Nov. 30, 1937. O. MAYCEN 2,100,343

FLUID ACTUATED DEVICE

Filed June 10, 1933 4 Sheets-Sheet 1

Fig. 1

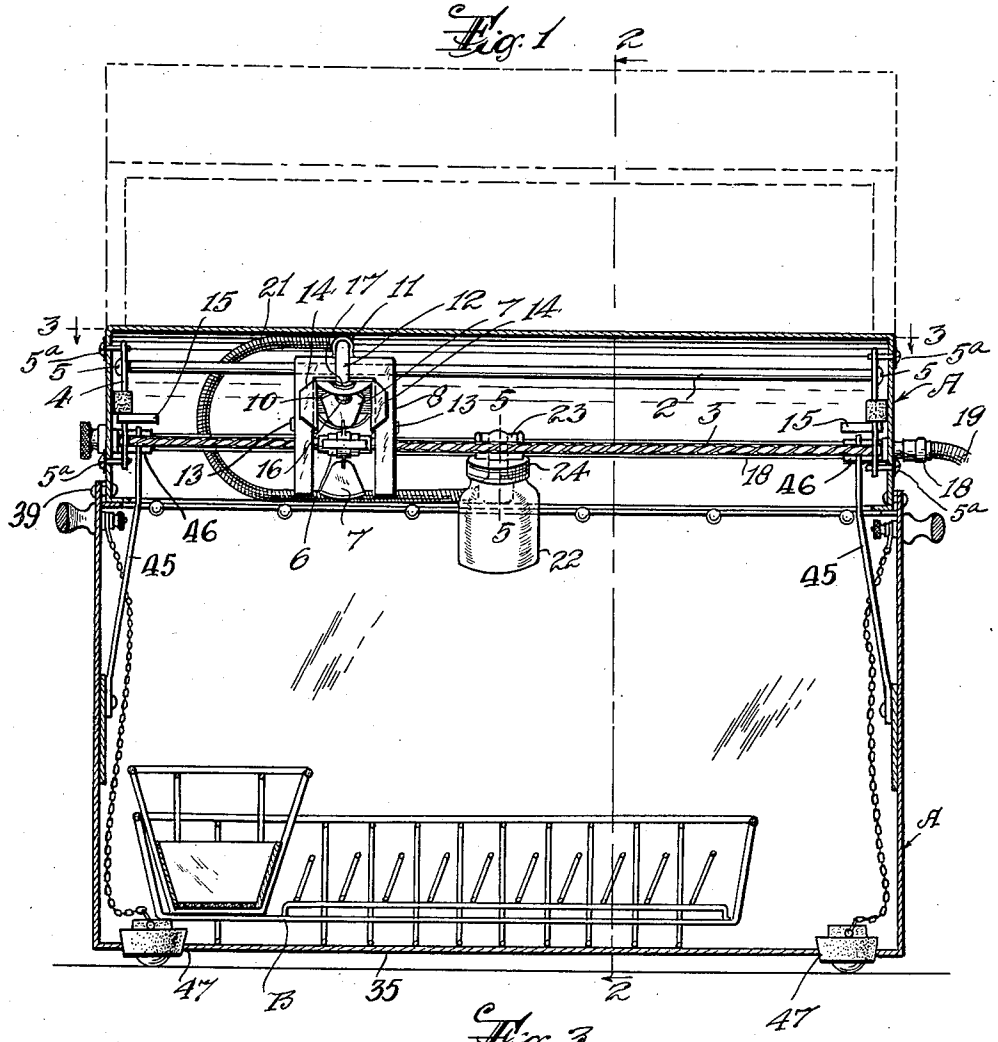
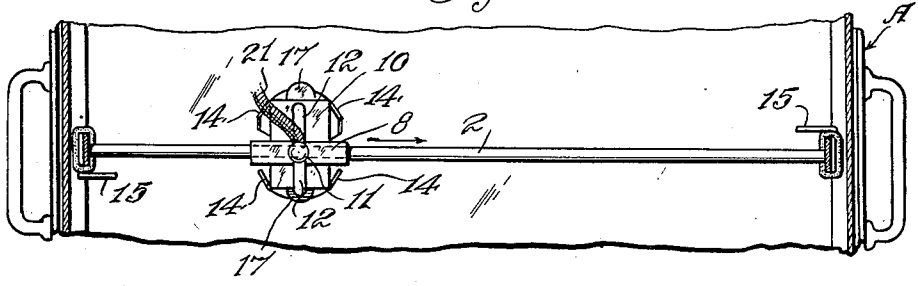


Fig. 3



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Nov. 30, 1937. O. MAYCEN 2,100,343

