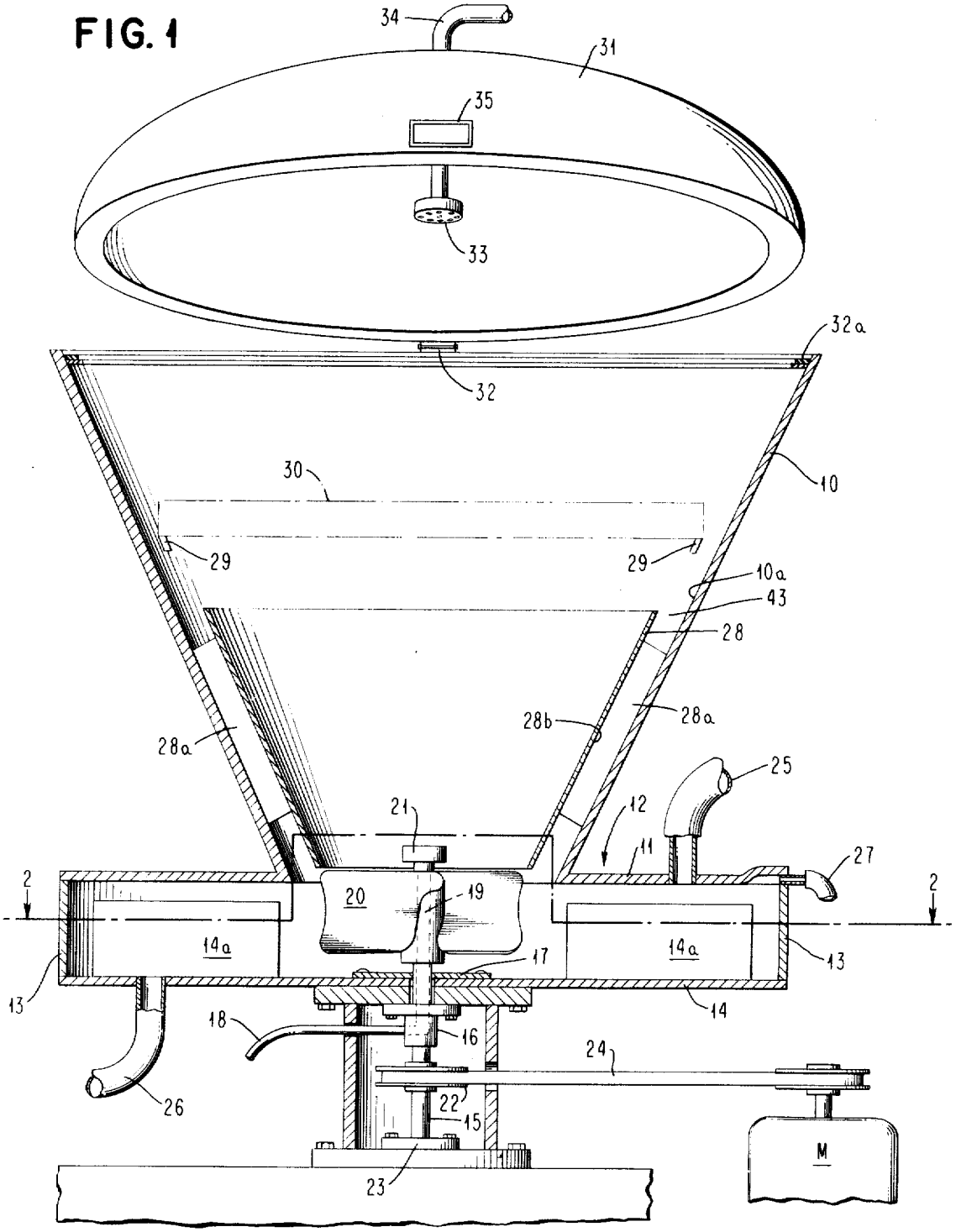
SOLID SMOOTH-SURFACE ARTICLE WASHING DEVICE

