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### DISHWASHER WITH INTEGRATED UTENSIL RINSING DEVICE

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#### Abstract

A dishwasher incorporates an integrated utensil rinsing device capable of being used when an external door of the dishwasher is in an opened position, and in some instances, when the dishwasher is otherwise off and/or not currently running a wash cycle. In some instances, for example, a utensil rinsing device may be supported on an interior side of an external door and may include a platform configured to rinse beverage containers by actuating a rinse valve when a rim of a beverage container is pressed against the platform.

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## Background/Summary

### BACKGROUND

[0001] Dishwashers are used in many single-family and multi-family residential applications to clean dishes, silverware, cutlery, cups, glasses, pots, pans, etc. (collectively referred to herein as “utensils”). Many dishwashers include one or more racks for holding the utensils, as well as one or more spray devices, e.g., one or more rotatable spray arms, that are supplied with wash fluid by a pump to spray wash fluid onto the utensils during a wash cycle.

[0002] It is common for users to place utensils in a dishwasher as they are dirtied, and then run a wash cycle once the dishwasher is full of utensils. In smaller households, it may be several days before the dishwasher is full and a wash cycle is run, and during that time any soil disposed on the utensils may have an opportunity to dry and harden, making it more difficult to remove during the wash cycle. Many users as a result will manually rinse off utensils in the sink before placing them in the dishwasher; however, doing so can be inconvenient and time consuming, and can result in a mess in the kitchen as wet, soiled utensils are moved from the sink to the dishwasher.

### SUMMARY

[0003] The herein-described embodiments address these and other problems associated with the art by providing in some instances a dishwasher that incorporates an integrated utensil rinsing device capable of being used when an external door of the dishwasher is in an opened position, and in some instances, when the dishwasher is otherwise off and/or not currently running a wash cycle. In some instances, for example, a utensil rinsing device may be supported on an interior side of an external door and may include a platform configured to rinse beverage containers by actuating a rinse valve when a rim of a beverage container is pressed against the platform.

[0004] Therefore, consistent with one aspect of the invention, a dishwasher may include an interior cavity defined by a wash tub and an external door, the external door movable between opened and closed positions and configured to provide external access to the interior cavity when in the opened position, one or more racks supported in the interior cavity to support a plurality of utensils during a wash cycle, at least one spray device supported in the interior cavity and configured to direct wash fluid onto the plurality of utensils during the wash cycle, and a utensil rinsing device supported on one of the wash tub and the external door and accessible by a user when the external door is substantially in the opened position, the utensil rinsing device configured to rinse a utensil while the external door is substantially in the opened position.

[0005] Also, in some embodiments, the utensil rinsing device is configured to rinse the utensil prior to the wash cycle during which the utensil is washed. Further, in some embodiments, the utensil rinsing device is configured to selectively spray rinse fluid onto the utensil in response to user input.

[0006] In some embodiments, the utensil rinsing device includes a rinse sprayer and a rinse valve that couples the rinse sprayer to a rinse fluid supply, and the utensil rinsing device is configured to selectively actuate the rinse valve in response to the user input to direct rinse fluid from the rinse fluid supply to the rinse sprayer. Also, in some embodiments, the rinse valve is a mechanically-actuated valve, and the user input includes mechanically actuating the mechanically-actuated valve.

[0007] In some embodiments, the utensil rinsing device further includes a utensil-actuated actuator configured to be actuated in response to pressing the utensil against the utensil-actuated actuator. Further, in some embodiments, the utensil-actuated actuator includes a platform disposed proximate the rinse sprayer and extending substantially perpendicular to an actuation axis and configured to selectively actuate the rinse valve in response to movement of the platform along the actuation axis. In some embodiments, the platform is movable between off and on positions along the actuation axis and is biased to the off position, the platform is configured to actuate the rinse

valve when in the on position, the utensil is a beverage container, and the platform is configured to move towards the on position in response to pressing a lip of the beverage container against the platform to actuate the rinse sprayer to spray rinse fluid into an interior of the beverage container. [0008] Further, in some embodiments, the rinse valve is an electronically-actuated valve and the utensil rinsing device includes a switch configured to actuate the electronically-actuated valve. In addition, some embodiments may further include a user interface configured to initiate the wash cycle, the rinse valve is an electronically-actuated valve and the user interface includes a user control configured to actuate the electronically-actuated valve.

[0009] In addition, some embodiments may also include an inlet valve configured to supply wash fluid to the wash tub, a pump configured to pump wash fluid collected in a sump of the wash tub to the at least one spray device, and a controller configured to control the inlet valve and the pump during the wash cycle. The utensil rinsing device is positioned such that rinse fluid sprayed on the utensil is captured in the dishwasher when the external door is substantially in the opened position, and the controller is configured to initiate the wash cycle by combining the rinse fluid captured in the dishwasher with fresh water by actuating the inlet valve while the rinse fluid is retained in the sump such that an initial fill performed during the wash cycle includes the rinse fluid.