FLUID ACTUATED DEVICE

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Fig. 2

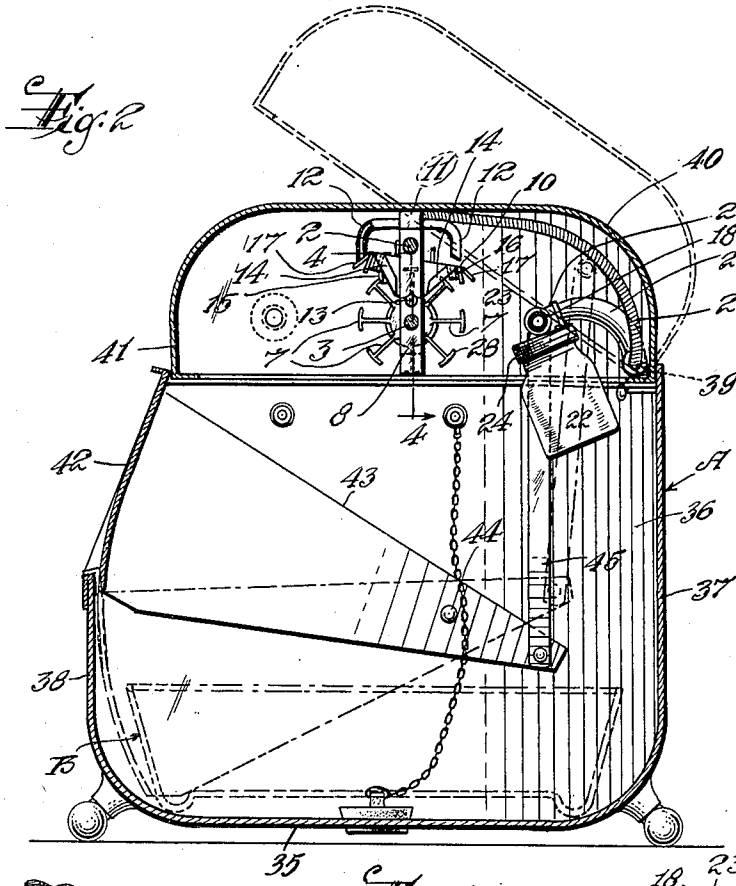
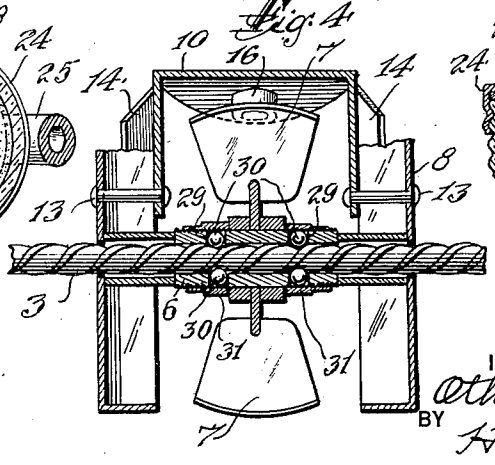


