Oct. 18, 1960 E. C. LEVIT ET AL 2,956,572

ROTARY SPRAY TUBE FOR DISHWASHERS

Filed July 16, 1956 4 Sheets-Sheet 1

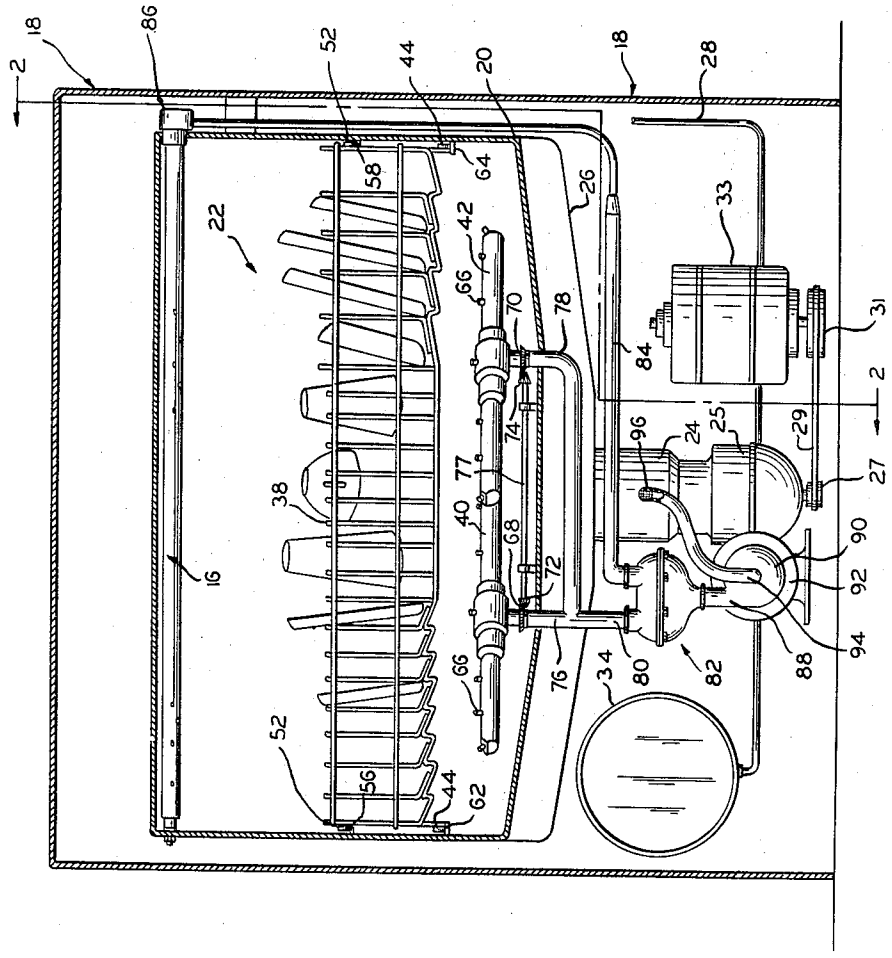


Fig. 1

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4 Sheets-Sheet 2

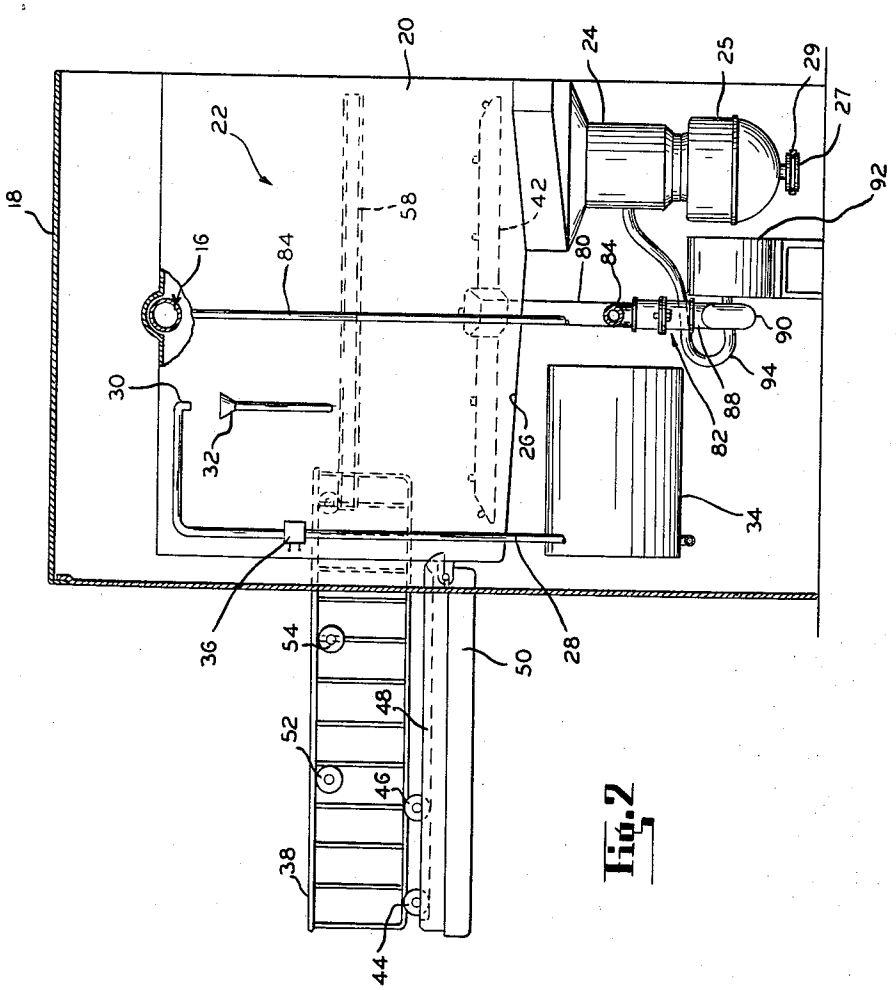


Fig. 2

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ROTARY SPRAY TUBE FOR DISHWASHERS

Filed July 16, 1956 4 Sheets-Sheet 3

