

July 11, 1944.

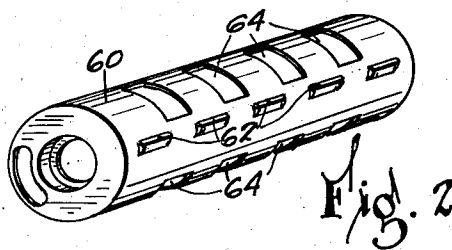
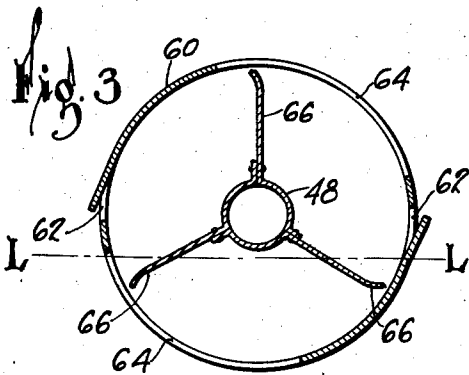
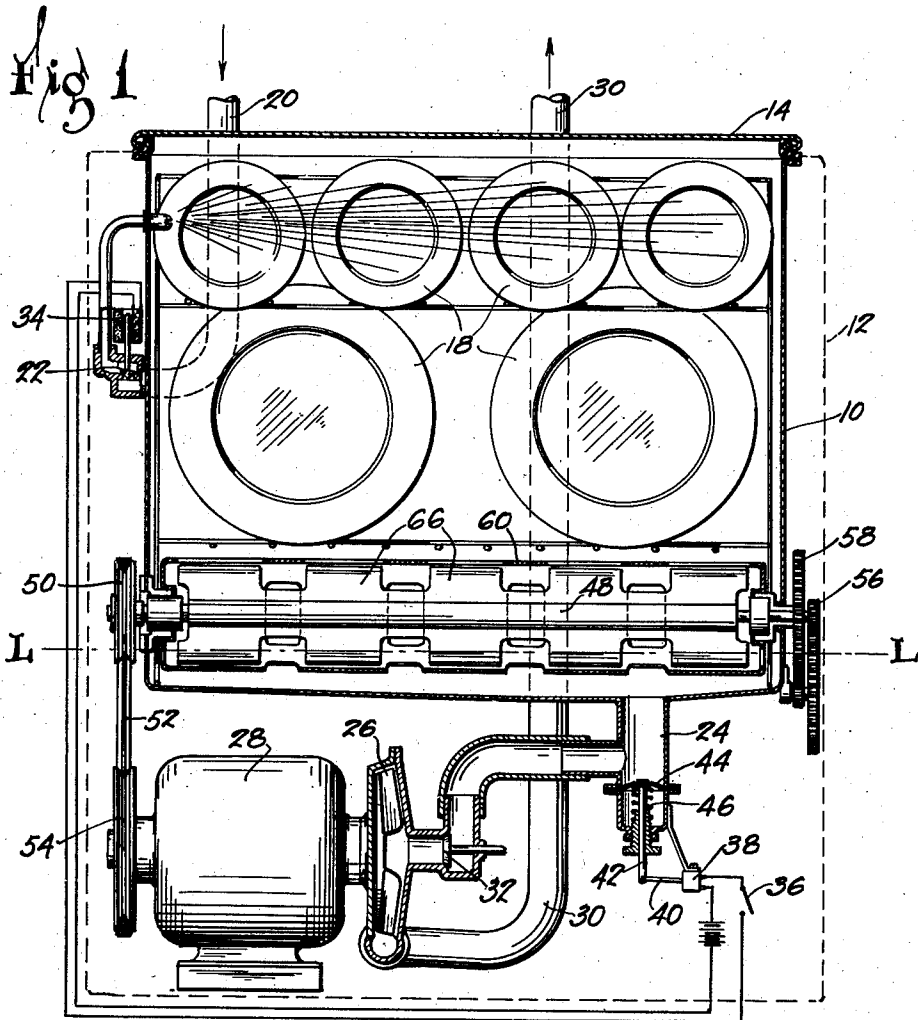
A. P. SCHULZ