Fig. 4



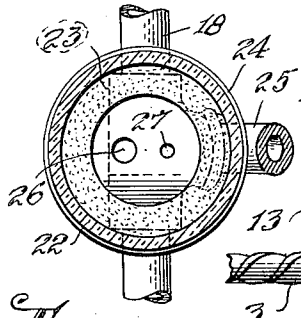


Fig. 6

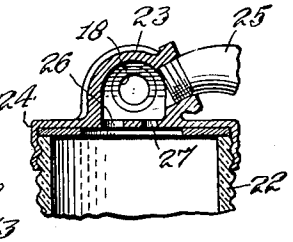


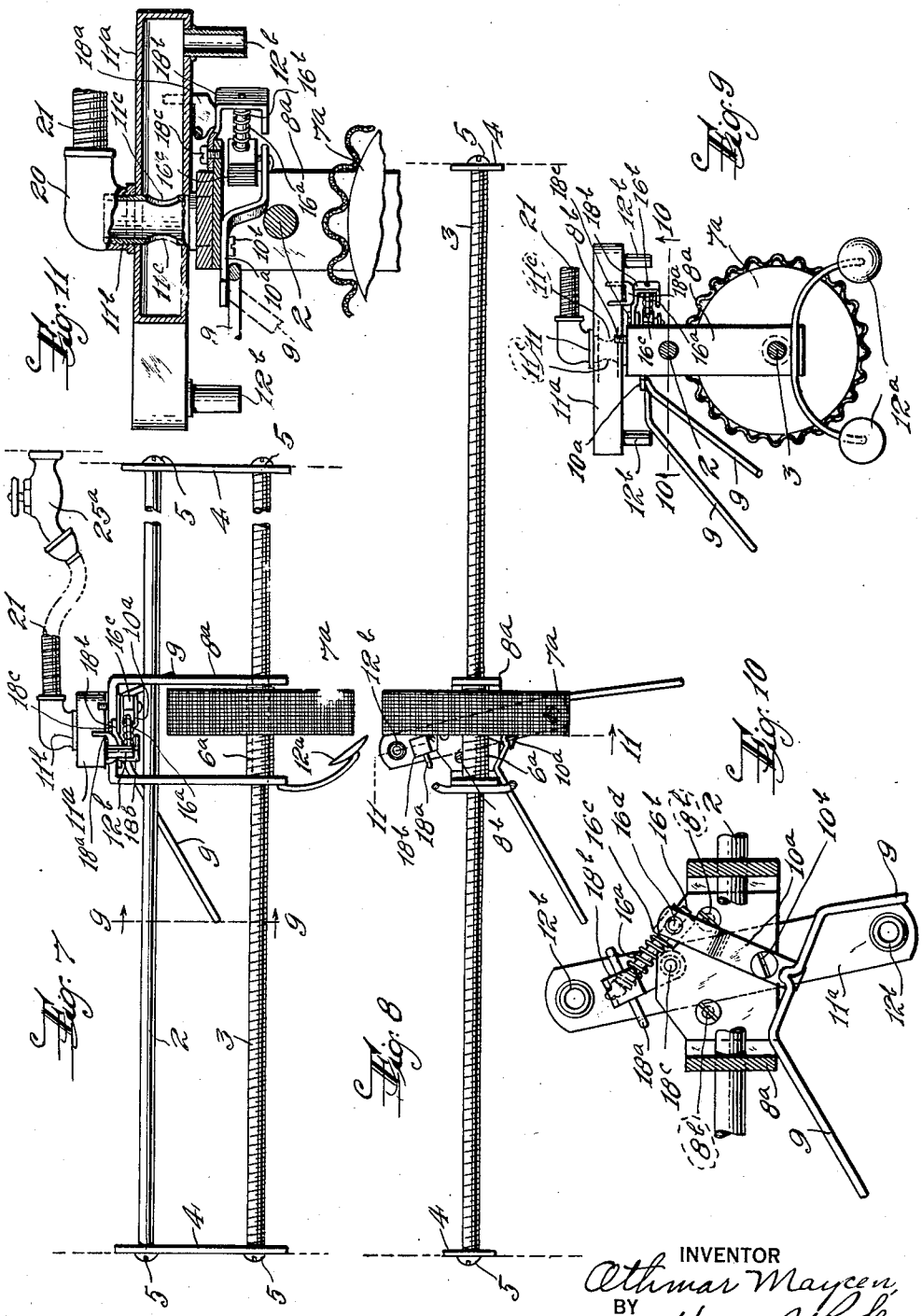
Fig. 5

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FLUID ACTUATED DEVICE

Filed June 10, 1933 4 Sheets-Sheet 3



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FLUID ACTUATED DEVICE

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Fig. 12

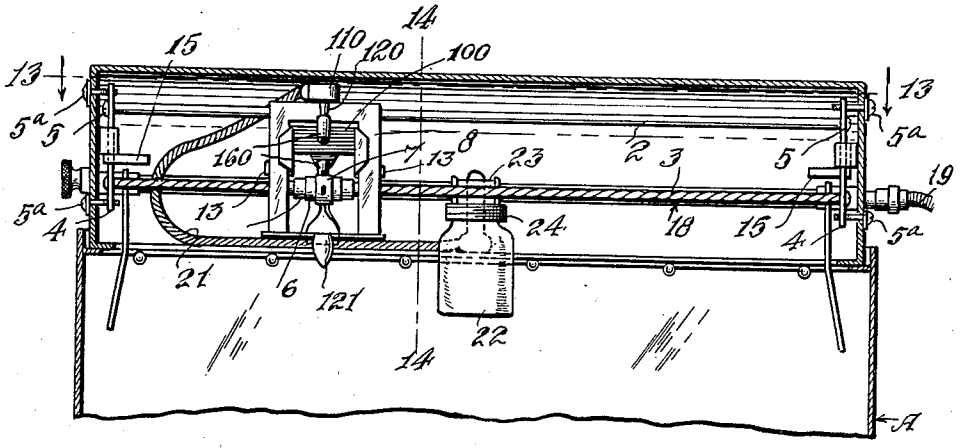


Fig. 13

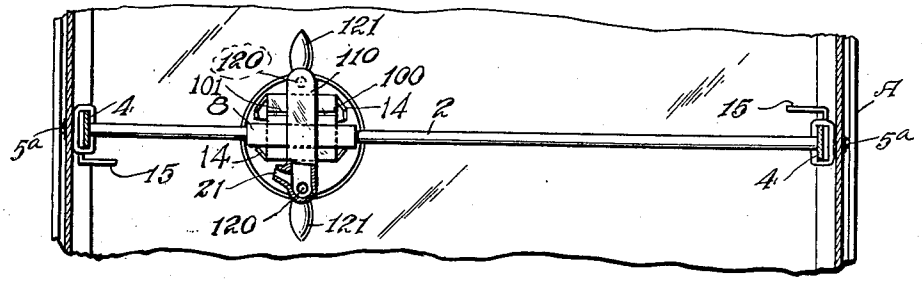
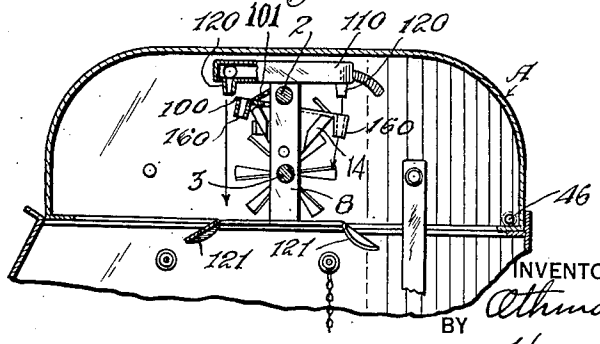


Fig. 14



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Patented Nov. 30, 1937

2,100,343

UNITED STATES PATENT OFFICE

2,100,343

FLUID ACTUATED DEVICE

Othmar Mayeen, New York, N. Y., assignor to Clarence N. Wheeler, Glen Ridge, N. J.

Application June 10, 1933, Serial No. 675,193

24 Claims. (Cl. 299—49)

This application is related to my prior application Serial No. 443,861 filed April 12, 1930, upon dish washers, and the present application includes all subject matter which was disclosed, as well as subject matter that was not embodied, in said prior application. More particularly the invention relates to a dish washer having a novel and improved water-spraying or distributing unit to be mounted in a cabinet or casing and including a spraying nozzle which travels back and forth across the casing to spray the water over the dishes, and is movable by and with a power actuated device or impeller, especially a water wheel which is actuated by the fluid that issues from the fluid supply pipe or nozzle so that the same fluid may be utilized for driving the fluid actuated impeller and for spraying or sprinkling purposes.

One object is to provide a novel and improved fluid sprinkling and distributing unit including a screw shaft and a traveling nut thereon, a power operated means connected to and movable with the nut for relatively rotating said screw shaft and nut, and a fluid spraying nozzle movable by and with said nut.