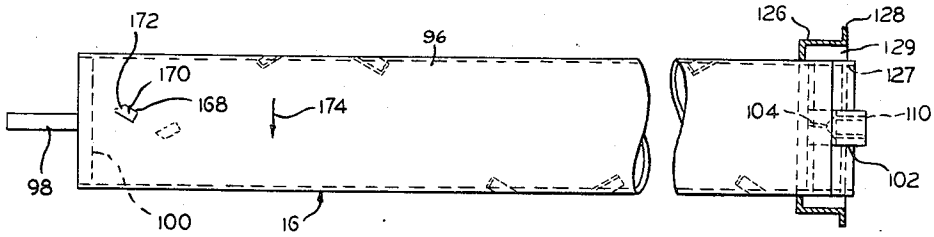


Fig. 3

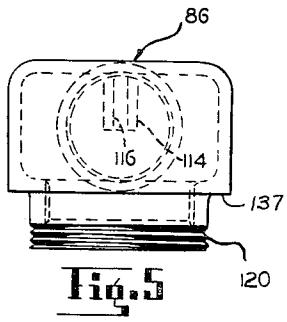


Fig. 5

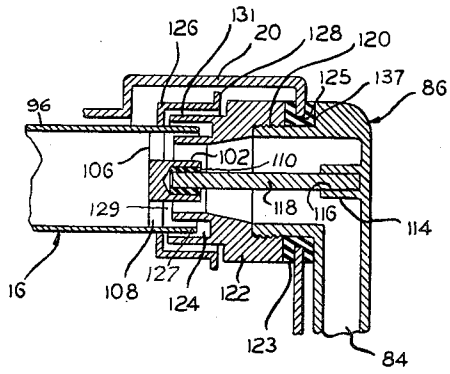


Fig. 4

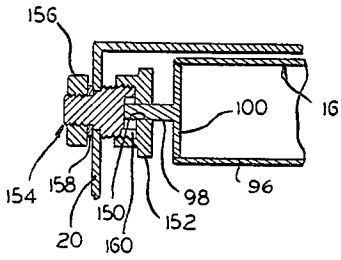


Fig. 6

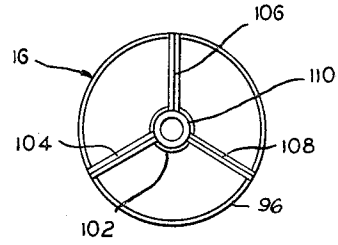


Fig. 7

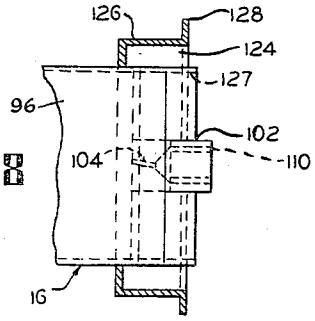


Fig. 8

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ROTARY SPRAY TUBE FOR DISHWASHERS

