during the rotation of the brushes the brushes also rotate the plate on its axis. Particularly due to the fact that the plate is resting on the rollers 35 and 36 it can rotate. However, due to the slight frictional engagement of the brushes beyond the axis of the plate, the brushes at this point have a tendency to retard the rotation of the plate and as a

result, while the plate is rotated under the action of the brushes so that all surfaces will be presented for cleansing, the movement of the plate is slower than that of the brushes so that the brushes will exert a scrubbing action on the plate or other article. By the connection of the cleansing liquid valve with the electric motor, when the electric motor is started to rotate the brushes, the flow of water through the soap container is likewise started and a supply of cleansing liquid is directed inwardly and towards the throat between the brushes by the cleansing liquid tubes, a certain amount of the liquid also being directed towards the ends of the brushes. As a result, when the article to be cleansed is inserted between the brushes the brushes themselves are saturated with the cleansing fluid and likewise a stream of cleansing fluid is directed towards both sides of the article. When the article is sufficiently cleansed, by manipulating the valve handle 85, streams of rinsing water are directed against both surfaces of the article as it is withdrawn from between the brushes and after it has passed beyond the cleansing liquid. It will be noted that in this case the streams of water are directed towards the plate or article to be cleansed and also towards the throat of the brushes so that it will not only tend to rinse the article but will also tend to rinse the brushes themselves, thereby removing any grease or food particles which may have adhered to the brushes.

Due to the fact that the ends of the brushes are tufted, hollow articles such as large glasses, bowls, and the like may be readily cleansed by placing the hollow article over the ends of the brushes and in this case the edges of the articles would be supported by the side rollers 37 and 38. Under these circumstances only the exterior of the article would be rinsed and it is therefore desirable after the article has been removed from the brushes to hold the same before the spray head so that the interior of the article may be thoroughly rinsed and cleansed.

While under most circumstances the brushes would be operated in a horizontal position it is obvious that the supporting plate 4, as heretofore described, could be tilted to a position where the brushes are extending in a vertical direction or in a substantially vertical direction.

I have found from experience that the brushes should be rotated sufficiently fast for centrifugal force to have a tendency to throw the water or cleansing liquid out towards the periphery of the brushes but that this speed should not be so great as to have a tendency to spray or throw the water off and to accomplish the best results in the structure illustrated, I have found that a speed of about from 250 to 350 R. P. M. is quite satisfactory, as at this speed, while the liquid is thrown towards the periphery of the brushes, it does not go much beyond the periphery of the brushes and is thrown merely sufficiently far to clear the brushes and it will then drop down into the pan.

I claim as my invention:

1. A dish washing device comprising, in combination, a pair of rotary bristle scrubbing brushes mounted in substantially the same plane and in substantially parallel relation with the peripheries of said brushes in contiguous relation, the bristles of said brushes being more dense at one end than at the other, and means for rotatably supporting the article to be cleansed between said brushes in a position to have a denser portion of the brushes engaging on one side of

substantially the center of said article and the less dense portion engaging the other side to cause one portion of the brushes to impart a rotative movement to the articles while the other portion of the brushes retard said rotative movement.

2. A dish washing device comprising, in combination, a pair of rotary scrubbing brushes mounted in substantially the same plane and in substantially parallel relation with the peripheries of said brushes in contiguous relation, and means adjustable toward and from said brushes for supporting the articles to be cleansed between said brushes.

3. A dish washing device comprising, in combination, a pair of rotary scrubbing brushes mounted in substantially the same plane and in substantially parallel relation with the peripheries of said brushes in contiguous relation, means for rotating said brushes in opposite directions, and a substantially rectangular open frame on the delivery side of said brushes for supporting the articles to be cleansed between said brushes.

4. A dish washing device comprising, in combination, a pair of rotary scrubbing brushes mounted in substantially the same plane and in substantially parallel relation with their peripheries in contiguous relation, means for rotating said brushes in opposite directions, and a substantially rectangular open frame on the delivery side of said brushes adjustable to and from the brushes for supporting the articles to be cleansed between said brushes.

5. A dish washing device comprising, in combination, a pair of rotary scrubbing brushes mounted in substantially the same plane and in substantially parallel relation with the peripheries of said brushes in contiguous relation, means for rotating said brushes in opposite directions, and a substantially rectangular frame having rollers on its four sides arranged on the delivery side of said brushes for supporting the article to be cleansed between said brushes.

6. A dish washing device comprising, in combination, a pair of rotary scrubbing brushes mounted in substantially the same plane and in substantially parallel relation with the peripheries of said brushes in contiguous relation, supporting means arranged on one side of said brushes in substantially parallel relation with said brushes receiving and supporting the articles to be cleansed between said brushes, means supported at one end only for adjusting said supporting means to and from the brushes and for maintaining said supporting means in its parallel relation with the brushes throughout its adjustment.