Original Filed March 27, 1968 3 Sheets-Sheet 1

FIG. 1



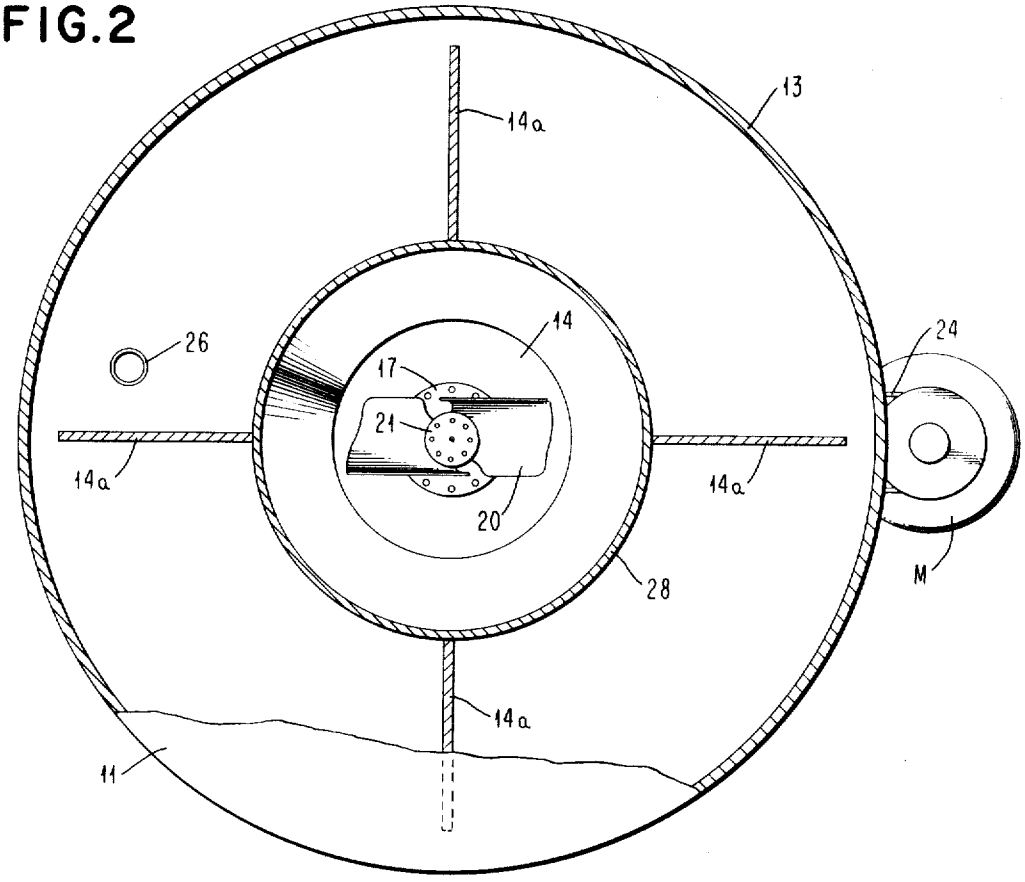
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SOLID SMOOTH-SURFACE ARTICLE WASHING DEVICE