Filed July 16, 1956 4 Sheets-Sheet 4

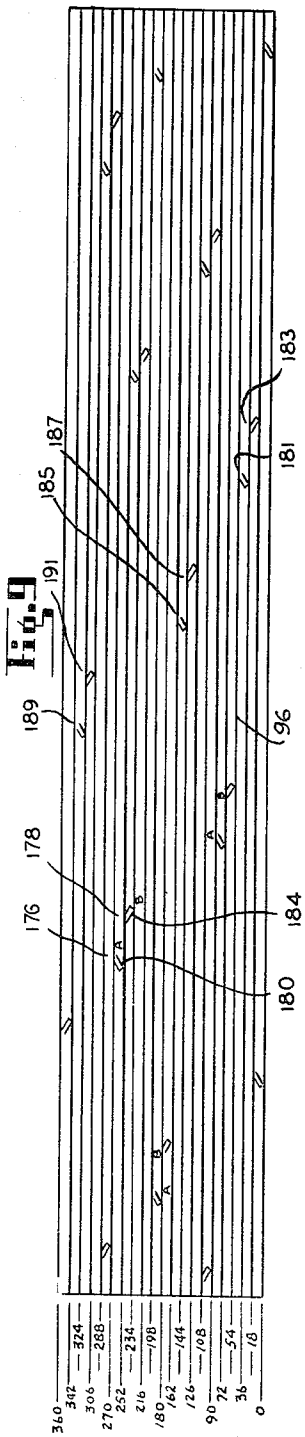


Fig. 4

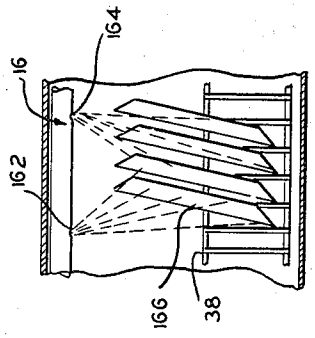


Fig. 12

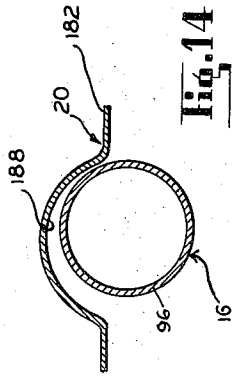


Fig. 14

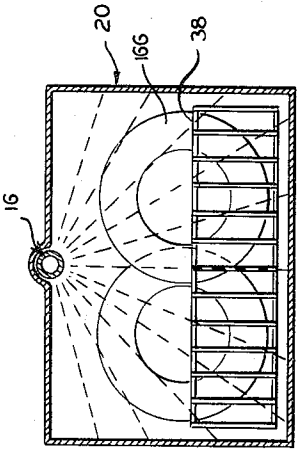


Fig. 11

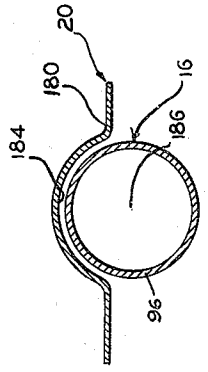


Fig. 17

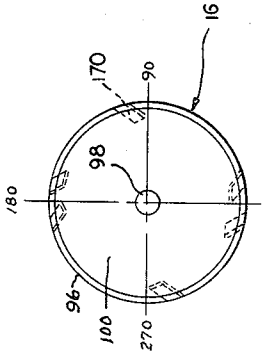


Fig. 13

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United States Patent Office 2,956,572 Patented Oct. 18, 1960

2,956,572

ROTARY SPRAY TUBE FOR DISHWASHERS

Edward C. Levit and James G. Ruspino, St. Joseph, Mich., assignors to Whirlpool Corporation, a corporation of Delaware

Filed July 16, 1956, Ser. No. 598,074

8 Claims. (Cl. 134—176)

The present invention relates to an improved dishwasher and particularly to a dishwasher for domestic use having an improved rotating spray tube for applying stream of water to cleanse the dishes.

An object of the invention is to provide an improved dishwashing machine wherein streams or jets of water are applied to the dish surfaces in an improved manner to enhance and improve the washing operation.

Another object of the invention is to provide a dishwasher with an improved rotating spray tube having a plurality of nozzles in the surface and rotating to successively direct streams of fluid varying in impact direction against the surfaces of the dishes.

Another object of the invention is to provide an improved rotating spray tube for a dishwasher having nozzles which are simplified in construction and improved in action and which have a self-cleaning action and remain unobstructed during the washing operation.

Another object of the invention is to provide a rotating spray tube for a dishwasher wherein the jets of fluid issuing therefrom will automatically cause the spray tube to rotate and will impinge against the dishes from varying angles so as to clean both sides of the dishes, and will emerge from the tube at opposing angles to engage both sides of the dishes and to reduce end thrust on the tube due to the reaction forces of the water.

Another object of the invention is to provide an improved spray tube for a dishwasher which is simple to assemble and to disassemble for cleaning, replacement, adjustment, etc.

Another object of the invention is to provide an improved rotating spray tube for a dishwasher which is provided with an internal vane operated by the reaction of the water for obtaining a positive controlled speed of rotation of the tube unaffected by extrinsic conditions within the dish treatment zone.

Another object is to provide an improved combined rotating spray tube and a washing fluid reflector for directing washing water against the dishes.

Other objects and advantages will become more apparent to those skilled in the art and to those to whom the invention is completely disclosed by the following specification, claims and drawings in which like numbers indicate like parts and in which:

Figure 1 is a vertically sectioned front elevational view illustrating a dishwasher embodying the concepts of the present invention;

Figure 2 is a side elevational view taken in vertical section along line 2—2 and illustrating the dishwasher of Fig. 1;

Figure 3 is an enlarged detailed elevational view of the rotary spray tube of the invention;

Figure 4 is an enlarged detailed sectional view of the bearing for supporting one end of the spray tube;

Figure 5 is an enlarged plan view of the elbow portion of the bearing of Fig. 4;

Figure 6 is an enlarged detailed elevational view of the bearing support for the opposite end of the spray tube;

Figure 7 is a detailed end elevational view of the spray tube and end insert which drives the tube in rotation and governs the speed of rotation;

Figure 8 is a detailed side elevation view partially in section of one end of the spray tube;

Figure 9 is a view illustrating a layout of the arrangement of openings to be placed in the spray tube surface;

Figure 10 is an end elevational view of the end of the spray tube, taken from the left end as it is pictured in Figs. 3 and 6;

Figure 11 is a schematic view illustrating the pattern of the spray against the dishes as viewed from the end of the spray tube;

Figure 12 is a side elevational view of the pattern of spray engaging the dishes;

Figure 13 is an enlarged detailed vertical sectional view illustrating the relationship between the spray tube and the fluid reflector; and

Figure 14 is a vertical sectional view similar to Fig. 13, but illustrating an alternative embodiment of the arrangement between the rotating spray tube and reflector.