[0010] In some embodiments, the utensil rinsing device is positioned such that rinse fluid sprayed on the utensil is captured in the sump of the dishwasher. In addition, in some embodiments, the rinse fluid supply supplies rinse fluid from an external water line to the rinse valve independent of the inlet valve. Also, in some embodiments, the utensil rinsing device is further configured to rinse a utensil while the controller is in an off state during which no wash cycle is being performed.

[0011] In addition, in some embodiments, the utensil rinsing device is supported on an interior side of the external door. In some embodiments, the utensil rinsing device is configured to articulate relative to an interior side of the external door. Further, in some embodiments, the utensil rinsing device is configured to automatically articulate relative to the interior side of the external door as the external door is moved from the closed position towards the opened position. In addition, in some embodiments, the utensil rinsing device is supported on one of a top wall of the wash tub, a side wall of the wash tub, a rear wall of the wash tub, a rack of the one or more racks, or a spray arm assembly. Further, in some embodiments, the utensil rinsing device is movable between a storage position and an operating position via linear and/or rotary motion.

[0012] Consistent with another aspect of the invention, a dishwasher may include an interior cavity defined by a wash tub and an external door, the external door movable between opened and closed positions and configured to provide external access to the interior cavity when in the opened position, one or more racks supported in the interior cavity to support a plurality of utensils during a wash cycle, at least one spray device supported in the interior cavity and configured to direct wash fluid onto the plurality of utensils during the wash cycle, and a beverage container rinsing device supported in the interior cavity on an interior side of the external door and accessible by a user when the external door is substantially in the opened position, the beverage container rinsing device configured to rinse a beverage container while the external door is substantially in the opened position and prior to washing the beverage container during the wash cycle. The beverage container rinsing device includes a rinse sprayer, a mechanically-actuated rinse valve that couples the rinse sprayer to a rinse fluid supply, and a platform disposed proximate the rinse sprayer and extending substantially perpendicular to an actuation axis and configured to selectively actuate the mechanically-actuated rinse valve in response to movement of the platform along the actuation axis. The platform is movable between off and on positions along the actuation axis and is biased to the off position, the platform is configured to actuate the rinse valve when in the on position, and the platform is configured to move towards the on position in response to pressing a lip of the beverage container against the platform to actuate the rinse sprayer to spray rinse fluid into an interior of the beverage container.

[0013] These and other advantages and features, which characterize the invention, are set forth in

the claims annexed hereto and forming a further part hereof. However, for a better understanding of the invention, and of the advantages and objectives attained through its use, reference should be made to the Drawings, and to the accompanying descriptive matter, in which there is described example embodiments of the invention. This summary is merely provided to introduce a selection of concepts that are further described below in the detailed description, and is not intended to identify key or essential features of the claimed subject matter, nor is it intended to be used as an aid in limiting the scope of the claimed subject matter.

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## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a perspective view of a dishwasher incorporating an integrated utensil rinsing device consistent with some embodiments of the invention.

[0015] FIG. 2 is a block diagram of an example control system for the dishwasher of FIG. 1.

[0016] FIG. 3 is a side elevational view of the dishwasher of FIG. 1.

[0017] FIG. 4 is a cross-sectional view taken through lines 4-4 of FIG. 3.

[0018] FIG. 5 is a functional diagram illustrating the integrated utensil rinsing device of the dishwasher of FIG. 1.

[0019] FIG. 6 is a flowchart illustrating an operational sequence for performing a wash cycle using captured rinse fluid capable of being performed by the dishwasher of FIG. 1.

[0020] FIG. 7 is a side elevational view of another example integrated utensil rinsing device consistent with some embodiments of the invention.

[0021] FIG. 8 is a side elevational view of other example integrated utensil rinsing devices consistent with some embodiments of the invention.

[0022] FIG. 9 is a front elevational view of other example integrated utensil rinsing devices consistent with some embodiments of the invention.

### DETAILED DESCRIPTION

[0023] In the embodiments discussed below, a dishwasher may utilize an integrated utensil rinsing device capable of being used when an external door of the dishwasher is in an opened position, and in some instances, when the dishwasher is otherwise off and/or not currently running a wash cycle.