Original Filed March 27, 1968 3 Sheets-Sheet 2

FIG.2



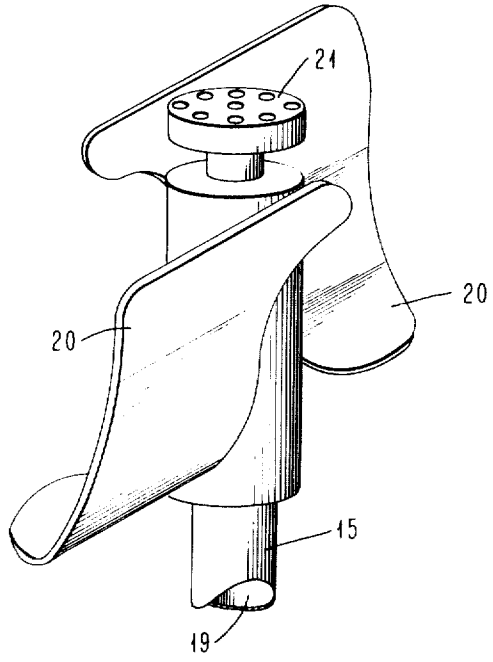


FIG.3

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SOLID SMOOTH-SURFACE ARTICLE WASHING DEVICE

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FIG. 4

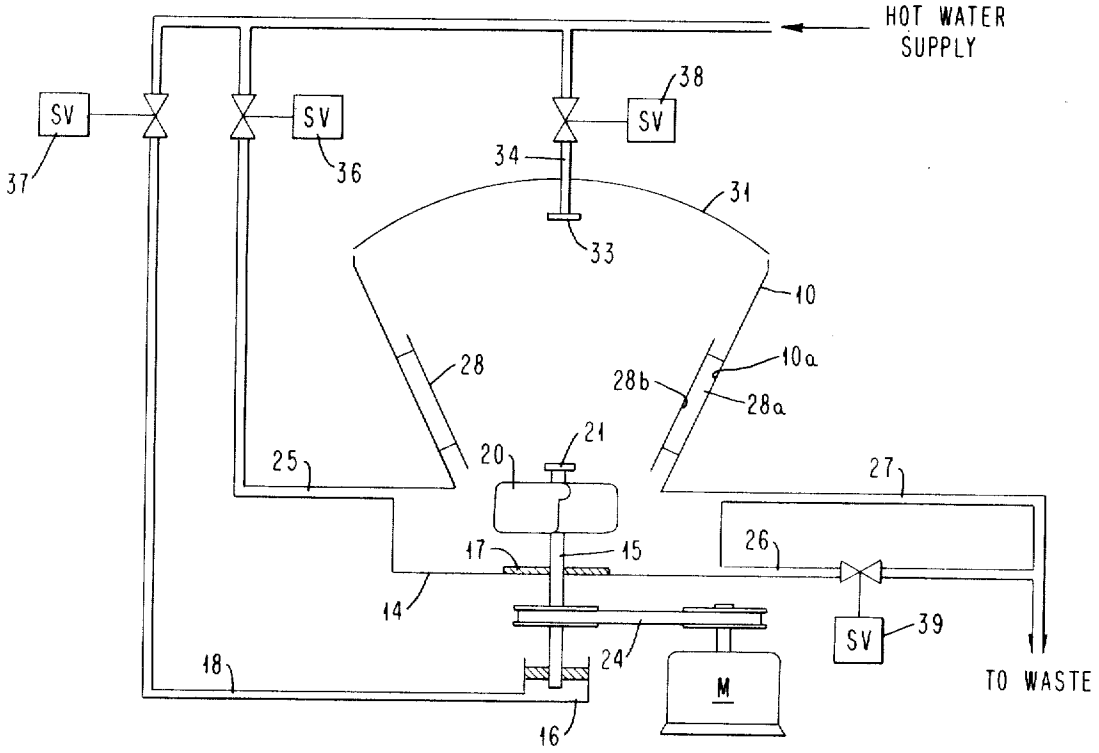
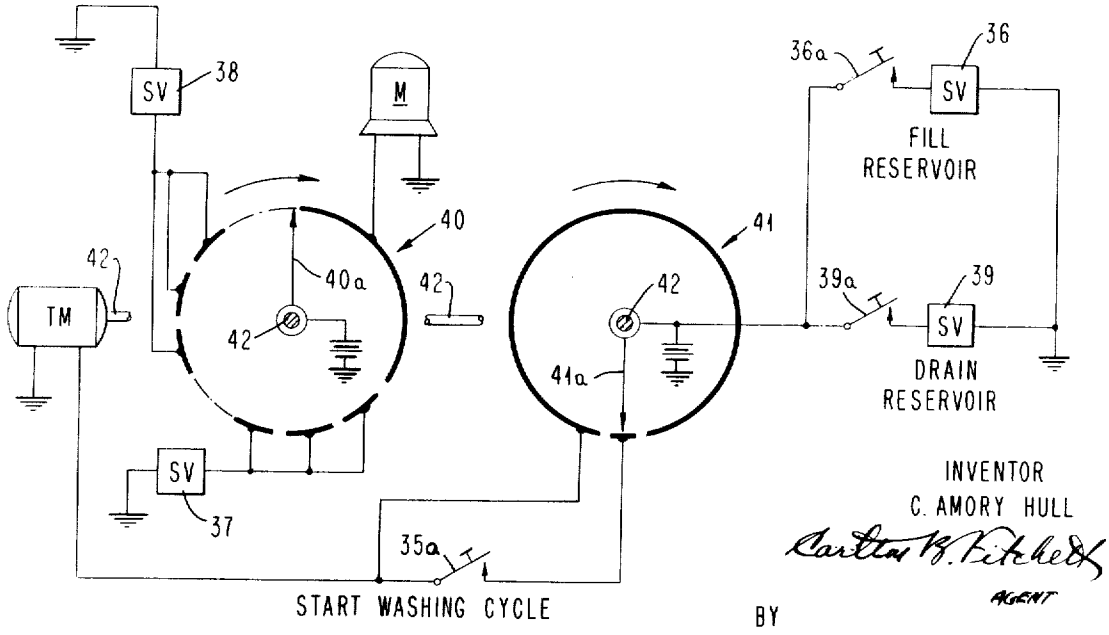