The preferred embodiment, as illustrated in Figs. 1 and 2, is shown incorporated for use in cooperation with a domestic type of dishwasher wherein the spray tube **16** is preferably located in the top of the washer. It is to be understood, however, that although the features, advantages and objectives of the invention enjoy particular utility and utilize their advantages in the arrangement illustrated, the rotary spray tube and its accompanying cooperative structural features may be utilized in other environments.

The dishwasher of the design shown, to which the present invention is not necessarily limited, is enclosed by a surrounding cabinet **18** which houses the operating mechanisms and affords an attractive enclosure for using the invention in a domestic household such as in a kitchen. Within the cabinet **18** is mounted a tank **20** which forms a treatment zone **22** for the dishes wherein the dishes are subjected to a series of treatments by washing and rinsing fluid. The sequence of steps of treatment may take various forms and incorporate the application of fluid heated to various temperatures and containing soaps or detergents as well as clear rinsing fluid. The fluid with which the dishes are treated is generally water but the rotary spray tube of the present invention, which will be described in complete detail, is not to be restricted to use with any particular type of fluid and, as will be seen, presents advantages which may be utilized in washing and rinsing and various treatments of the dishes.

As illustrated in Figs. 1 and 2, the tank **20** is provided at its base with a sump **24** to which the fluid is directed from the sloping bottom **26** of the tank. The fluid is gathered in the sump when fresh fluid is first placed in the tank, and during the washing operation after the fluid is forcibly directed against the dishes it drains to the bottom of the tank running down into the sump.

The water is obtained from the sump for spraying against the dishes and when the water is to be drained for the admission of fresh water, the drain pump **25** is operated to pump the waste fluid to the household drain through a conduit, not shown. The drain pump is driven by a pulley **27** over which is trained a drive belt **29** driven by the pulley **31** of the drain pump motor **33**.

For first filling the tank **20** and for providing a supply of fluid for treating the dishes, water is admitted through the supply pipe **28** which leads upwardly to run out of the downwardly directed open spout **30**, Fig. 2, and be caught by a funnel shaped conduit **32**, which leads inwardly to the interior of the tank **20** of the washer. The break between the spout **30** and the funnel **32** prevents any syphoning effect during the filling of the dishwasher. The supply pipe **28** may lead from the household

hot and cold water supply lines (not shown) to obtain a supply of washing and rinsing water and may also be connected to a special booster tank **34** provided with a heater for supplying water of a very high temperature. The flow of water from the booster tank and the household lines is controlled by a valve **36** in the supply line **28**.

The water for treating the dishes in the dish treatment zone **22** is thus all obtained from the sump **24** at the base of the tank. The dishes are supported within the tank **20** by being carried on a rack **38** and the spaces in the rack for supporting the dishes may be strategically located with respect to the rotary spray tube **16** and the rotating spray arms **40** and **42** at the base of the tank.

As may be seen in Fig. 2, the dish supporting rack **38** carries sets of support rollers **44** and **46** at its base which roll on tracks **48** in the door **50** when the door is in the open position, as shown in Fig. 2. In this position, the dish rack **38** is filled with dishes and then pushed into the treatment zone **22** within the tank **20**. The rack carries sets of upper rollers **52** and **54** which, when the rack is within the tank, roll on a track **56** on one side of the tank and on a track **58** on the opposing side, as is shown in Fig. 1. Lower tracks **62** and **64** are also provided within the tank to supply continuations of the tracks **48** on the door. When the rack is in its position within the treatment zone **22** within the tank, the door **50** is closed and seals the tank against the escape of fluid.

Washing fluid is alternately applied to the dishes in the rack from the rotating arms **40** and **42**, positioned below the rack, and the rotating spray tube **16** above the rack. Although the spray tube is shown in the peculiar location illustrated and described, it is to be understood that many of the features of this spray tube may be utilized in placing this spray tube in other locations and in other positions within the tank and within the treatment zone **22**.