[0024] Turning now to the drawings, wherein like numbers denote like parts throughout the several views, FIG. 1 illustrates an example dishwasher 10 in which the various technologies and techniques described herein may be implemented. Dishwasher 10 is a residential-type built-in dishwasher, and as such includes a front-mounted external door 12 that provides access to a wash tub 14 housed within a cabinet or housing 16. Door 12 is generally hinged along a bottom edge and is pivotable between an opened position illustrated in FIG. 1 and a closed position (not shown). External door 12 and wash tub 14 define an interior cavity 18 for the dishwasher, and when door 12 is in the opened position, access is provided to one or more sliding racks 20, e.g., a lower rack, an upper rack and/or a middle rack, within which various utensils are placed for washing. A lower rack may be supported on rollers, while upper and/or middle racks may be supported on side rails, and each rack 20 is movable between loading (extended) and washing (retracted) positions along a substantially horizontal direction. One or more spray devices, e.g., a lower spray arm 22 and a plurality of tubular spray elements (TSEs) 24, may be provided to direct a spray of wash fluid onto utensils in the wash tub. In addition, in some embodiments one or more spray devices (e.g., tubular spray elements 24) may be controllably-movable, e.g., using a tubular spray element drive 26, such that a direction of spray can be controlled. In some embodiments, all spray devices may be controllably-movable, while in other embodiments, no spray devices may be controllably-movable.

[0025] Control over dishwasher 10 by a user is generally managed through a control panel 28 typically disposed on a top or front of door 12, and it will be appreciated that in different

dishwasher designs, the control panel may include various types of input and/or output devices, including various knobs, buttons, lights, switches, textual and/or graphical displays, touch screens, etc. through which a user may configure one or more settings and start and stop a wash cycle. [0026] The embodiments discussed hereinafter will focus on the implementation of the hereinafter-described techniques within a hinged-door dishwasher. However, it will be appreciated that the herein-described techniques may also be used in connection with other types of dishwashers in some embodiments. For example, the herein-described techniques may be used in commercial applications in some embodiments. Moreover, at least some of the herein-described techniques may be used in connection with other dishwasher configurations, including dishwashers utilizing sliding drawers.

[0027] Now turning to FIG. 2, dishwasher **10** may be under the control of a controller **30** that receives inputs from a number of components and drives a number of components in response thereto. Controller **30** may, for example, include one or more processors **32** and a memory **34** within which may be stored program code for execution by the one or more processors. The memory may be embedded in controller **30**, but may also be considered to include volatile and/or non-volatile memories, cache memories, flash memories, programmable read-only memories, read-only memories, etc., as well as memory storage physically located elsewhere from controller **30**, e.g., in a mass storage device or on a remote computer interfaced with controller **30**.

[0028] As shown in FIG. 2, controller **30** may be interfaced with various components, including one or more tubular spray element drives **26** and/or the drive systems of other controllably-movable sprayers, as well as an inlet valve **36** that is coupled to a water source to introduce water into wash tub **14**, which when combined with detergent, rinse agent and/or other additives, forms various wash fluids. A wash fluid may be considered to be a fluid, generally a liquid, incorporating at least water, and in some instances, additional components such as detergent, rinse aid, and other additives. During a rinse operation, for example, the wash fluid may include only water. A wash fluid may also include steam in some instances.

[0029] Controller **30** may also be coupled to a water heater **38** that heats fluids, a pump **40** that recirculates fluid within the wash tub by pumping fluid to the wash arms and other spray devices in the dishwasher, a drain valve **42** that is coupled to a drain to direct fluids out of the dishwasher, and a diverter **44** that controls the routing of pumped fluid to different wash arms and/or other spray devices during a wash cycle. In some embodiments, a single pump **40** may be used, and drain valve **42** may be configured to direct pumped fluid either to a drain or to the diverter **44** such that pump **40** is used both to drain fluid from the dishwasher and to recirculate fluid throughout the dishwasher during a wash cycle. In other embodiments, separate pumps may be used for draining the dishwasher and recirculating fluid. Diverter **44** in some embodiments may be a passive diverter that automatically sequences between different outlets, while in some embodiments diverter **44** may be a powered diverter that is controllable to route fluid to specific outlets on demand. Generally, pump **40** may be considered to be a fluid supply in some embodiments as pump **40** supplies a pressurized source of fluid to diverter **44** for distribution to one or more spray arms and/or spray devices.

[0030] Controller **30** may also be coupled to a dispenser **46** to trigger the dispensing of detergent and/or rinse agent into the wash tub at appropriate points during a wash cycle. Additional sensors **48** and actuators may also be used in some embodiments, including, for example, a temperature sensor to determine a wash fluid temperature, a door switch to determine when door **12** is latched, various turbidity or conductivity sensors, etc. Moreover, controller **30** may be coupled to a user interface **50** including various input/output devices such as knobs, dials, sliders, switches, buttons, lights, textual and/or graphics displays, touch screen displays, speakers, image capture devices, microphones, etc. for receiving input from and communicating with a user (e.g., at least partially disposed on control panel **28** of FIG. 1).