FIG. 5



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SOLID SMOOTH-SURFACE ARTICLE WASHING DEVICE

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Int. Cl. B08b *3/00*
U.S. Cl. 134—58 D 7 Claims

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

ABSTRACT OF THE DISCLOSURE

A solid smooth-surface article washing device comprising a flat top wash fluid reservoir with two inverted frusto-conical casings mounted one inside the other on the top surface of the reservoir. A wash fluid impeller is arranged within the reservoir with the body thereof substantially below the liquid level of the wash fluid therein and in vertical alignment with the relatively narrow end of the inner casing. The article to be washed is suspended above the relatively wide end of the inner casing. When activated, the impeller moves the wash fluid upwardly within the inner casing in a spiraling rotary pattern to flow outwardly over the surface of the article being washed. On leaving the peripheral edge of the article being washed, the fluid continues to move outwardly until it contacts the inner side wall of the outer casing whereupon it drains back into the fluid reservoir through a chamber formed between the casings.

BACKGROUND OF THE INVENTION

This invention relates to solid smooth-surface article washing devices and more particularly to a dish washer adapted to wash dishes one at a time.

In conventional dish washers, a relatively large area is provided for stacking a large number of dishes and other items incident to the serving of meals. In some dish washers, means are provided for rotating the stacked dishes, etc., past a plurality of spray nozzles. In other dish washer arrangements, the nozzle array is rotated past the stacked dishes. In order to assure a satisfactory washing of the stacked articles when using either of the above arrangements, it has been found necessary to utilize relatively prolonged increments of time for the wash and rinse cycles. More recently, relatively small versions of the conventional type of dish washers specially designed to accommodate only a few dishes have been made available on the open market but these dish washers still require a stacking of the articles to be washed with the above-noted disadvantage of prolonged timing cycles.

These disadvantages are overcome by the device disclosed by the present invention wherein the dishes are washed one at a time. The invention, while seemingly quite simple, nevertheless affords an important advance in the art of dish washers in that it provides a device adapted for the daily needs of a small family and/or for those persons whose daily living routine results in a need for a dish washer at somewhat infrequent intervals.

SUMMARY OF THE INVENTION

The dish washer herein disclosed contemplates the individual washing of each soiled item of tableware. An advantage of such a concept is that the dish washing device can be of extremely small over-all size and the

operating parts thereof can be arranged for the very best and efficient cleaning of the individual items of tableware. In addition, the amounts of heated wash fluids and rinsing fluids utilized in the operation of the device are greatly reduced as well as keeping the time of each cycle of the washing operation at a minimum. A further advantage is that an opportunity is provided to inspect each washed article for cleanliness when it is removed from the device at the conclusion of each individual washing operation.

The primary object of the invention is to provide a dishwasher wherein the advantages noted above are inherent from its mode of operation. Other objects, features and advantages will be apparent from the hereinafter detailed description.