Each of the spray arms **40** and **42** is provided with a plurality of nozzles, such as illustrated at **66**, with certain of the nozzles set at an angle so that the reactive force of the water issuing therefrom causes the arms **40** and **42** to rotate on their supports. The arms are of such a length so as to overlap in the fluid treatment zone between the arms, and in order to prevent interference between the arms and to insure that the overlapping action will remain free of interference, the arms must be synchronized. To this end each of the arms carries at its base a bevel gear **68** and **70**. The bevel gears are in mesh with mating bevel gears **72** and **74**, carried on a cross shaft **77** rotatably supported in the base of the tank, and the shaft insures concurrent and synchronized rotation of the spray arms **40** and **42** as they rotate due to the action of the fluid spraying from the jets **66**. Each of the arms is rotatably mounted at the upper end of its supply pipe **76** and **78**. The supply pipes lead to a common connecting pipe **80**. The pipe **80** leads to one of the outlet ports of the diverter valve **82**. The other outlet port of the diverter valve **82** leads to the pipe **84** which extends upwardly within the cabinet **18** to connect to the end fitting **86** which supplies fluid to the rotating spray tube **16**. The diverter valve **82** is controllable through the control mechanism of the washer which is usually driven by a sequential time control that automatically dictates the sequence of treatments given to the dishes within the treatment zone.

The diverter valve **82** may be of the type described in the copending application, "Transfer Valve," Clearman, filed May 10, 1956, Serial No. 584,091. The valve **82** receives pressurized washing or rinsing fluid from the tangential output **88** of the pump **90**. This pump is illustrated as being of the centrifugal type and is driven by a motor **92** and receive a supply of liquid through the inlet pipe **94** which connects through a screened inlet **96** to the sump **24**.

Thus, during operation of the pump, the fluid is pumped from the sump through the outlet **88** of the pump and is directed in accordance with the setting of the diverter valve **82** either through pipe **80** to the supply pipes **76** and **78** of the rotating spray arms **40** and **42**, or through the supply line **84** leading up to the rotary spray tube **16**.

The rotary spray tube **16**, as is illustrated in the detailed drawing of Fig. 3, consists of a hollow elongated horizontally disposed tube **96** which, during operation when water is being sprayed from it against the dishes, is filled with water. The tube is supported for concentric rotation about its horizontal central axis on a rotary support pin **98** extending from one end of the tube and secured to the plug **100**, which is press fit into the end of the tube, Figs. 3 and 6. The tube may be formed of material such as stainless steel which resists corrosion, and the plugs in the end may be of metal or may be of a plastic, such as nylon, which is adapted to being pressed into the end of the tube and which resists corrosion and the effects of hot washing water.

The other end of the tube remains open to receive a supply of washing or rinsing fluid that is to be ejected through the jets in the peripheral surface of the tube. Secured in the right end of the tube, as illustrated in Fig. 3, is a hub **102** which is centrally supported by radially extending vanes **104**, **106** and **108**. The vanes may be of metal or plastic and project outwardly to engage the inner surface of the tube end and can be brazed or otherwise secured to the tube. The hub **102** serves as a bearing for supporting the rotating spray tube **96** and for this purpose may have an insert of bearing material **110**, such as nylon.

The elbow **86** rotatably supports the tube and directs a supply of pressurized fluid to the hollow interior of the tube. Within the end hollow elbow-shaped casting **86** is a boss **114**, having a centrally bored hole **116**. Positioned within the hole **116** is a journal pin **118** which projects into the bearing insert **110**, shown in Fig. 4, to thereby freely support the rotating spray tube **96**.

The hollow elbow **86** carries external threads **120** which receive a female threaded connector sleeve **122**. For assembly of the foregoing parts, the threaded portion **120** of the elbow **86** is inserted into a grommet **123** which is placed in a circular opening **125** in the wall of the tank **20**. This grommet acts as a gasket to prevent leakage of water past the elbow. The elbow carries an annular shoulder **137** which abuts the grommet and as the connector sleeve **122** is turned onto the threaded portion **120** of the elbow, the sleeve and shoulder **137** are drawn together to firmly secure the elbow in place.

The unthreaded end of the connector sleeve **122** is provided with an annular recess or groove **124** into which projects the annular edge or end **127** of the tube **16**. This forms a seal to prevent the escape of water as it passes from the elbow **86** into the tube **16**. To complete the seal and form a labyrinth seal for preventing the escape of water, a cup-shaped annular member **126** is slid over the end of the rotary tube **16** to rotate therewith. This forms a groove **129** between the end **127** of the tube and the cup-shaped member **126**. Into this groove projects the annular flanged neck portion **131** of the connector sleeve **122**. The cup-shaped member **126** carries annular sling flange **128** to cause the small leakage of water which passes through the labyrinth seal to drip down into the tank rather than working its way along the elbow **86** to reach the grommet seal **123**.

As the fluid moves up the fluid supply conduit **84** and enters the elbow **86** to pass into the tube **16**, it passes the vanes **104**, **108** and **106**, and these vanes are angularly positioned with respect to radial planes of the tube parallel to the tube axis, so that the tube will be caused to rotate due to the reaction of the vanes against the moving fluid. Each of the vanes is set at an angle, as is indicated by the vane **104** in Fig. 8, and the number of the vanes chosen, their cross sectional area, and their

angle with respect to the amount of fluid passing into the tube will determine the speed and amount of rotation of the tube. For a given set of constructional factors the speed of rotation will be set and will vary only as the rate of flow of water varies. Thus the vanes act as a governor determining the speed of rotation. In the embodiment illustrated, the streams of water emerge from the tube **16** slightly tangentially to the surface of the tube and this creates an additional rotative force but the speed is substantially governed by the vanes so that the tangential jets cannot create extremely high rotating speeds of the tube.