2,353,368

CLEANING MACHINE

Filed Dec. 4, 1939

2 Sheets-Sheet 1



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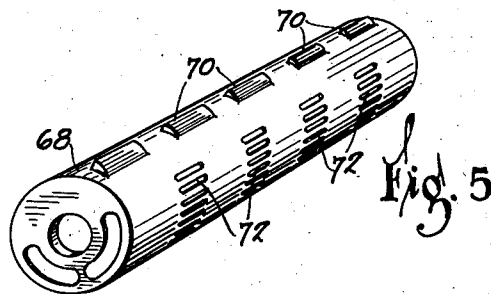
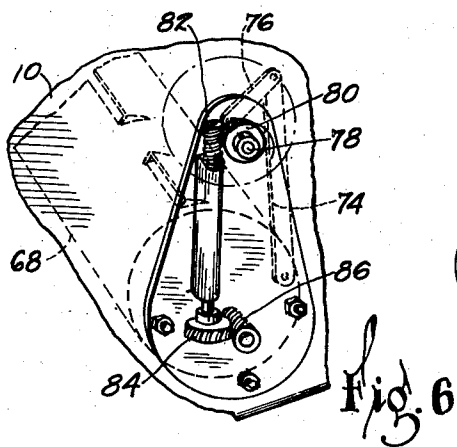
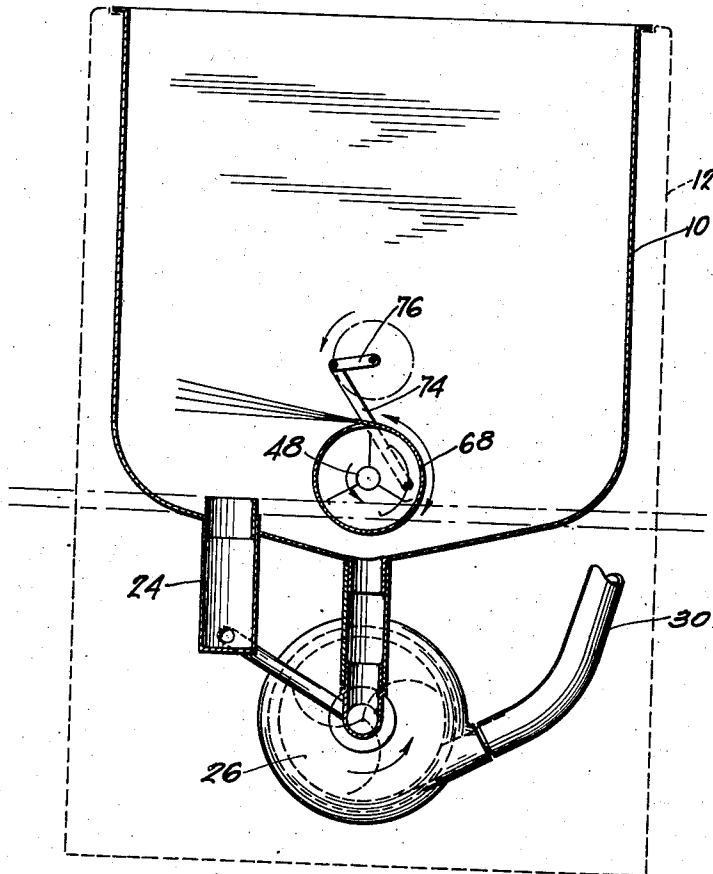
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2 Sheets-Sheet 2

Fig. 4



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UNITED STATES PATENT OFFICE

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CLEANING MACHINE

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Application December 4, 1939, Serial No. 307,385

6 Claims. (Cl. 299—63)

This invention relates to a cleaning machine and more particularly to a machine for washing dishes and like articles.

One of the objects of the invention is to provide a cleaning machine in which the articles to be cleaned are supported in a stationary rack or the like and a fan-like spray of cleaning liquid is directed over them in arcuate sweeps. The arcuate sweeps of the spray may be either oscillating sweeps or successive sweeps in the same direction.

Another object of the invention is to provide a cleaning machine including a vaned impeller for creating a spray of cleaning liquid in which the spray is guided in different directions. According to one important feature of the invention the spray is confined to a relatively thin sheet whose direction is changed to sweep across the container or casing of the machine.

Yet another object of the invention is to provide a cleaning machine in which the level of cleaning liquid is automatically and accurately limited.