[0031] In some embodiments, controller **30** may also be coupled to one or more network interfaces

52, e.g., for interfacing with external devices via wired and/or wireless networks **54** such as Ethernet, Bluetooth, NFC, cellular and other suitable networks. For example, dishwasher **10** may interface with one or more user devices **56**, e.g., to permit consumer remote control of dishwasher **10** and/or to provide status information to a consumer. Dishwasher **10** may also interface with one or more remote services **58**, e.g., for diagnostics, maintenance, system updates, remote control, and/or practically any other suitable purpose. Additional components may also be interfaced with controller **30**, as will be appreciated by those of ordinary skill having the benefit of the instant disclosure.

[0032] Moreover, in some embodiments, at least a portion of controller **30** may be implemented externally from dishwasher **10**, e.g., within a mobile device, a cloud computing environment, etc., such that at least a portion of the functionality described herein is implemented within the portion of the controller that is externally implemented. In some embodiments, controller **30** may operate under the control of an operating system and may execute or otherwise rely upon various computer software applications, components, programs, objects, modules, data structures, etc. In addition, controller **30** may also incorporate hardware logic to implement some or all of the functionality disclosed herein. Further, in some embodiments, the sequences of operations performed by controller **30** to implement the embodiments disclosed herein may be implemented using program code including one or more instructions that are resident at various times in various memory and storage devices, and that, when read and executed by one or more hardware-based processors, perform the operations embodying desired functionality. Moreover, in some embodiments, such program code may be distributed as a program product in a variety of forms, and that the invention applies equally regardless of the particular type of computer readable media used to actually carry out the distribution, including, for example, non-transitory computer readable storage media. In addition, it will be appreciated that the various operations described herein may be combined, split, reordered, reversed, varied, omitted, parallelized and/or supplemented with other techniques known in the art, and therefore, the invention is not limited to the particular sequences of operations described herein.

[0033] In addition, with reference to FIG. **1**, as discussed in greater detail below, dishwasher **10** may also include an integrated utensil rinsing device **60** suitable for rinsing utensils while door **12** is in an opened position and typically prior to placing the utensils in the dishwasher and/or prior to running a wash cycle to wash the utensils. With reference to FIG. **2**, in some embodiments the integrated utensil rinsing device **60** may be electronically controllable by controller **30**, e.g., via electronic control over an electronically-actuated rinse valve **62**, and in response to user input received, for example, through user interface **50**.

[0034] Numerous variations and modifications to the dishwasher illustrated in FIGS. **1-2** will be apparent to one of ordinary skill in the art, as will become apparent from the description below. Therefore, the invention is not limited to the specific implementations discussed herein.

#### Dishwasher with Integrated Utensil Rinsing Device

[0035] As noted above, in some embodiments of the invention, it may be desirable to incorporate a utensil rinsing device, e.g., utensil rinsing device **60** of FIG. **1**, in a dishwasher. By doing so, utensils may be rinsed prior to being placed in the dishwasher, and prior to a wash cycle being initiated.

[0036] Rinsing utensils prior to placement in a dishwasher is often performed in a sink, e.g., to remove soil before it dries and hardens on the utensils, as doing so can improve dishwasher performance, particularly where there is a delay of hours or days between placing the utensils in the dishwasher and running a wash cycle. Rinsing a utensil in a sink and placing it in a dishwasher, is often a multi-step process, requiring a user to turn the sink faucet on, manipulate the utensil under the sink and/or manipulate a faucet's spray nozzle to rinse the utensil, turn the sink faucet off, open the dishwasher door, pull out a rack, place the utensil in the dishwasher rack, push the rack back in, and close the dishwasher door. Such a process may need to be repeated for multiple utensils, and

moreover, may be relatively messy due to the fact that rinsing in a sink can cause water to splatter in the vicinity of the sink, and due to the need to move the utensils from the sink to dishwasher while they are still wet and dripping.

[0037] Embodiments consistent with the invention, on the other hand, incorporate a utensil rinsing device that is supported by one of a wash tub and an external door of a dishwasher, and sometimes supported in an interior cavity defined by the wash tub and the external door, and that is capable of being used when the external door is in an opened position. In some embodiments, moreover, the utensil rinsing device is operable when the dishwasher is prior to or otherwise not performing a wash cycle, and in some instances, when the dishwasher is not even currently in an active/on state. Furthermore, in some instances, the utensil rinsing device is inoperative during a wash cycle or otherwise when the external door is in the closed position, and as such, any sprayer used by the utensil rinsing device is incapable of spraying fluid onto utensils during any wash cycle.