The bearing for supporting the closed end of the rotating spray tube **96**, shown as the left end in the present drawings, is illustrated in detail in Fig. 6. The tube **16** carries an insert **100** having a projecting journal pin **98**. This is supported in a bearing hole **150** in the closed end of a cup-shaped nut **152**. This nut carries internal threads and is threaded to the enlarged end of a connector member **154** which passes through the wall of the tank **20**. The reduced end of the connector member **154** receives a nut **156** which is threaded up against the wall of the tank with a gasket **158** slipped over the connector member. The inner enlarged end of the connector member has a downwardly opening slot **160** which is exposed when the nut **152** is removed. Thus for assembly and disassembly of the tube support, the nut **152** is threaded off of the connector member and pushed up against the insert **100** of the tube at which time there is sufficient space for it to clear the connector member and drop the end of the tube downwardly with the journal pin **98** sliding downwardly in the slot **160**. The labyrinth seal at the right end of the tube, as shown in Fig. 4, will of course readily disassemble with the pin **118** sliding out of the bearing fitting **110** supported within the tube.

The rotary spray tube **16**, as shown in Fig. 3, is provided with a plurality of nozzles or openings in the peripheral surface to direct the water radially outwardly from the tube as it rotates. These nozzles direct individual streams of water downwardly against the dishes supported in the rack in the washer as the tube rotates. With reference to Figs. 11 and 12, the effect of the streams of water issuing from the individual nozzles are shown. In Fig. 11, which is an end elevational view, it will be seen that the streams of water extend uniformly around the circumference of the tube. As illustrated in Fig. 12, which is a front elevational view of the tube, two of the jets, **162** and **164**, are shown to illustrate the principle of having the streams directed at opposing angles to a vertical plane which extends at right angles to the axis of the tube. The jets, as will later be explained in greater detail, are arranged in pairs such as **162** and **164**, and the members of the pair direct their streams of fluid in different directions so that both sides of the dish **166** will be engaged by the stream of fluid. This achieves an improved washing action. As the rotating spray tube rotates these intersecting streams of fluid will be swept past the entire surface of the dish in its path, and thus, all surfaces will be covered from all directions as the spray tube rotates.

The nozzles for the rotating spray tube are formed in an unique manner by lancing holes in the surface of the tube. The lanced openings which form the nozzles are shown in detail in Figs. 3 and 10 with the arrangement of the openings being shown in Fig. 9. The lanced openings, as illustrated by opening **168** in Fig. 3, are substantially rectangular in shape and are formed by cutting or punching an opening in the metal tubing wall along three sides to form an ear **170** which is bent inwardly to project into the interior of the tube, being connected to the wall along its base **172**. The ear projecting inwardly and remaining attached to the tubing gives a direction to the stream of water which issues from the opening **168** being formed by the lancing operation. The stream of fluid, for example, issuing from the opening at **168**, will issue laterally to the left, as shown in Fig. 3, and upwardly somewhat in the direction leading from the free tip of the ear **170** to its base **172**. Each of the openings or nozzles is set at an angle between a plane transverse of the tube axis and a plane intersecting the tube axis and the nozzle opening. The direction in which the metal ear is formed determines the direction that the stream of water will issue from the tube. Each of the streams of water issues slightly in a tangential direction which will cause a reactive effect which will have a component force in a tangential direction with respect to the tube to cause it to positively rotate in the direction indicated by the arrow **174**. Thus, the reactive effects of the various streams of water is complementary to the rotational force caused by the vanes **104**, **106** and **108** shown in Figs. 7 and 8, but the vanes will primarily govern the speed of rotation.

In addition to the rotational effect caused by the nozzles formed by the unique lancing, the lancing is done so that the nozzles form pairs. In Fig. 9, a number of the pairs are labeled with one of the nozzles of the pair being given the label A and the other nozzle being given the label B. It is to be noted with regard to Fig. 9 that the ears of the two nozzles of each pair extend in different directions. For example, in the pair of nozzles shown at **176** and **178** in Fig. 9, the ear **180** extends to the left and the ear **182** extends to the right. Thus, the stream of water issuing from the nozzle **176** will be directed toward the nozzle **178**, and the stream of water issuing from the nozzle **178** will be directed toward the nozzle **176**. The angles of water streams may be varied by nozzle design.

The left or the right nozzles of each pair are spaced radially from the corresponding nozzles of the other pairs but is at the same angle as the other corresponding nozzles from each pair. Further, no two nozzles occupy the same radial position. Each of the nozzles of the pair is also however, circumferentially separated from the other nozzle by a 10° span. This will insure that the stream of water will be separated and will not impinge on each other to cancel their effect. In addition to other advantages of the opposing arrangement of nozzles, the jets of water balance each other with respect to the axial thrust. This avoids any severe lateral forces on the bearings which would increase friction and inhibit the free rotation of the spray tube. The arrangement of the nozzles completely around the spray tube at circumferentially spaced evenly arranged intervals also balances the reactive forces in a radial direction so that the spray tube literally floats in its rotation and free rotation is assured.