According to this invention, each article to be washed is placed in the device above and in vertical alignment with an impeller which, when activated, impells the wash fluid spiraling upwardly with a rotating pattern against a surface of the article to be washed. On contacting the surface to be washed, the rotating pattern of the wash fluid continues and causes the same to leave the peripheral edge of the article and impinge on the inside wall of a casing forming part of the overall enclosure of the device. The wash fluid then flows downwardly and returns to the wash fluid reservoir through a peripheral chamber adjacent the inside wall of the casing. When the impeller is deactivated, clean rinse water is directed against the article being washed through a pair of spray nozzles, one arranged above and another below the article.

BRIEF DESCRIPTION OF THE DRAWING

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and method of operation, will be best understood from the following description of a preferred embodiment when read in connection with the accompanying drawings.

FIG. 1 is a side elevation view of a dish washing device according to the invention.

FIG. 2 is a top elevation view, partly in section, taken along the line **2—2** of FIG. 1.

FIG. 3 is a side view in perspective showing a preferred form of the impeller together with a spray nozzle mounted thereabove on the upper end of the impeller drive shaft.

FIG. 4 is a mechanical schematic view showing the fluid supply passages to various elements of the device and the arrangement in these passages of solenoid operated valves for controlling liquid flow therethrough.

FIG. 5 is an electrical schematic view of the timing device for the sequential operation and control of the various parts of the device according to this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings wherein like numerals designate like parts throughout the various views, the numeral **10** indicates the major portion of the over-all enclosure for the device. Specifically, it may be described as a casing which is inverted and elongated frusto-conical in shape. The casing **10** is secured by suitable means to and extends above the top cover **11** of a wash fluid supply reservoir **12** having a peripheral side wall **13** and a base plate **14**. Wings **14a** affixed to the base plate **14** serve to prevent excessive swirling of wash fluid within the reservoir when the impeller **20** is activated.

At the center of the base of the reservoir **12**, a rotatable shaft **15** is journaled at **16** and extends into the reservoir. Sealing means are provided at **17** to prevent

eakage of fluid from the reservoir. The journal **16** includes a further sealing means (not shown) whereby inse liquid conduit **18** is placed in throughflow connection with the central hollow portion **19** of shaft **15**. An mpeller **20** is secured on that part of shaft **15** within he reservoir **12**. A form of impeller particularly adapted or the needs of this invention is shown in detail in FIG.). The upper end portion of shaft **15** above the impeller **!0** serves as a mounting means for a spray nozzle **21** vhich, in turn, receives rinse fluid through conduit **18** and he hollow portion **19** of shaft **15**. The lower end of shaft 15 below the journal **16** is equipped with a drive pulley 22 and a further bearing means **23**. A motor M, together vith a belt **24**, serves as the driving means for shaft **15**.

The wash liquid reservoir **12** is provided with three conduit connections **25**, **26** and **27** which are for the purpose of supplying liquid to the reservoir, to drain liquid from the reservoir, and a liquid level overflow, respectively. The supply and drain conduits **25** and **26**, respectively, as well as the conduit **18**, are equipped with suitable valves in order to open or close the conduits as the need may be during the operation of the device. These valves are indicated in FIGS. 4 and 5, and their operation will be explained in detail hereinafter.

Arranged within the casing **10** and supported in spaced apart relation thereto is a second similarly shaped casing **28** of less overall vertical length than the casing **10**. The casing **28** is supported in the position shown by a plurality of radially extending wings **28a** and both casings are so arranged above the reservoir **12** that the relatively narrow end openings of the casings are in substantial horizontal alignment, and with the centers of the said openings directly above and in line with the centerline of shaft **15**. Further, the upper edges of the wings of impeller **20** and the lower edge of casing **28** are closely adjacent, and the nozzle **21** is within the lower portion of casing **28**. The above described relationship between these parts is clearly shown in FIG. 1. A peripheral chamber **43** is formed between the side wall **10a** of casing **10** and the sidewall **28b** of casing **28**.