[0038] As will also become more apparent below, a utensil rinsing device may be accessible to a user even when the external door of the dishwasher is only partially opened, whereby a user may, in some instances, be able to rinse a utensil such as a glass, cup, mug, bottle, or other type of beverage container simply by opening the external door of the dishwasher a relatively small amount, temporarily actuating the utensil rinsing device to spray a rinse fluid such as fresh water onto the utensil, pulling out the upper rack a short way, placing the beverage container in the upper rack, and then pushing the rack back in the wash tub and closing the external door. As such, it will be appreciated that an opened position of an external door during which the utensil rinsing device may be used may be considered to include, in addition to a fully opened position where the external door is generally horizontally oriented and capable of supporting the lower rack when extended, a multitude of other intermediate opened positions between the fully opened position and the fully closed position where the external door forms a seal with the wash tub to fully enclose the interior cavity of the dishwasher.

[0039] FIGS. 3-5, for example, illustrate one example embodiment of utensil rinsing device **60**, which is supported on an interior side **64** of door **12**, and is capable of rinsing a utensil, e.g., a glass or other beverage container **66**. In this regard, utensil rinsing device **60** may be considered to be a beverage container rinsing device in some embodiments, although it will also be appreciated that a beverage container rinsing device may be capable of rinsing other types of utensils, even if its design is focused on rinsing beverage containers. For context, FIG. 3 also illustrates dishwasher **10** mounted in a base cabinet **68** in an undercounter application beneath countertop **70**.

[0040] With reference to FIG. 5, utensil rinsing device **60** includes a rinse valve **62** coupled to and in fluid communication with a rinse fluid supply **72**. Rinse fluid supply **72**, for example, may supply fresh water from an external water line, although in other embodiments, rinse fluid supply **72** may supply other rinse fluids, e.g., water mixed with detergent or other additives, or gray water retained by dishwasher **10** in some embodiments. In some embodiments, rinse fluid supply **72** may be coupled to rinse valve **62** through inlet valve **36** or otherwise receive rinse fluid from the same external connection to an external water line that supplies water to the dishwasher, while in other embodiments, rinse fluid supply **72** may be completely independent from the inlet valve and/or the supply of water to the main fluid supply for the dishwasher, whereby a separate connection to an external water line (which in some instances may be a cold water line) may be used to supply rinse fluid to rinse valve **62**. In one particular embodiment, a tee may be used to couple both inlet valve **36** and rinse valve **62** to a common external connection, such that no additional external connections are required to install the dishwasher, but also such that utensil rinsing device **60** is independently operable from inlet valve **36** and the other components in dishwasher **10** that are used to perform a wash cycle. In such embodiment, utensil rinsing device **60** may be operable even when controller **30** is in an off state and/or no wash cycle is being performed.

[0041] Downstream of and in fluid communication with rinse valve **62** is a rinse sprayer **74**, which is configured to receive rinse fluid from rinse valve **62** to direct one or more streams of rinse fluid

onto utensil **66**. It will be appreciated that rinse sprayer **74** may be implemented using various arrangements of apertures, nozzles, fluidic nozzles, etc., and in some embodiments may generate various combinations of fixed, oscillating and/or movable spray patterns. Multiple rinse sprayers may be used in some embodiments, and rinse sprayers may be integrated into other structures of a utensil rinsing device (e.g., a platform) in some embodiments.

[0042] Utensil rinsing device **60**, in the illustrated embodiment, selectively actuates rinse valve **62** to selectively supply rinse fluid to rinse sprayer **74** to spray rinse fluid onto utensil **70** in response to user input received from a user. In one embodiment, for example, utensil rinsing device **60** includes a utensil-actuated actuator, e.g., a platform **76**, that may be used to actuate rinse valve **62** in response to user input in the form of pressing a utensil against the utensil-actuated actuator. Platform **76**, for example, may extend substantially perpendicular to, and be movable along, an actuation axis A, such that pressing a lip **78** of utensil **66** against platform **76** in the direction of the arrow illustrated in FIG. 5 urges platform **76** along actuation axis A. Platform **76**, for example, may move between off and on positions along actuation axis A, and may be biased to the off position (illustrated in FIGS. 3 and 4) by a spring or other bias mechanism **80**, such that movement towards the on position (which is illustrated in FIG. 5), actuates rinse valve **62** to direct fluid to rinse sprayer **74**.

[0043] In some embodiments, rinse valve **62** may be a mechanically-actuated valve, and may be mechanically coupled to platform **76** or another utensil-actuated or other type of actuator such that the valve is mechanically actuated via a mechanical coupling between the rinse valve and actuator. In other embodiments, however, and as illustrated in FIG. 5, rinse valve **62** may be electronically-actuated valve, and may be coupled via control logic **82** (which, in various embodiments, may be implemented by controller **30** or by a separate control circuit) to an electronic actuator, e.g., an electrical, magnetic, capacitive, or other suitable switch **84** that actuates rinse valve **62** in response to movement of platform **76** along actuation axis A. In some embodiments, for example, control logic **82** may be implemented as a simple switching circuit that supplies power to rinse valve **62** in response to actuation of switch **84**.