As may be seen from the layout of the jets extending around the tube, as pictured in Fig. 9, the holes or jets are arranged in helical paths around the tube. For example, the pairs of jets **181—183**, **185—187**, and **189—191** are each arranged successively behind each other and axially spaced so as the tube rotates, a substantially helical fan or wall of water will be formed by the jets which are angled in a similar direction. That is, jets **181**, **185** and **189** will form the helical wall of water projecting in one direction and the opposed jets **183**, **187** and **191** will form a helical wall of water extending in the other direction. Thus this helical wall of water will sweep past each of the dishes and a particular surface of a dish will be swept by jets engaging it at successively different angles. Another helical wall of water will be formed by the next row of jets which includes **176** and **178**. This forms an extremely effective washing action removing soils from the surfaces of the dishes.

The rotary spray tube, as shown in detail in Figs. 13 and 14, is mounted in close adjacency to the top of the tank **20**, shown at **180** in Fig. 13, and shown at **182** in Fig. 14. The tank is formed so as to present an arcuate concave reflector surface **184**, Fig. 13. The surface is

positioned to extend across the tank parallel to the spray tube **96** and is curved with the axis **186** of the curvature arc being the same as the axial center of the tube **16**. The tube is closely spaced to the reflector **184** and as the tube rotates the streams of water which are directed upwardly through the nozzles of the tube are reflected downwardly to impinge directly on the dishes below. As illustrated in Fig. 11, the spray tube and the reflector **184** may be positioned directly in the center of the tank **20** so that the reflected streams of water and the direct streams of water issuing from the spray tube will strike the dishes with equal distribution across the tank.

An alternative construction is illustrated in Fig. 14 with a slightly larger reflector surface **188** which extends across the tank parallel to the spray tube **96**, but with the spray tube slightly off-center or eccentric of the reflector **188**. This permits some of the streams reflecting off the surface **188** to be able to pass downwardly without striking the rotating spray tube and to directly engage the dishes in the rack below the tube and reflector. The energy and washing ability of the streams of water directed upwardly are not wasted but are reflected downwardly to engage the dishes. The reflector surfaces may be set in the tank as an additional member or may be formed as part of the tank top and be integral therewith.

Although the operation of the mechanism hereinbefore described and the principles of the method of operation will be understood from the description of the individual elements, a brief summary of the utilization of the mechanism may be helpful in further understanding the objectives and advantages of the invention. The dishes are first placed in the rack **38** and the rack is rolled into the dish treatment zone shown at **22** within the tank **20** of the machine. The door **50** is closed to seal the machine and water or a sutiable cleansing fluid is fed in through the inlet line **28** whereupon it drains down into the sump **24**. Operation of the pump **90** forces the washing fluid upwardly through the diverter valve **82** which is set to either direct the water upwardly through the conduit **80** or the conduit **84**. The conduit **80** leads the washing fluid to the rotating spray arms **40** and **42**. The conduit **84** directs the washing or rinsing fluid upwardly to the rotating spray tube **16**.

The fluid enters the spray tube through the elbow **86**, Fig. 4, and engages the angled vanes **104**, **106** and **108** set in the open end of the tube. This caues the tube to rotate in the direction of the vanes and the flow of water in the tube will govern the speed of rotation of the vanes since they will act as a brake if the tube attempts to rotate too fast. The tube, supported at its ends by the pins **98** and **118**, is filled with washing fluid which is pressurized and is emitted through the lanced openings or jets in the tube surface. The openings are so formed as to be located in pairs on the rotating tube. The streams of water will emerge to cause a slight tangential thrust to insure positive rotation of the tube and the streams of each pair of jets, as illustrated by jets **176** and **178**, will be directed toward each other to engage opposing sides of the dishes. The nozzles or jets are spaced around the tubes in a circumferential direction so that they will not impinge upon each other to destroy their effectiveness. The pairs of nozzles are arranged in a helical path around the tubes so as to cause a sweeping wall of water to engage the dishes and provide an improved cleansing effect. Positioned above the rotating spray tube is a reflector surface such as **184** or **188**, Figs. 13 and 14, which directs the water downwardly to aid in the washing action, and also serves as a shield to increase back-pressure so as to cause the major portion of the fluid to take the path of least resistance through the exposed nozzles directed toward the articles being washed.

Thus, it will be seen that we have provided an improved dishwasher arrangement and especially an improved rotating spray tube arrangement for a domestic type dishwasher which meets the objectives and advantages hereinbefore set forth. The spray tube is inexpensive and simple to manufacture and no special nozzles of expensive design need be provided. The nozzles, as provided by the unique lancing operation, can be positively controlled to direct the stream of fluid issuing from the opening to the location and direction desired. Further, the lanced openings have a self-cleaning action, are easy to clean, and plugging by foreign materials does not often occur. If plugging does occur, however, the spray tube can be removed and the tube is easily cleaned, such as by forcing a stream of water through the lanced openings from outside of the tube which rapidly and readily cleans them.