Another object is to provide a sprinkling and distributing unit of the character described wherein a fluid actuated device or impeller is rotatably mounted directly on and rotates coaxially with a screw rod or screw threaded shaft to move longitudinally of the latter, and said fluid actuated device moves a fluid supply pipe or nozzle which supplies fluid both for actuating the fluid actuated device and for spraying or sprinkling, whereby the direct and coaxial connection of the impeller to the screw enables the impeller to be actuated with small power, for example, that supplied from an ordinary dwelling house water supply system.

Further objects are to provide such a fluid sprinkling distributing unit including novel and improved means for automatically causing movement of said fluid actuated device alternately in opposite directions to produce a back and forth movement thereof; to provide for this purpose, means including said fluid supply nozzle for automatically directing fluid jets alternately to opposite sides of the periphery of said fluid actuated device; to provide a fluid supply nozzle having two outlets one at each side of the periphery of said fluid actuated device, and means cooperating with said nozzle so as to direct fluid alternately from said outlets upon said fluid actuated device; and to provide an oscillatory nozzle having two outlets to direct fluid jets alternately on opposite sides of said fluid actuated device upon oscillation of the nozzle, and means for oscillating the nozzle.

Other objects are to provide a fluid sprinkling and distributing unit of the character described which shall be small, compact, inexpensive in construction and simple, reliable, and ready for installation to various purposes; to provide such a unit which can be started and stopped by simply opening and closing a single valve, for example a faucet on a kitchen sink; to provide a novel and improved combination of such a unit and a soap receptacle whereby the water passing from said supply pipe to said nozzle will pass through the receptacle and mix with soap therein; to provide novel and improved means for deflecting or breaking into a spray the fluid that issues from a fluid supply nozzle; to provide such a unit which can be operated with fluid at low pressures, for example fluids at pressures ordinarily supplied in municipal water supply systems for dwelling houses; and to obtain other advantages and results as will be brought out by the following description.

Referring to the accompanying drawings in which corresponding and like parts are designated throughout the several views by the same reference characters,

Figure 1 is a vertical longitudinal sectional view through a dish washing machine embodying my invention.

Figure 2 is a transverse vertical sectional view on the line 2—2 of Figure 1.

Figure 3 is a fragmentary horizontal sectional view on the line 3—3 of Figure 1.

Figure 4 is an enlarged fragmentary transverse vertical sectional view on the line 4—4 of Figure 2.

Figure 5 is an enlarged fragmentary transverse sectional view on the line 5—5 of Figure 1, showing the inlet and outlet of the soap receptacle.

Figure 6 is a bottom plan view of the parts illustrated in Figure 5.

Figure 7 is a side elevation of another form of fluid sprinkling and distributing unit.

Figure 8 is a bottom plan view of the device shown in Figure 7.

Figure 9 is a transverse sectional view taken on the line 9—9 of Figure 7.

Figure 10 is an enlarged fragmentary sectional view taken on the line 10—10 of Figure 9.

Figure 11 is a transverse vertical sectional view on a scale similar to Figure 10 taken on the line 11—11 of Figure 8.

Figure 12 is a fragmentary vertical longitudi-

nal sectional view through a dish washing machine showing another form of fluid sprinkling and distributing unit.

Figure 13 is a horizontal sectional view on the line 13—13 of Figure 12, and

Figure 14 is a transverse sectional view on the line 14—14 of Figure 12.

Specifically describing the illustrated embodiment of the invention, and with particular reference to Figures 1 to 5 inclusive, my invention includes a fluid sprinkling or spraying and distributing unit which is shown as including two approximately parallel guide rods 2 and 3 the latter of which is screw threaded or in the form of a helical or screw shaft. These two guide rods are connected at their ends by brackets or tie bars 4 which are attached to the ends of the rods by screws 5 and are adapted for mounting the unit on a support, for example upon the inside walls of a casing or cabinet A as by screws 5a which pass through the walls of the cabinet into the brackets.

A fluid actuated device, for example, an impeller or water wheel or motor is mounted on the screw rod 3. As shown, this fluid actuated device comprises a sleeve or nut 6 having a screw threaded connection with the screw rod 3 and having mounted thereon a plurality of radial blades 7 which form a water wheel so that upon rotation of the nut 6 and water wheel, the nut coacts with the screw rod 3 to cause movement of the nut and the water wheel longitudinally of the screw rod.

An approximately U-shaped frame or carriage 8 is slidably mounted on both of the guide rods 2 and 3 and embraces the nut 6 and water wheel between its arms, so that upon movement of the nut and water wheel longitudinally of the screw rod, the carriage 8 is moved by and with them. This carriage serves as a support for a fluid supply pipe or nozzle 11 which has two outlets 12, one at each side of the periphery of the water wheel or impeller 7 so as to supply jets or streams of water to the water wheel.

Cooperating with the nozzle 11 is a selector 10 for directing fluid alternately from said outlets 12 upon the impeller 7. This selector comprises an approximately U-shaped piece of sheet metal having the extremities of its arms pivotally connected at 13 to the arms of the carriage 8 so as to oscillate in a plane transverse of the carriage and parallel to the common plane of the outlets 12. The selector has an inclined flange 14 on each arm at opposite sides of the selector to cooperate with abutments 15 one of which is mounted on each bracket 4, so as to oscillate the selector. As the carriage 8 moves in one direction to the end of the screw rod 3, one inclined flange 14 will engage one abutment 15 to swing the selector 10 from one position to the other.