[0044] In other embodiments, however, rinse valve **62** may be controlled mechanically or electronically in response to other forms of user input that are not utensil-actuated. For example, a dedicated button or other user control on dishwasher **10** that is accessible to a user when the door is in an opened position may be used in some embodiments to actuate rinse valve **62**. In other embodiments, a user control in user interface **28** may be used to signal controller **30** to actuate rinse valve **62**. Other manners of actuating rinse valve **62** in response to user input will be appreciated by those of ordinary skill having the benefit of the instant disclosure, so the invention is not limited to the specific examples described herein.

[0045] With reference to FIG. 4, utility rinsing device **60** may also incorporate a spray guard **86** that circumscribes rinse sprayer **74** to capture rinse fluid and reduce splashing around the device. Spray guard **86** also includes a drain channel **88** that is downwardly-facing whenever external door **12** is tilted up from a horizontal position, such that rinse fluid sprayed by rinse sprayer **74** drains through the drain channel and onto the interior side **64** of external door **12**. In addition, interior side **64** of external door includes a stepped profile as well as lateral ridges **90** that are configured to constrain and direct any rinse fluid that collects on the interior side towards wash tub **16** and into a sump **92** thereof.

[0046] By collecting rinse fluid dispensed by utensil rinsing device **60** in sump **92**, the collected rinse fluid may be used to reduce water consumption by the dishwasher in a subsequently-performed wash cycle. It will be appreciated, for example, that the amount of water added to a dishwasher in an initial fill operation of a wash cycle is generally controlled to be a predetermined amount, e.g., by using a float switch, by monitoring the amount of water received by the inlet valve using a flowmeter, etc. Thus, by reusing the collected rinse fluid in the initial fill, the amount of additional water required to meet the predetermined amount when the wash cycle is initiated can be



offset by the amount of rinse fluid collected in the sump.

[0047] FIG. 6, for example, illustrates an operation sequence **100** where collected rinse fluid is used to offset the amount of additional water for a wash cycle. In block **102**, rinse fluid dispensed by the utensil rinsing device is collected in the sump, and then in block **104**, a wash cycle is thereafter initiated. During an initial fill in the wash cycle, the amount of rinse fluid collected in the sump is used to reduce the amount of additional water added during the initial fill. For example, where a float switch is used, the presence of the rinse fluid in the sump will cause the fluid level that triggers the float switch to be reached more quickly when the inlet valve is activated. Where a flowmeter is used, the amount of rinse fluid dispensed by the utensil rinsing device may be tracked and used to reduce the amount of wash fluid introduced to the sump by the inlet valve. Then, in block **106**, the remainder of the wash cycle is completed in a conventional manner, but using the collected rinse fluid in combination with the wash fluid introduced by the inlet valve.

[0048] It will be appreciated that a utensil rinsing device may be implemented in a number of different manners consistent with the invention. FIG. 7, for example, illustrates a dishwasher **120** that includes an articulating utensil rinsing device **122** mounted to an interior side **124** of an external door **126**. Utensil rinsing device **122** includes a tray **128** mounted on an articulating support **130** that is pivotably coupled to external door **126**, as well as a rinse sprayer **132** and platform **134** that activates a rinse valve (not shown) in response to pressure applied by a beverage container or other utensil **136**. It will be appreciated that the articulating nature of utensil rinsing device **122** allows for the actuation axis for platform **134** to be oriented in a substantially horizontal orientation that may be more convenient for use in some applications.

[0049] In some embodiments, utensil rinsing device **122** may be moved between operating and storage positions (the former of which is illustrated in FIG. 7, and the latter of which is similar to the orientation of utensil rinsing device **60** as illustrated in FIG. 3), and may do so through manual manipulation by a user. In other embodiments, however, utensil rinsing device **122** may automatically articulate between the operating and storage positions, e.g., as the external door is moved from the closed position towards the opened position. In some embodiments, for example, a mechanical linkage **138** may be used to pivot utensil rinsing device **122** in response to pivoting of the external door. In other embodiments, linkage **138** may be a component of an electro-mechanical arrangement that automatically pivots utensil rinsing device **122** to the operating position when external door **126** is within a predetermined range of positions, or alternatively, in response to user selection of a button or other control. Other manners of articulating utensil rinsing device **122** between storage and operating positions will be apparent to those of ordinary skill having the benefit of the instant disclosure, so the invention is not limited to the specific examples given herein.

[0050] It will also be appreciated that a utensil rinsing device may be supported in other locations and/or by other components of a dishwasher in other embodiments, e.g., on one of a top wall of a wash tub, a side wall of a wash tub, a rear wall of a wash tub, a rack, or a spray arm assembly, and in some instances, may be manually and/or automatically movable between storage and operating positions. In addition, while in many instances only a single utensil rinsing device may be provided in a particular dishwasher, in other embodiments, multiple utensil rinsing devices, having any of the various configurations illustrated herein, may be used together.

