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### Washbasin incorporating steam generator

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#### Abstract

A washbasin having a basin and a steam generator. The basin has a drain and a basin steam outlet. The steam generator has a water inlet, a tank configured to store water received at the water inlet, a heater configured to heat the water to generate steam, and a generator steam outlet configured to output the steam. Coupling elements couple the steam generator to the basin and a steam outlet conduit fluidly connects the generator steam outlet to the basin steam outlet. The basin steam outlet is located on a rear wall of the basin.

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**Inventors:** Asinkar; Anand (Delhi, IN), Virk; Fateh Singh (Delhi, IN), Wadhawan; Rahul (Delhi, IN)

**Applicant:** Kohler India Corporation Pvt Ltd (Delhi, IN)

**Family ID:** 1000008762679

**Assignee:** Kohler India Corporation Pvt Ltd. (New Delhi, IN)

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*Primary Examiner:* Baker; Lori L

*Attorney, Agent or Firm:* Lempia Summerfield Katz LLC

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## **Background/Summary**

### **CROSS REFERENCE TO PRIOR APPLICATIONS**

(1) This application claims priority to Indian Patent Application No. 202311036754, filed May 27, 2023, hereby incorporated by reference in its entirety.

### **BACKGROUND**

(2) The present invention generally relates to washbasins, and more particularly to washbasins incorporating a steam generator.

(3) Washbasins may be utilized in washrooms and other lavatory areas such as bathrooms, water closets, and the like. In many implementations, steam generation is also desirable within these lavatory areas. While separate steam generators may be provided, these require separate installations and take up valuable space within the lavatory area.

(4) Improvements are desired to allow easier and more compact installation of steam generator. Improvements are also desired to facilitate streamlined interfaces for steam generators.

### **SUMMARY**

(5) The present application discloses a washbasin having a basin, a steam generator, coupling elements, and a steam outlet conduit. The basin has a drain and a basin steam outlet. The steam generator has a water inlet, a tank configured to store water received at the water inlet, a heater configured to heat the water to generate steam, and a generator steam outlet configured to output the steam. The coupling elements couple the steam generator to the basin. The steam outlet conduit fluidly connects the generator steam outlet to the basin steam outlet. The basin steam outlet is located on a rear wall of the basin.

(6) The present application also discloses a method of generating steam. First, a washbasin is provided, the washbasin having a basin and a steam generator coupled to the basin. Second, steam is generated within the steam generator. Third, steam is transmitted from a generator steam outlet of the steam generator to a basin steam outlet via a steam outlet conduit. The basin steam outlet is positioned on a rear wall of the basin.

(7) The present application also discloses a washbasin having a basin, a steam generator, coupling elements, and a steam outlet conduit. The basin has a drain, a basin steam outlet, a front portion, and a rear portion. The front portion and the rear portion are located on opposite sides of the drain. The steam generator has a water inlet, a tank configured to store water received at the water inlet, a heater configured to heat the water to generate steam, and a generator steam outlet configured to output the steam. The coupling elements couple the steam generator to the basin. The steam outlet conduit fluidly connects the generator steam outlet to the basin steam outlet. The steam generator is suspended beneath the front portion of the basin by the coupling elements, the steam outlet conduit extending from beneath the front portion of the basin to the basin steam outlet.

(8) Further areas of applicability of the present invention will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific

examples, while indicating the preferred embodiment of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention.

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## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

- (1) The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein like elements are labeled similarly and in which:
- (2) FIG. 1 is a perspective view of a washbasin according to the present disclosure;
- (3) FIG. 2 is a front view thereof;
- (4) FIG. 3 is a rear view thereof;
- (5) FIG. 4 is a right view thereof;
- (6) FIG. 5 is a left view thereof;
- (7) FIG. 6 is top view thereof;
- (8) FIG. 7 is a bottom view thereof;
- (9) FIG. 8 is an exploded view thereof;
- (10) FIG. 9 is a schematic illustrating the plumbing and electrical routing thereof;
- (11) FIG. 10 is a perspective view of a portion of a steam generator of the washbasin of FIG. 1;
- (12) FIG. 11 is a bottom rear perspective view thereof;
- (13) FIG. 12 is a cross-sectional view thereof, taken along line 12-12 of FIG. 10;
- (14) FIG. 13 is a cross-sectional view thereof, taken along line 13-13 of FIG. 10;
- (15) FIG. 14 is a perspective view of a basin of the washbasin of FIG. 1;
- (16) FIG. 15 is a front view thereof;
- (17) FIG. 16 is a rear view thereof;
- (18) FIG. 17 is a right view thereof;
- (19) FIG. 18 is a left view thereof;
- (20) FIG. 19 is top view thereof;
- (21) FIG. 20 is a bottom view thereof;
- (22) FIG. 21 is an exploded view thereof;
- (23) FIG. 22 is a perspective view of the steam generator of the washbasin of FIG. 1;
- (24) FIG. 23 is a front view thereof;
- (25) FIG. 24 is a rear view thereof;
- (26) FIG. 25 is a right view thereof;
- (27) FIG. 26 is a left view thereof;
- (28) FIG. 27 is top view thereof;
- (29) FIG. 28 is a bottom view thereof; and
- (30) FIG. 29 is a perspective view of a control panel of the washbasin of FIG. 1.
- (31) All drawings are schematic and not necessarily to scale. Features shown numbered in certain figures which may appear un-numbered in other figures are the same features unless noted otherwise herein.