The selector has a guide tube 16 to cooperate with each outlet 12 of the nozzle so that when said guide tube is disposed in alinement with or directly beneath the corresponding outlet, the fluid jet from the outlet will be directed upon the impeller 7 so as to actuate the same. As the selector is oscillated to bring one guide tube 16 into alinement with one outlet 12, the other outlet is closed by a valve lip 17 on the selector. Gravitational action on the selector tends to hold it in one or the other of its two positions, and, with the force of the fluid stream against the walls of the guide tubes 16, will hold the selector in one position until it is moved into another position by engagement of the inclined flange 14 and abutment 15. With this construction, it will be observed that the fluid jets will be directed alternately from said outlets 12 alternately upon opposite sides of the impeller 7, whereby the direction of movement of the impeller longitudinally of the screw rod will be automatically reversed at each end of the screw rod.

The water which issues from the outlet 12 after it leaves the impeller is utilized for sprinkling and spraying or for washing dishes.

Where the unit is used for washing dishes, it is desirable to place it in a cabinet or casing A at the top thereof so that the dishes may be arranged in a suitable rack B at the bottom of the cabinet and water issuing from the outlets 12 will be distributed over the dishes as the carriage and nozzle moves back and forth along the guide rods 2 and 3 by the impeller 7. In such case, it is desirable that water be supplied to the nozzle 11 through a pipe 18 which extends longitudinally of the cabinet and may be connected to a faucet or other water supply by a hose 19. Intermediate the ends the pipe 18 has connected thereto a T-fitting 23 to which is connected a branch nipple 25 to which in turn is connected one end of a flexible hose 21 which is connected to the nozzle 11. The T-fitting 23 has secured thereto a cap 24 for a soap receptacle 22 which is separably connected to the cap 24 by screw threads. The cap 24 preferably has two openings 26 and 27 communicating with the T-fitting one opening being larger than the other. In operation, soap or soap powder is placed in the soap container 22 which is connected to the cap 24, and upon flow of water through the supply pipe 18, the water passes through the openings 26 and 27 into the soap container, causes a turbulent agitation of the soap so as to mix the water and soap thoroughly, and then passes outwardly through the openings to the nozzle 11. Agitation of the water and soap in the container is caused by the openings of different sizes, the inlet being larger than the outlet so that a slight difference in pressure of the water at the two openings is created. As shown, these openings 26 and 27 are arranged in a common plane parallel with the direction of flow of the water through the nipple 25 into the T-fitting with the outlet nearer the nipple 25. Obviously, if desired, an amount of soap just sufficient to wash the dishes may be placed in the soap container so that after the soap has been exhausted a continuation of the flow of water will result in clean rinsing water being sprayed over the dishes, or, if substantial soap is placed in the container, the rinsing may be done by means of the hose 19.

For the purpose of breaking up the water jets into a spray and more widely distributing the supply over the dishes, the ends of the blades of the water wheel or impeller may have transverse annular flanges 28 upon impact with which the water will be diffused, and which due to the rotation of the blades will widely throw the spray laterally from the impeller.

Preferably the screw rod 3 is in the form of a round metal rod having a coarse screw-thread or helical groove and the sleeve 6 has a smooth interior and two pairs of diametrically opposite openings 29 in which are arranged balls 30 to ride in the grooves of the thread and cause coaction of the sleeve with the thread to produce longitudinal movement of the sleeve upon rotation thereof. The balls 30 are held in the open-

ings 29 by collars 31 which may be screw-threaded on the sleeve. This construction ensures a smooth and easy rotation and noiseless longitudinal movement of the impeller.

Figures 12 to 14 show a modification of the unit which is in general similar to the unit shown in Figures 1 to 6 inclusive, the main difference being that in the unit shown in Figures 12 to 14 the outlets 120 of the nozzle 110 are arranged so as to direct the jets of fluid therefrom outside or clear of the impeller, and the selector 100 has the guide tubes 160 arranged so that in one position each guide tube registers with one of the outlets 120 to direct water on the impeller, and in the other position the guide tube is out of alinement with the outlet. The selector is oscillated to move the tubes from one position to the other by the flanges 14 and abutments 15 as hereinbefore described, and in operation of the unit, while the fluid is turned on, jets issue from both of the outlets 120, but the jet from one outlet is directed by the corresponding guide tube 160 so as to impinge upon the impeller, while the jet from the other outlet flows clear of the impeller so as to be sprayed over the articles being washed; and the selector is operated so as to simultaneously move the guide tubes from one position to the other alternately with one guide tube in one position and the other guide tube in the other position, so that the direction of movement of the impeller and nozzle is periodically reversed. Movement of the selector is limited by stop ears 101 on the selector which engage the carriage 8.

If desired, deflectors 121 may be mounted on the carriage 8 beneath the outlets 120 so as to break up the streams or jets of water from the outlets into drops or a spray and scatter the water over the articles being washed.

Figures 7 to 11 inclusive show the form of the fluid spraying and distributing unit described and claimed in my above-mentioned copending application. In this form of the invention, the fluid spraying and distributing unit includes the two parallel guide rods 2 and 3 the latter of which is a stationary screw rod or shaft. A traveling sleeve or nut 6a is mounted on and has a screw-threaded connection with said screw rod 3 to coact therewith so that upon rotation of the sleeve nut it will travel longitudinally of the rod.

A fluid actuated impeller or water wheel 7a is fixedly mounted on said sleeve nut to rotate therewith coaxially with said screw rod, the periphery of said impeller consisting of a ring of close-mesh fabric, such as wire gauze, which is transversely corrugated to have a wave-like form.