[0051] FIG. 8, for example, illustrates a dishwasher **140** including an external door **142** and a utensil rinsing device **144** slidably supported by one or more rails **146** on a top wall **148** of a wash tub **150**, and supplied with rinse fluid by a flexible hose **152**. Utensil rinsing device **144** may be stored in a retracted position similar to a rack within wash tub **150**, and when a user wishes to use the utensil rinsing device, the user may open external door **142** and pull utensil rinsing device **144** into an operating position as illustrated in FIG. 8, and it will be appreciated that with utensil rinsing device **144** disposed over external door **142**, dispensed rinse fluid will be channeled to the sump of the dishwasher by the interior side of the external door. Alternatively, a separate drain hose (not

shown), may be used to route dispensed rinse fluid to the sump. In addition, rather than being supported on the top wall **148** of wash tub **150**, a utensil rinsing device may be supported by a side wall **154** of wash tub **150**, e.g., as illustrated at **144'**.

[0052] FIG. **9** further illustrates a number of additional potential locations for a utensil rinsing device consistent with the invention, where a dishwasher **160** includes a pair of spray arm assemblies **162**, **164** and a pair of racks **166**, **168** disposed in a wash tub **170** including a top wall **172** a pair of side walls **174**, **176**. Utensil rinsing device **178**, for example, illustrates a rack-supported utility rinsing device supported on rack **166**, while utensil rinsing device **180** illustrates a spray arm assembly supported utility rinsing device supported on spray arm assembly **162**. Utensil rinsing device **182** is supported on top wall **172**, but external from wash tub **170**, and mounted within a sliding drawer **184** that allows utensil rinsing device **182** to be positioned over an external door when used, such that dispensed rinse fluid can be collected by the interior side of the external door.

[0053] In addition, while utensil rinsing devices **178**, **180** and **182** are all illustrated as slidable components that move linearly between storage and operating positions, in other embodiments, rotary motion may be used in lieu of or in addition to linear motion. Utensil rinsing device **186**, for example, is configured to move from a storage position (illustrated at **186'**) to the operating position illustrated in FIG. **9** via a combination of linear motion (pulling outwardly from the wash tub) and rotary motion (pivoting from a substantially vertical orientation against side wall **174** to a substantially horizontal orientation). In other embodiments, a utensil rinsing device may pivot down from the top wall of the wash tub, or may swing down on scissor arms. Other manners of moving a utensil rinsing device between storage and operating positions may be used in other embodiments, as will be appreciated by those of ordinary skill having the benefit of the instant disclosure.

[0054] It will also be appreciated that, rather than collecting dispensed rinse fluid in a sump, dispensed rinse water may be collected in another receptacle, e.g., a gray water storage receptacle **188**, for later use during an initial fill during a wash cycle. In addition, while the embodiments discussed herein have focused on rinsing beverage container-type utensils, in other embodiments, a utensil rinsing device may be specifically configured for other types of utensils, e.g., pots and pans, dishware, silverware, etc., and accordingly, such a device may be positioned, and may utilize particular combinations and configurations of rinse sprayers, that are optimized for rinsing off these other types of utensils. Therefore, the invention is not limited to the specific embodiments discussed herein.

[0055] It will also be appreciated that, while certain features may be discussed herein in connection with certain embodiments and/or in connection with certain figures, unless expressly stated to the contrary, such features generally may be incorporated into any of the embodiments discussed and illustrated herein. Moreover, features that are disclosed as being combined in some embodiments may generally be implemented separately in other embodiments, and features that are disclosed as being implemented separately in some embodiments may be combined in other embodiments, so the fact that a particular feature is discussed in the context of one embodiment but not another should not be construed as an admission that those two embodiments are mutually exclusive of one another. Various additional modifications may be made to the illustrated embodiments consistent with the invention. Therefore, the invention lies in the claims hereinafter appended.

## Claims

1. A dishwasher, comprising: an interior cavity defined by a wash tub and an external door, the external door movable between opened and closed positions and configured to provide external access to the interior cavity when in the opened position; one or more racks supported in the interior cavity to support a plurality of utensils during a wash cycle; at least one spray device

supported in the interior cavity and configured to direct wash fluid onto the plurality of utensils during the wash cycle; and a beverage container rinsing device supported in the interior cavity on an interior side of the external door and accessible by a user when the external door is substantially in the opened position, the beverage container rinsing device configured to rinse a beverage container while the external door is substantially in the opened position and prior to washing the beverage container during the wash cycle, and the beverage container rinsing device including: a rinse sprayer; a mechanically-actuated rinse valve that couples the rinse sprayer to a rinse fluid supply; and a platform disposed proximate the rinse sprayer and extending substantially perpendicular to an actuation axis and configured to selectively actuate the mechanically-actuated rinse valve in response to movement of the platform along the actuation axis, wherein the platform is movable between off and on positions along the actuation axis and is biased to the off position, the platform is configured to actuate the rinse valve when in the on position, and the platform is configured to move towards the on position in response to pressing a lip of the beverage container against the platform to actuate the rinse sprayer to spray rinse fluid into an interior of the beverage container.