The above and other objects, advantages and novel features of the invention will appear from the following description when read in connection with the accompanying drawings, in which:

Figure 1 is a central section of a dishwashing machine embodying the invention;

Figure 2 is a perspective view of the tubular guide sleeve of Figure 1;

Figure 3 is an enlarged section through the guide sleeve offset to show both the inlet and outlet openings;

Figure 4 is a section at right angles to Figure 1 illustrating another construction;

Figure 5 is a perspective view of the guide sleeve of Figure 4;

Figure 6 is a partial perspective showing the guide sleeve driving gearing of Figure 4.

The machine of Figure 1 comprises a container or receptacle 10 supported in a casing illustrated by the dotted line 12 and adapted to be closed by a cover plate 14. The receptacle holds a rack 16 supported above its bottom which supports dishes 18 or like articles to be cleaned. A conduit 20 which may lead from the usual city water supply is connected to the upper part of the container 10 past a valve 22. An outlet conduit 24 also communicates with the lower part of the receptacle and with the inlet of a pump 26 which is driven by a motor 28. The pump outlet communicates with a discharge conduit 30 leading to any desired point. The outlet conduit is controlled by a valve 32 arranged adjacent the pump inlet and which may be operated in any desired manner.

The inlet valve, as shown, is adapted to be opened by a solenoid 34 connected in series with a manual switch 36 and with a second switch 38.

The switch 38 has an operating arm 40 connected to a rod 42 which extends into the drain pipe 24 and is secured at its upper end to a flexible diaphragm 44 therein. A spring 46 urges the diaphragm upwardly to move the switch 38 to its closed position.

When it is desired to fill the machine with water or other cleaning liquid the switch 36 may be closed to energize solenoid 34 and open the inlet valve 22. Water then flows into the container 10 filling the drain pipe 24 and creating a pressure head on the diaphragm 44 opposing the spring 46. When the water in the container reaches a sufficient level to depress the diaphragm 44 the switch 38 will be opened to interrupt the circuit to solenoid 34 so that the inlet valve 22 may close. Thus this construction determines and limits the level of the water in the container. Preferably the spring 46 is so adjusted as to maintain the water level substantially at the line L—L in Figure 1.

An impeller indicated generally at 48 is rotatably mounted in the lower part of the container and is provided at its ends with a shaft extending through the opposite sides of the container wall. A pulley 50 is secured to one end of the impeller shaft and is connected by a belt 52 with a pulley 54 on the shaft of the driving motor 28. It will be noted that the pulley 50 is substantially smaller than the pulley 54 so that the impeller will be driven at a relatively high speed. In a preferred embodiment a motor turning 1725 R. P. M. and a ratio of 2 to 1 between pulleys 54 and 50 are used so that the impeller is driven at a speed of 3450 R. P. M.

At its opposite end the impeller shaft carries a pinion 56 driving a concentric pinion 58 through a train of reduction gearing. The pinion 58 is secured to the sleeved end of a tubular guide sleeve 60 which is rotatably mounted around the impeller in the lower part of the container.

The guide sleeve 60, as best seen in Figures 2 and 3, is formed with a series of axially spaced outlet openings 62 on diametrically opposite sides formed by slitting the periphery of the sleeve and pressing out a portion thereof in the shape of a louver. The guide sleeve is further formed with diametrically opposite series of inlet openings 64 substantially elongated circumferentially of the sleeve and spaced axially and circumferentially from the outlet openings 62.

The impeller is formed with a series of axially spaced sets of vanes 66 in alignment with the outlet openings 62 and with the spaces between the vanes aligned with the inlet openings 64.

In use the container is filled to the indicated level with cleaning liquid such as hot water to which detergent material may be added. The motor 28 is then started to rotate the impeller at high speed so that it will pick up water from

the lower portion of the guide sleeve and throw it out at high velocity in the form of a flat fan shaped spray through the outlet openings 62. As the impeller rotates, the guide sleeve 60 will be rotated at a much slower speed through the reduction gearing 58—58 so that the spray will sweep across the container in contact with the dishes and will clean the same. Water from the lower part of the container flows constantly into one or the other sets of inlet openings 64 and axially into the impeller vanes so that a continuous spray is created. As best seen in Figure 3, one of the sets of inlet openings is constantly submerged to provide for the inlet of water and during the major part of the rotation of the guide sleeve one or the other of the sets of outlet openings is submerged so as to be ineffective.