The arrangement of jets around the spray tube achieves an improved cleaning effect on the dishes and an even continued rotation with a well defined distribution of streams of water is assured. The use of the reflectors above the rotary spray tube enhances the effectiveness of the streams of water played on the dishes, and the advantages of the rotating spray tube with the moving jets are fully utilized and additional advantages are achieved by the streams received from the reflectors.

We have, in the drawings and specification, presented a detailed disclosure of the preferred embodiments of our invention, but it is to be understood that we do not intend to limit the invention to the specific form disclosed but intend to cover all modifications, changes and alternative constructions and methods falling within the scope of the principles taught by our invention.

We claim as our invention:

1. A mechanism for washing articles with a spray of washing fluid comprising a tank for supporting the articles therein and providing a treatment zone for cleansing the articles, an elongated tube horizontally mounted in the top of the tank for rotation about the tube axis, a plurality of nozzles arranged along the tube and with each nozzle set at an angle between a plane perpendicular to the tube axis and a plane parallel to the tube axis, certain of said nozzles being at opposing angles to cause jets of fluid to impinge on both sides of the articles, and a fluid conduit connected to the tube to supply pressurized washing fluid thereto.

2. A mechanism for washing articles with sprays of washing fluid comprising a tank for supporting articles therein to be engaged by streams of washing fluids, an elongated spray tube mounted within the tank, a plurality of nozzles arranged linearly along the tube and disposed in pairs at an angle to a plane perpendicular to the tube with the nozzles of each said pairs directed toward each other with the streams issuing from the nozzles intersecting as they engage the articles to wash opposite surfaces thereof, and a fluid conduit connected to the tube to supply pressurized washing fluid thereto.

3. A mechanism for cleansing articles comprising an elongated hollow rotary spray tube adapted for rotation about its elongated axis and provided with a plurality of lanced holes distributed in the peripheral surface arranged longitudinally along the tube and circumferentially around the tube to provide nozzles for the issuance of sprays of washing fluid to cleanse the articles, the ears of tube material from the lanced holes remaining connected to the tube and projecting into the hollow interior thereof, said ears extending in both directions laterally of the tube and extending in a single direction circumferentially to obtain rotation thereof, and a fluid treatment tank provided with means for supporting the articles and rotatably supporting the tube therein.

4. A mechanism for cleansing articles comprising a fluid treatment tank provided with racks for supporting articles therein, a horizontally disposed elongated concave reflector positioned in the top of the tank for deflecting streams of washing fluid downwardly, an elongated rotatable hollow spray tube mounted in the top of the

tank parallel to said concave reflector and having a plurality of longitudinally and circumferentially disposed nozzles in the surface thereof, means for rotating the tube about its longitudinal axis, and a fluid conduit connected to the tube to supply pressurized fluid to the interior thereof.

5. A mechanism for washing articles with a spray of washing fluid comprising a fluid treatment tank provided with means for supporting articles therein, an elongated concave reflector disposed within the tank and positioned to face the articles, an elongated hollow spray tube positioned parallel to the reflector between the reflector and the articles, a plurality of spaced fluid emitting nozzles in the surface of the tube, means for rotating the tube about its longitudinal axis during the washing operation, and a fluid conduit connected to the tube to supply washing fluid thereto.

6. A mechanism for washing articles with a spray of washing fluid comprising a tank for supporting the articles therein providing a treatment zone for cleansing the articles, a rotatable elongated hollow tube supported for rotation within the tank, said tube being provided with a plurality of nozzles arranged longitudinally and circumferentially along the tube for directing streams of fluid against the articles, means for rotating the tube about its longitudinal axis during the washing operation, a concave reflector positioned parallel to the tube to reflect the streams of fluid toward the articles and positioned offset from the tube, and a fluid conduit connected to the tube to supply pressurized washing fluid thereto.

7. A mechanism for cleansing articles with a washing fluid comprising a tank for supporting the articles therein and providing a treatment zone for cleansing the articles, a door on the front of the tank providing an access into the tank, an elongated hollow tube extending transversely in the tank and mounted at its ends on side walls of the tank for rotation therein about its longitudinal axis, a plurality of nozzles arranged laterally and circumferentially around the tube with certain of the nozzles disposed at an oblique angle with respect to a radial plane passing through the nozzle and tube axis to cause a rotation of the tube, a hollow fluid supply member secured within the tank and communicating with one end of the spray

tube to supply washing fluid thereto, and a removable bearing member connected to the other end of the spray tube for sliding the tube out of the hollow fluid supply member and removing the tube from the tank to clean it at the end of a washing operation.

8. A mechanism for washing articles with a spray of washing fluid comprising a fluid treatment tank provided with means for supporting the articles therein, an elongated concave shield positioned at the top of said tank, an elongated rotatable hollow spray member mounted at the top of said tank below said shield and having a plurality of longitudinally and circumferentially disposed nozzles in the surface thereof, means for rotating said tube about its longitudinal axis, and a fluid conduit connected to said tube for supplying fluid to the interior thereof, said shield being adapted and arranged to cause the major portion of the washing fluid which is sprayed upwardly to be reflected downwardly toward the articles being washed.

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