**2.** A dishwasher, comprising: an interior cavity defined by a wash tub and an external door, the external door movable between opened and closed positions and configured to provide external access to the interior cavity when in the opened position; one or more racks supported in the interior cavity to support a plurality of utensils during a wash cycle; at least one spray device supported in the interior cavity and configured to direct wash fluid onto the plurality of utensils during the wash cycle; and a utensil rinsing device supported on one of the wash tub and the external door and accessible by a user when the external door is substantially in the opened position, the utensil rinsing device configured to rinse a utensil while the external door is substantially in the opened position.

**3.** The dishwasher of claim 2, wherein the utensil rinsing device is configured to rinse the utensil prior to the wash cycle during which the utensil is washed.

**4.** The dishwasher of claim 2, wherein the utensil rinsing device is configured to selectively spray rinse fluid onto the utensil in response to user input.

**5.** The dishwasher of claim 4, wherein the utensil rinsing device includes a rinse sprayer and a rinse valve that couples the rinse sprayer to a rinse fluid supply, and the utensil rinsing device is configured to selectively actuate the rinse valve in response to the user input to direct rinse fluid from the rinse fluid supply to the rinse sprayer.

**6.** The dishwasher of claim 5, wherein the rinse valve is a mechanically-actuated valve, and the user input includes mechanically actuating the mechanically-actuated valve.

**7.** The dishwasher of claim 5, wherein the utensil rinsing device further includes a utensil-actuated actuator configured to be actuated in response to pressing the utensil against the utensil-actuated actuator.

**8.** The dishwasher of claim 7, wherein the utensil-actuated actuator comprises a platform disposed proximate the rinse sprayer and extending substantially perpendicular to an actuation axis and configured to selectively actuate the rinse valve in response to movement of the platform along the actuation axis.

**9.** The dishwasher of claim 8, wherein the platform is movable between off and on positions along the actuation axis and is biased to the off position, the platform is configured to actuate the rinse valve when in the on position, the utensil is a beverage container, and the platform is configured to move towards the on position in response to pressing a lip of the beverage container against the platform to actuate the rinse sprayer to spray rinse fluid into an interior of the beverage container.

**10.** The dishwasher of claim 5, wherein the rinse valve is an electronically-actuated valve and the utensil rinsing device includes a switch configured to actuate the electronically-actuated valve.

**11.** The dishwasher of claim 5, further comprising a user interface configured to initiate the wash cycle, wherein the rinse valve is an electronically-actuated valve and the user interface includes a

user control configured to actuate the electronically-actuated valve.

**12.** The dishwasher of claim 5, further comprising: an inlet valve configured to supply wash fluid to the wash tub; a pump configured to pump wash fluid collected in a sump of the wash tub to the at least one spray device; and a controller configured to control the inlet valve and the pump during the wash cycle; wherein the utensil rinsing device is positioned such that rinse fluid sprayed on the utensil is captured in the dishwasher when the external door is substantially in the opened position; and wherein the controller is configured to initiate the wash cycle by combining the rinse fluid captured in the dishwasher with fresh water by actuating the inlet valve while the rinse fluid is retained in the sump such that an initial fill performed during the wash cycle includes the rinse fluid.

**13.** The dishwasher of claim 12, wherein the utensil rinsing device is positioned such that rinse fluid sprayed on the utensil is captured in the sump of the dishwasher.

**14.** The dishwasher of claim 12, wherein the rinse fluid supply supplies rinse fluid from an external water line to the rinse valve independent of the inlet valve.

**15.** The dishwasher of claim 12, wherein the utensil rinsing device is further configured to rinse a utensil while the controller is in an off state during which no wash cycle is being performed.

**16.** The dishwasher of claim 2, wherein the utensil rinsing device is supported on an interior side of the external door.

**17.** The dishwasher of claim 16, wherein the utensil rinsing device is configured to articulate relative to an interior side of the external door.

**18.** The dishwasher of claim 17, wherein the utensil rinsing device is configured to automatically articulate relative to the interior side of the external door as the external door is moved from the closed position towards the opened position.

**19.** The dishwasher of claim 2, wherein the utensil rinsing device is supported on one of a top wall of the wash tub, a side wall of the wash tub, a rear wall of the wash tub, a rack of the one or more racks, or a spray arm assembly.

**20.** The dishwasher of claim 19, wherein the utensil rinsing device is movable between a storage position and an operating position via linear and/or rotary motion.

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