The inner surface of casing **10** above the relatively wide upper end opening of casing **28** may be provided with a plurality of lugs **29** adapted to support a wire mesh or otherwise substantially *perforate* [imperforate] tray **30** (shown in phantom since the exact form and shape thereof may vary in many ways) into which a solid smooth-surface article to be washed may be placed. The upper edge of the relatively wide portion of casing **10** is fitted with a dome-shape cover **31**, the same being moveably secured thereto through a hinge means **32**. A sealing ring **32a** is arranged between the bottom edge of the cover and the upper edge of the casing **10** to insure a fluid tight joint therebetween. The under side of the cover at its center is fitted with a downwardly directed spray nozzle **33** and a throughflow passage thereto is provided through the cover to a conduit **34**. A suitable valve to open or close conduit **34** is provided and its proper sequence of operation is shown in FIGS. 4 and 5. Such operation will be explained hereinafter. The cover **31** is also provided with a latch means **35** which may also include, in the preferred embodiment, an electrical switch means **35a** through which the sequential timing of the various cycles incident to the device according to this invention is instigated in a manner to be fully explained hereinafter in connection with FIGS. 4 and 5.

The mode of operation of the device will now be described with reference being made particularly to FIGS. 4 and 5 which show a mechanical schematic representation of the subject invention, and an electrical schematic representation of an arrangement for controlling the preferred sequence of operations of the device, respectively.

As will be seen from FIG. 5, the timing motor TM is at rest and all circuits to the associated and controlled equipment, motor M, solenoid valve **37**, and solenoid valve **38**, are open. When it is desired to wash a hard smooth-surface article in this device, solenoid valve **36** is activated by closing switch **36a** thereby opening conduit **25** to permit hot water to flow into the reservoir **12**. When an overflow is noted from open conduit **27**, the switch **36a** is released and solenoid valve **36** once more closes conduit **25**.

A suitable amount of detergent is then added manually to the fluid now in reservoir **12** to make up the wash fluid recited in the appended claims. Next, an article to be washed is placed in the tray **30** (FIG. 1) and the cover **31** is closed and latched. The latching of the cover momentarily closes switch **35a**, included as part of the cover latch as mentioned above, and starts the running of motor TM for driving the timing switch schematically represented in FIG. 5 by the segmented rings **40** and **41** and the contact arms **40a** and **41a** associated therewith.

As soon as the timing motor TM begins to run, continuing power for a full revolution of shaft **42** driven thereby is provided through the arm **41a** and the ring **41** associated therewith. At the same time, the switch arm **40a** moves into contact with the relatively long section of ring **40** associated therewith and closes a circuit to activate the motor M which drives the impeller **20**. Thus, the wash fluid is impelled upwardly within the casing **28** and returns to the reservoir in the manner previously described. As the arm **40a** moves off the long section of ring **40**, the impeller driving motor M is deactivated, and as the arm continues its movement, it consecutively contacts a plurality of short segments of ring **40** thereby activating solenoid valve **37** to consecutively open and close the conduit **18** leading to the now stationary nozzle **21** a plurality of times, three being illustrated. Each time the conduit **18** is opened, a flow of clean rinse water from the hot water source is directed by the nozzle **21** against the adjacent surface of the article in tray **30**. After the switch arm **40a** moves from the last of the segments of ring **40** connected to the solenoid valve **37**, it next consecutively contacts an additional plurality of short segments of the ring **40** connected to solenoid valve **38**, each of which consecutively opens and closes conduit **34** leading to nozzle **33** depending from the inside of cover **31**. Each time the conduit **34** is opened, a flow of clean rinse water from the hot water supply is directed by the nozzle **33** against the side of the article in tray **30** adjacent to that nozzle. After leaving the last of the segments of ring **40** connected to solenoid valve **38**, the arm **40a** continues its movement until just before it reaches the above-mentioned relatively long section of the ring **40**. Movement of the shaft **42** driving the arm **40a** is stopped at this time by the arm **41a** running off the continuous part of ring **41** thus stopping the running of the timing motor TM.