A U-shaped carriage 8a is slidably mounted on said guide rods 2 and 3 and embraces between its arms, the sleeve nut 6a and water wheel 7a, so that upon movement of said nut and impeller longitudinally of the screw rod, the carriage is moved by and with the nut.

The impeller and nut are rotated by fluid streams or jets from the two outlets 12b of a nozzle 11a which is oscillatably mounted intermediate its ends on a nipple 11b projecting upwardly from the base portion of the carriage 8a. The nozzle 11a is hollow and the nipple 11b has diametrically opposite openings 11c communicating with the nozzle. The nipple has connected thereto an elbow 20 which is in turn connected to a flexible hose 21 which can be connected to a fluid supply, for example, a faucet 25a of a dwelling house water supply system.

The nozzle is arranged and oscillated on the carriage so that the outlets 12b may alternately direct fluid streams or jets on opposite sides of the periphery of the impeller to cause the impeller to rotate alternately in opposite directions and thereby produce movement of the impeller and carriage longitudinally of the screw rod alternately in opposite directions. As shown, the nozzle is oscillatory in a plane transverse of the plane of rotation of the impeller, and is arranged with one outlet at each side of the impeller so that one or the other outlet 12b is located above and in line with the impeller to direct a fluid stream thereon, while the other outlet is located beyond one end of the impeller so that the fluid stream will flow clear of and will not impinge upon the impeller, and upon oscillation of the nozzle alternately in opposite directions, first one and then the other outlet 12b is brought into position to discharge fluid upon the impeller.

For oscillating the nozzle, I have shown a system of levers and a spring which are actuated as the carriage 8a approaches the ends of the screw rod so as to swing the nozzle with a snap action from one position to the other. One lever 10a is pivotally mounted at 10b intermediate its ends on the base portion of the carriage and has at one end a pair of divergent arms 9 to engage the respective supports or inside walls of a cabinet at the ends of the guide rods 2 and 3. Another lever 18b is pivotally connected at one end 18c to the carriage and is connected adjacent its other end by a yoke 18a to one end of the nozzle. A compression spring 16a is interposed between the last-mentioned end of the lever 18a and the end of the lever 10a opposite the arms 9, and for holding said spring against displacement I have shown a pin 16b slidably mounted at one end in a block 16c which is pivotally connected at 16d to the lever 10a, and with its other end in abutting relation to the free end of the lever 18b. With this construction, the levers 10a, 18b and spring 16a normally hold the nozzle 11a in oblique relation to the carriage in the position described and against one or the other of two stops 8b on the carriage, and with one arm 9 abutting the adjacent arm of the carriage.

In operation, when water is supplied to the nozzle, as by opening the faucet 25a a stream or jet of water is directed from one outlet 12b upon the impeller 7a so that the force of the stream and the weight of the water accumulated in the openings of the wire gauze rotates the impeller in one direction. The impeller, carriage and nozzle are thereby moved longitudinally of the guide rods until one arm 9 strikes the support or side of the cabinet. Thereupon, the lever 10a is swung until a dead center relation is reached between the end of the lever, the pivot 10b and the free end of the lever 18b whereupon the spring with a snap action or jerk completes the swinging of the levers and moves the nozzle so as to bring the other outlet 12b into position to discharge a stream of water on the impeller, movement of the nozzle and levers being limited by the stops 8b and engagement of the arm 9 with the carriage, and the spring and levers positively holding the nozzle in the proper position. The impeller is then rotated in the opposite direction, and the carriage moves toward the other end of the guide rods until the other arm 9 engages the support or cabinet, whereupon the direction of movement of the impeller and carriage is again reversed in the same way. This action continues

until the water is shut off at faucet 25*a*, so that the nozzle is moved back and forth along the guide rods and the water therefrom is sprayed and distributed over the articles, for example, dishes, being washed or sprinkled.

Where the fluid spraying and distributing unit is to be used in a dish washer, it is desirable that the unit be mounted in a casing or cabinet which shall prevent splashing of the water about the room, and which shall be convenient for the placing and removal of dishes into and from the cabinet. A desirable form of cabinet is shown in Figures 1 and 2 of the drawings, said cabinet including a body portion having a bottom 35, end walls 36, rear walls 37 and a front wall 38. This front wall is shorter than the rear and end walls, in other words, terminates short of the top edges of said rear and end walls. At the top of the rear wall 37 is hingedly connected at 39, a cover or top section 40 to the ends of which are connected the brackets 4 of the fluid distributing means so that the unit will move with the cover into an out of the way position as the cabinet is opened to insert or remove dishes. For bridging the gap between the front end 41 of the cover and the front wall 38 I provide an intermediate front wall section 42 which has end wings 43 pivotally mounted intermediate the ends at 44 on the inside of the end walls 36. The free ends of said wings 44 are pivotally connected to a link 45 which is also pivotally connected at 46 to the cover section 40, for example, to the water supply pipe 18, as shown. With this construction, as the cover section 40 is raised or opened, the intermediate front wall section 42 is lowered into the body section to a position behind the front wall 38, while when the cover is closed the front wall section 42 is elevated to close the space between the front wall 38 and the cover. Easy and convenient access to the dish rack B is thus afforded and the danger of dropping the dishes as well as discomfort which would be incident to reaching downwardly into the casing from a position in line with the top edge of the end and rear walls, is eliminated.

Preferably the cabinet is of such size that it can be set into or in convenient relation to a sink, and drain openings 47 are provided in the bottom of the cabinet so that the water can be easily and quickly drained therefrom.

While I have shown and described several forms of my invention, it should be understood that this is primarily for illustrating the principles thereof and that many modifications and changes may be made in the details of construction of the invention without departing from the spirit or scope of the invention.