7. A dish washing device comprising, in combination, a base, a supporting plate pivotally mounted on said base and swingable from right angle to parallel relation to said base, a pair of rotary scrubbing brushes having their peripheries in contiguous relation projecting from one face of said plate, cleansing fluid delivery nozzles extending from said face of said plate substantially parallel with said brushes, and a motor for driving said brushes in opposite directions mounted on the opposite face of said plate.

8. A dish washing device comprising, in combination, a base, a supporting plate pivotally mounted on said base to swing from a right angle to parallel position with respect to said base, a pair of rotary scrubbing brushes extending from one face of said base with their peripheries

in contiguous relation, cleansing fluid delivery tubes extending from the face of said plate in parallel relation to said brushes, rinsing fluid tubes extending from the same face of said plate in parallel relation to the brushes, a motor for driving said brushes in opposite directions mounted on the opposite face of said plate, and means for controlling the flow of fluid through said tubes mounted on said opposite face of said plate.

9. A dish washing device comprising, in combination, a base, a supporting plate pivotally mounted on said base to swing from a right angle to parallel position relative to said base, a pair of scrubbing brushes extending from one face of said plate having their peripheries in contiguous relation, means for supporting the articles to be scrubbed between said brushes extending from said face of said plate, and a motor for driving said brushes in opposite directions mounted on the opposite face of said plate.

10. In a dish washing device, comprising, in combination, a pair of rotary scrubbing brushes mounted in substantially the same plane and in substantially parallel relation with the peripheries of said brushes in contiguous relation, a pair of supporting arms on one side of said brushes, pivotally mounted at one end to permit adjustment of the free ends relatively to the brushes, an article support mounted on the free ends of said arms for adjustment relatively to the brushes with the adjustment of the free ends of the arms and means for maintaining said article support in substantially paralleled relation to the brushes throughout its adjustment.

11. A dish washing device, comprising, in combination, a pair of rotary scrubbing brushes mounted in substantially the same plane and in substantially parallel relation with the peripheries of the brushes in contiguous relation, a pair of supporting arms mounted on one side of said brushes, and pivoted at one end to permit an adjustment of the free ends thereof relatively to the brushes, an article support pivotally mounted on the free ends of said arms and adjustable relatively to the brushes with the adjustment of said arms, and means for rocking the said support on its pivot with the adjustment of the arms to maintain the support in substantial parallelism with the brushes throughout its adjustment.

12. A dish washing device, comprising in combination, a base, a supporting plate pivotally mounted on said base and swingable from right angle to parallel relation to said base, a pair of rotary scrubbing brushes projecting from one face of said plate, an article support carried by said plate and positioned on the delivery side of said brushes, and cleansing fluid delivery nozzles extending from said plate substantially parallel with said brushes.

13. A dish washing device, comprising, in combination, a base, a supporting plate pivotally mounted on said base and swingable from right angle to parallel relation to said base, a pair of rotary scrubbing brushes projecting from one face of said plate, cleansing fluid delivery nozzles extending from said face of said plate substantially parallel with said brushes, and shields arranged on each side of said brushes and extending from said face of said plate.

14. A dish washing device comprising, in combination, a supporting plate arranged to be supported in a substantially vertical position, a plurality of brushes projecting from said supporting plate at substantially right angles thereto,

means mounted on the rear face of said supporting plate for driving said brushes in opposite directions, and a supporting member for the articles to be cleansed projecting from said supporting plate and beneath said brushes, and a motor mounted on said supporting plate and adapted to drive said brush driving means.

15. A dish washing machine comprising, in combination, a supporting plate arranged to be supported in a substantially vertical position, a plurality of brushes extending substantially at right angles to said plate and rotatable in opposite directions in contiguous relation to one another, means on the opposite face of said plate for driving said brushes in opposite directions, a motor for driving said driving means carried by said plate and a supporting frame projecting from said plate in a substantially parallel relation with said brushes and arranged beneath said brushes,

and including a plurality of rollers adapted to receive and support the articles to be cleansed.

16. A dish washing machine comprising, in combination, a supporting plate adapted to be supported in a substantially vertical position, a plurality of brushes extending from one face of said plate in substantially the same plane and rotatable in contiguous relation to one another, means on the opposite side of said plate for driving said brushes in opposite directions, a motor carried by said supporting plate for driving said driving means, and a supporting frame carried by said supporting plate and mounted on said plate beneath said brushes and extending in substantially parallel relation to said brushes, said frame carrying a plurality of rollers for supporting the articles to be cleansed between said brushes.

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