When the device shuts down as described above, the cover is opened and the washed article removed from tray **30** and may be inspected for cleanliness. When another article is placed in the tray and the cover **31** once more closed and latched, the washing and rinsing steps set forth above are repeated by the associated reactivation of the timing motor TM. The wash fluid may be drained from the reservoir **12** at the conclusion of any individual article washing cycle by closing switch **39a** which energizes solenoid valve **39** to open conduit **26** whereupon the wash fluid in reservoir **12** passes to the waste connection.

It is to be noted that the described and illustrated arrangement of the casing parts **10** and **28** forms a peripheral hollow chamber **43**, the lower relatively narrow end thereof being in substantially horizontal alignment with the lower narrow end of each of the respective casings and, accordingly, communicating with the wash fluid reservoir; that any well known practice, either by mechanical automation or manual act, for adding a detergent to any household hot tap water and thereby obtain a suitable wash fluid is included in the reference to a wash fluid supply as that term is used herein; and that

any household hot water tap will suffice as a suitable source of a rinse fluid as that term is used herein.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

I claim:

1. A solid smooth-surface article washing device comprising

a wash fluid supply reservoir,

a first inverted and elongated substantially frusto-conical casing having an inner side wall, the casing being affixed to the wash fluid supply reservoir with its relatively narrow end opening into said reservoir,

a second inverted but less elongated substantially frusto-conical casing having an outer side wall, said second casing being arranged within and spaced apart from said first casing and forming therewith a peripheral chamber between the said inner and outer side walls of the casings, the relatively narrow end of the chamber communicating with said reservoir,

means for supplying wash fluid to the reservoir,

a substantially *perforate* [imperforate] tray adapted to support therein an article to be washed, the tray being arranged within the upper relatively wide portion of the first casing and above the upper wide end portion of the second casing,

means for supporting said tray above the upper wide end portion of the second casing,

an impeller, including a drive shaft to which it is affixed, adapted for rotation and mounted within said reservoir in axial alignment with the said narrow end opening of said second casing, the diameter of said impeller being less than the inner diameter of said peripheral chamber at its point of communication with said reservoir,

a rinse fluid supply means,

a first and a second spray nozzle arranged within said casings for dispensing rinse fluid to and against opposite surfaces of an article supported in said tray, and

means for rotating the impeller drive shaft whereby wash fluid from within the reservoir is impelled by the impeller upwardly within the second casing in a substantially spiraling and rotating pattern to and against an adjacent surface of an article supported in said tray.

2. An article washing device according to claim 1, in which the wash fluid on impinging with said spiraling and rotating pattern against the surface of an article supported in said tray, continues its rotating pattern outwardly along said surface to the periphery thereof and, on leaving the periphery, strikes against the said inside wall of said first casing and thereafter flows downwardly through the said peripheral chamber into the said wash fluid supply reservoir.

3. An article washing device according to claim 1, in which said first spray nozzle is directed upwardly and arranged on the impeller shaft above the impeller, and including also a rinse fluid conducting means within said impeller drive shaft whereby rinse fluid is conducted from the rinse fluid supply means to and through said first nozzle against one surface of an article supported in said tray.

4. An article washing device according to claim 1, including also a cover moveably supported on the upper relatively wide end portion of said first casing and having a latch means for securing the same thereto, the second spray nozzle being supported from the underside of said cover at the center thereof and directed downwardly, and a rinse fluid conducting means carried by the cover whereby rinse fluid is conducted from the rinse fluid supply means to and through said second nozzle against another surface of an article supported in said tray.

5. An article washing device according to claim 4, in which the cover, the wall of the first casing, and the walls of the wash fluid reservoir, together form a total enclosure for the device.

6. An article washing device according to claim 4, including also an automatic timing means for individually actuating in sequence (a) the rotation of the wash fluid impeller, (b) the dispensing of rinse fluid through said first spray nozzle, and (c) the dispensing of rinse fluid through said second spray nozzle, said automatic timing means being activated by means operable upon the closing and latching of the said cover.

7. An article washing device according to claim 1, in which the rotation of the impeller and the dispensing of rinse fluid through the said first and second spray nozzles are individually activated in sequence.

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U.S. Cl. X.R.

134—95, 99, 177, 182, 200