Having thus described my invention, what I claim is:

1. A device of the character described comprising a stationary screw, a fluid actuated impeller mounted to rotate coaxially thereon and to coact therewith so as to move longitudinally of said screw upon rotation of the impeller, and a fluid spraying nozzle movable by and with said impeller longitudinally of said screw for directing a fluid jet onto said impeller to rotate the latter.

2. A device of the character described comprising a stationary screw rod, a fluid actuated impeller mounted thereon and coacting therewith to travel thereon, a carriage movable by and with said impeller, and a fluid discharge nozzle movable by and with said carriage for directing fluid to said impeller for actuating the latter.

3. A device of the character described comprising a stationary screw, a fluid actuated impeller mounted to rotate coaxially thereon and to coact therewith so as to move longitudinally of said screw upon rotation of the impeller, and means for automatically directing fluid jets alternately to opposite sides of the periphery of said impeller to cause said impeller to move alternately in opposite directions.

4. A device of the character described comprising a stationary screw, a fluid actuated impeller mounted to rotate coaxially thereon and to coact therewith so as to move longitudinally of said screw upon rotation of the impeller, and a fluid spraying nozzle movable by and with said impeller longitudinally of said screw for directing a fluid jet onto said impeller to rotate the latter, and means including said spraying nozzle for automatically directing fluid jets alternately to opposite sides of the periphery of said impeller to cause said impeller to move alternately in opposite directions.

5. A fluid sprinkler comprising, a stationary screw, a traveling nut on said screw, fluid actuated means for rotating said traveling nut and being connected to and movable with the latter along said screw, and a fluid supply pipe movable by and with said traveling nut for directing fluid to said fluid actuated means for actuating the latter, and means including said fluid supply pipe for automatically periodically reversing said fluid actuated means to cause said nut to travel on said screw rod alternately in opposite directions.

6. A dish washer comprising a screw shaft and a traveling nut thereon, power actuated means connected to and movable with said nut for relatively rotating said screw shaft and said nut to cause movement of said nut longitudinally of said screw shaft, and a fluid spraying nozzle movable by and with said nut.

7. In a dish washer, a pair of parallel guide rods one of which is screw threaded, a rotary fluid actuated device mounted coaxially on and coacting with said screw threaded rod to move longitudinally thereof, and a carriage slidably connected to said guide rods and operatively connected to said fluid actuated device for movement thereby and therewith longitudinally of said guide rods, and a liquid supply conduit carried by said carriage and including a sprinkling nozzle, and means for controlling flow of liquid from said conduit to said fluid actuated device for operating the latter.

8. In a dish washer, a pair of parallel guide rods one of which is screw threaded, a rotary fluid actuated device mounted coaxially on and coacting with said screw threaded rod to move longitudinally thereof, and a carriage slidably connected to said guide rods and operatively connected to said fluid actuated device for movement thereby and therewith longitudinally of said guide rods, a fluid discharge nozzle carried by said carriage and automatic means for causing rotation of said fluid actuated device alternately in opposite directions.

9. In a dish washer, a pair of parallel guide rods one of which is screw threaded, a water wheel mounted coaxially on and coacting with said screw threaded rod to move longitudinally thereof, and a carriage slidably connected to said guide rods and operatively connected to said water wheel for movement thereby and there-

with longitudinally of said guide rods, and a liquid spraying nozzle mounted on said carriage for directing liquid jets upon said water wheel.

10. In a dish washer, a pair of parallel guide rods one of which is screw threaded, a rotary fluid actuated device mounted coaxially on and coacting with said screw threaded rod to move longitudinally thereof, and a carriage slidably connected to said guide rods and operatively connected to said fluid actuated device for movement thereby and therewith longitudinally of and guide rods, and a fluid spraying nozzle mounted on said carriage for directing fluid jets upon said fluid actuated device, said nozzle being oscillatory and having two outlets to direct fluid jets alternately on opposite sides of the periphery of said fluid actuated device upon oscillation of said nozzle, and means for oscillating said nozzle.

11. In a dish washer, a pair of parallel guide rods one of which is screw threaded, a rotary fluid actuated device mounted coaxially on and coacting with said screw threaded rod to move longitudinally thereof, and a carriage slidably connected to said guide rods and operatively connected to said fluid actuated device for movement thereby and therewith longitudinally of said guide rods, and means for automatically directing fluid jets alternately to opposite sides of the periphery of said fluid actuated device to cause the latter to move alternately in opposite directions longitudinally of said screw threaded rod.

12. A device of the character described comprising a stationary screw rod, a rotary fluid actuated impeller mounted coaxially on and coacting with said screw rod to move longitudinally thereof, a carriage movable by and with said impeller, a fluid spraying nozzle mounted on said carriage and having two outlets one at each side of the periphery of said impeller for supplying fluid thereto, and means cooperating with said nozzle so as to direct fluid alternately from said outlets upon said impeller.

13. A device of the character described comprising a stationary screw rod, a rotary fluid actuated impeller mounted coaxially on and coacting with said screw rod to move longitudinally thereof, a carriage movable by and with said impeller, a fluid spraying nozzle mounted on said carriage and having two outlets one at each side of the periphery of said impeller for supplying fluid thereto, and means for simultaneously opening one and closing the other outlet in alternation to cause said impeller to move alternately in opposite directions.