In the construction shown in Figures 4 to 6 many of the parts are identical with those of Figures 1 to 3 and have been indicated by the same reference characters. In this construction the impeller 48 is identical with that of Figure 1, but the guide sleeve 68 differs in that it is provided with only one set of louvered outlet openings and one set of inlet openings 72 which are formed with closely spaced sets of elongated slots. The guide sleeve 68 is pivotally connected to one end of a link 74 which is pivoted at its opposite end to a crank 76 lying inside of the container 10. The crank is connected to a shaft 78 projecting through the wall of the container and carrying on the outside thereof a worm gear 80 which meshes with a worm 82. A worm gear 84 rigid with the worm 82 meshes in turn with a worm 86 formed on or secured to the end of the impeller shaft. In this construction as the impeller rotates, the link 74 will be rocked by the crank 76 to oscillate the guide sleeve 68. Thus the spray directed outwardly by the outlet openings 70 will sweep back and forth across the container and against the dishes or other articles which may be supported therein.

An important novel feature of the invention resides in the fact that the guide sleeve concentrates the entire impeller discharge into a spray of exceptionally high mass, and a very high velocity results from rotating the impeller at its relatively high speed of 3450 R. P. M. This theory of operation is distinctive over the prior art machines in which large mass surges are created by relatively slow moving impellers (1725 R. P. M.); and over the prior art machines in which very fine, low mass sprays are created by fast moving impellers.

While several embodiments of the invention have been shown and described in detail it will be understood that various changes might be made therein and it is not intended to limit the scope of the invention to the exact forms shown nor otherwise than by the terms of the appended claims.

What is claimed is:

1. For use in a cleaning machine including a container for articles to be cleaned, a rotatable impeller having a plurality of axially spaced sets of vanes, means for rotating said impeller, a tubular guide sleeve rotatably surrounding the impeller and formed with peripheral outlet openings alined with the sets of vanes and peripheral inlet openings between the sets of vanes, and means for continuously turning the guide sleeve

at a rate slower than the rotation of said impeller to vary the position of the discharge openings.

2. For use in a cleaning machine including a container for articles to be cleaned, a rotatable impeller having a plurality of axially spaced sets of vanes, means for rotating said impeller, a tubular guide sleeve movably surrounding the impeller and formed with peripheral outlet openings alined with the sets of vanes and peripheral inlet openings between the sets of vanes, and means for oscillating the guide sleeve to move the outlet openings back and forth across the upper portion of the impeller at a rate slower than the movement of said impeller in its rotation.

3. For use in a cleaning machine including a container for articles to be cleaned, a rotatable impeller having a plurality of axially spaced sets of vanes, means for rotating said impeller, a tubular guide sleeve movably surrounding the impeller and formed with diametrically opposite sets of peripheral outlet openings alined with the sets of vanes and peripheral inlet openings of substantial circumferential extent between the sets of vanes, and means for rotating the guide sleeve relative to said impeller so that the sets of outlet openings alternately move around the upper part of the impeller at a rate slower than the rotation of said impeller.

4. For use in a cleaning machine including a container for articles to be cleaned, a rotatable impeller having a plurality of axially spaced sets of vanes, a tubular guide sleeve movably surrounding the impeller and formed with peripheral outlet openings alined with the sets of vanes and peripheral inlet openings between the sets of vanes, means for supplying cleaning liquid to a level intermediate the top and bottom of the guide sleeve whereby liquid will flow into the sleeve through the inlet openings and will be forced out through the outlet openings by the impeller, and driving means for rotating the impeller and for turning the sleeve relative to said impeller at a rate slower than the rotation of said impeller.

5. For use in a cleaning machine including a container for articles to be cleaned, a rotatable impeller having a plurality of axially spaced sets of vanes, means for rotating said impeller, a tubular guide sleeve movably surrounding the impeller and formed with diametrically opposite sets of peripheral outlet openings alined with the sets of vanes and peripheral inlet openings of substantial circumferential extent between the sets of vanes, means for supplying cleaning liquid to a level intermediate the top and bottom of the guide sleeve, and means for rotating the guide sleeve relative to said impeller at a rate slower than the rotation of said impeller so that the sets of outlet openings are alternately submerged in and move above the level of the liquid.

6. For use in a cleaning machine, a spray unit for cleaning liquid comprising a rotatable vaned impeller and a tubular guide sleeve surrounding the impeller formed with an axially spaced series of peripheral outlet openings and a series of peripheral inlet openings spaced axially and circumferentially of the outlet openings, means for rotating said impeller, and means to rotate said tubular guide sleeve on the axis of said impeller but at a rate of rotation slower than the rate of rotation of said impeller.

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