14. A device of the character described comprising a stationary screw, a fluid actuated impeller coacting with said screw to travel thereon, a carriage movable by and with said impeller, a fluid spraying nozzle on said carriage having outlets at each side of the periphery of said impeller to direct jets of fluid clear of said impeller, movable guide tubes on said carriage for said outlets each of which in one position is in line with the respective outlet to direct a fluid stream therefrom upon the periphery of said impeller and in another position is out of line with said outlet, and means for simultaneously moving said guide tubes from one position to the other alternately with one tube in one position and the other tube in the other position for reversing the direction of travel of the impeller on the screw.

15. A device of the character described comprising a stationary screw, a fluid actuated impeller mounted to rotate coaxially thereon and to coact therewith so as to move longitudinally of said screw upon rotation of the impeller, a carriage movable by and with said impeller, a fluid supply conduit including a sprinkling nozzle on said carriage, and automatic means for controlling the flow of fluid from said fluid supply conduit to said fluid actuated impeller to cause rotation of said impeller alternately in opposite directions.

16. A device of the character described comprising a stationary screw, a fluid actuated impeller mounted to rotate coaxially thereon and to coact therewith so as to move longitudinally of said screw upon rotation of the impeller, said impeller having radial blades, a carriage movable by and with said impeller longitudinally of said screw, and a fluid spraying nozzle carried by said carriage, said nozzle being oscillatory in a plane transverse of the plane of rotation of the impeller and having two outlets one at each side of said impeller to direct fluid jets on the blades of the impeller alternately on opposite sides of said impeller upon oscillation of said nozzle, and means for oscillating said nozzle.

17. A mechanism comprising a stationary screw, a fluid actuated device mounted with a movable carriage and coacting with said screw to travel on said screw alternately in opposite directions according to the direction of operation of said fluid actuated device, a fluid supply conduit carried by said carriage and having an outlet so arranged relative to said fluid actuated device that the discharge therefrom will actuate the device in one direction and having another outlet so arranged relative to said fluid actuated device that the discharge therefrom will operate the device in the opposite direction, means so controlling the flow of fluid from said outlets that while one outlet is effective to operate the device the other outlet is ineffective to operate the device, means coacting with said fluid flow control means to operate the same at the extremities of a predetermined path of movement of the device and carriage, and supporting means for supporting the above structure when installed.

18. A mechanism comprising a stationary screw, a fluid actuated device mounted with a movable carriage and coacting with said screw to travel on said screw alternately in opposite directions according to the direction of operation of said fluid actuated device, a fluid supply conduit carried by said carriage and having an outlet so arranged relative to said fluid actuated device that the discharge therefrom will actuate the device in one direction and having another outlet so arranged relative to said fluid actuated device that the discharge therefrom will operate the device in the opposite direction, each outlet being formed to discharge the fluid in a stream, means so controlling the flow of fluid from said outlets that while one outlet is effective to operate the device the other outlet is ineffective to operate the device but continues to discharge fluid in a stream, a deflector on said carriage for each outlet to break up and spread the stream therefrom when the stream is ineffective to operate said device, means coacting with said fluid flow control means to operate the same at the extremities of a predetermined path of movement of the device and carriage, and supporting means for supporting the above structure when installed.

19. A mechanism comprising a screw shaft, a carriage and a guide therefor, a motor actuated driving means connected to said carriage and

including a nut coacting with said screw shaft to cause relative rotation of said shaft and said nut and thereby produce movement of the nut and carriage longitudinally of said shaft, and a fluid spraying nozzle carried by said carriage.

20. A mechanism comprising a screw shaft, a carriage and a guide therefor, a fluid actuated driving means connected to said carriage and including a nut coacting with said screw shaft to cause relative rotation of said shaft and said nut and thereby produce movement of the nut and carriage longitudinally of the shaft, a fluid supply conduit movable by and with said carriage, and means for controlling flow of fluid from said conduit to said fluid actuated driving means for operating the latter.

21. A mechanism comprising a screw shaft, a carriage and a guide therefor, a fluid actuated driving means connected to said carriage and including a nut coacting with said screw shaft to cause relative rotation of said shaft and said nut and thereby produce movement of the nut and carriage longitudinally of the shaft, a fluid supply conduit carried by said carriage and having an outlet so arranged relative to said fluid actuated driving means that the discharge therefrom will actuate the said driving means in one direction and having another outlet so arranged relative to said fluid actuated driving means that the discharge therefrom will operate the driving means in the opposite direction, means so controlling the flow of fluid from said outlets that while one outlet is effective to operate the driving means the other outlet is ineffective to operate the driving means, and means for operating said fluid flow control means at predetermined points in the path of movement of the carriage and driving means.

22. A mechanism comprising a stationary screw shaft, a carriage and a guide therefor, driving means connected to said carriage and including a nut coacting with said screw and power operated means for rotating said nut to cause movement of the nut and carriage longitudinally of said screw shaft, and a fluid spraying nozzle carried by said carriage.

23. A mechanism comprising a screw shaft, a carriage and a guide therefor, a driving means including a rotatable fluid actuated device and a nut coacting with said screw shaft to cause relative rotation of said shaft and said nut and thereby produce movement of the nut and carriage longitudinally of the shaft, a fluid supply conduit movable by and with said carriage, means for controlling flow of fluid from said conduit upon the periphery of said fluid actuated device alternately at opposite sides of the axis of rotation thereof to cause movement of said carriage alternately in opposite directions, and means for operating said fluid flow control means at predetermined points in the path of movement of said carriage.

24. A mechanism comprising a screw shaft, a motor actuated device mounted with a movable carriage and coacting with said screw to travel longitudinally of the screw upon operation of said device, a fluid supply conduit carried by said carriage and having a fluid spraying outlet, and supporting means for supporting the above structure when installed.

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