### DETAILED DESCRIPTION

(32) The features and benefits of the invention are illustrated and described herein by reference to non-limiting examples in which aspects of the disclosure may be embodied. This description of examples is intended to be read in connection with the accompanying drawings or photos, which are to be considered part of the entire written description. Accordingly, the disclosure expressly should not be limited to such examples illustrating some possible non-limiting combination of features that may exist alone or in other combinations of features disclosed herein.

(33) In the description of examples disclosed herein, any reference to direction or orientation is merely intended for convenience of description and is not intended in any way to limit the scope of the present invention. Relative terms such as “lower,” “upper,” “horizontal,” “vertical,” “above,” “below,” “up,” “down,” “top” and “bottom” as well as derivative thereof (e.g., “horizontally,” “downwardly,” “upwardly,” etc.) should be construed to refer to the orientation as then described or as shown in the drawing under discussion. These relative terms are for convenience of description only and do not require that the apparatus be constructed or operated in a particular orientation. Terms such as “attached,”

“affixed,” “connected,” “coupled,” “interconnected,” and similar refer to a relationship wherein structures are secured or attached to one another either directly or indirectly through intervening structures, as well as both movable or rigid attachments or relationships, unless expressly described otherwise.

(34) As used throughout, any ranges disclosed herein are used as shorthand for describing each and every value that is within the range. Any value within the range can be selected as the terminus of the range.

(35) FIGS. 1-8 show a washbasin **10** incorporating a basin **100**, a steam generator **200**, a plurality of coupling elements **20**, first and second steam outlet conduits **40**, and a control panel **60**. The basin **100** is coupled to the steam generator **200** by the plurality of coupling elements **20**, the plurality of coupling elements **20** comprising brackets **21** and fasteners **22**. The coupling elements **20** may be formed of sheet metal, plastic, or any other desired material and may be used to mount the steam generator **200** to the basin **100**. In other configurations, only a single bracket **21** may be used. Further optionally, the fasteners **22** may be snap features on the brackets **21** to enable simple and secure installation while reducing component count.

(36) The basin **100** has a top edge **102** defining an opening **104** to a cavity **106**. The cavity **106** is configured to collect water or other liquids. The top edge **102** may define a top plane P-P. The top plane P-P is in surface contact with the top edge **102**. An entirety of the top edge **102** may be in contact with the top plane P-P or only a portion of the top edge **102** may be in contact with the top plane P-P. No portion of the top edge **102** extends beyond the top plane P-P. Otherwise stated, the entirety of the basin **100** is below the top plane P-P and no part of the top plane P-P extends through the basin **100**. The top plane P-P comes in contact with the basin **100** but does not extend through the basin **100**.

(37) The cavity **106** of the basin **100** is defined by an inner surface **110** formed by a plurality of walls of the basin **100**. The cavity **106** extends from the opening **104** at the top edge **102** to a drain **108**, the drain **108** located in a floor **120** of the basin **100**. The basin **100** has a rear wall **112**, a front wall **114** opposite the rear wall **112**, and left and right walls **116**, **118**. The rear wall **112**, front wall **114**, and left and right walls **116**, **118** meet at the floor **120**. The drain **108** is formed into the floor **120** and extends through the floor **120** to a drain outlet **111** located beneath the floor **120**. The drain **108** may have a cover **109** or may simply be a hole connecting to the drain outlet **111** which receives a drain pipe or other plumbing conduit. The cover **109** may serve as a shield to prevent loss of larger items down the drain **108** by having a constriction in at least one dimension such as an elongated slot or other feature. The drain **108** may optionally be a plurality of holes which are coupled to the drain pipe instead of a single hole or aperture and the cover **109** may form a series of apertures or a single aperture when coupled to the drain **108**, these apertures leading to the drain pipe.

(38) A mid-plane M-M is located halfway between the drain **108** and the top plane P-P. The mid-plane M-M is parallel to the top plane P-P but is spaced from the top plane P-P. The mid-plane M-M is located exactly halfway from an opening to the drain **108** and the top plane P-P. In addition, a central plane C-C is located perpendicular to the top plane P-P, the basin **100** being symmetric about the central plane C-C. The central plane C-C extends through the drain **108**, the rear wall **112**, the front wall **114**, and the floor **120**.

(39) The basin **100** has a main body **101** which may be formed of a ceramic material, a composite material comprising a resin, a metal material, or any other known material suitable for use in a wet environment. For instance, the basin **100** may be formed of a china or glass, a fiberglass material, or stainless steel. Any material may be used without limitation, so long as it does not degrade in the presence of water. Optionally, the basin **100** may have provisions for fitting a faucet. In other implementations, such as the one illustrated, the basin **100** may not have holes or other features configured to receive a faucet. Instead, the basin **100** may mount to a support structure and the faucet may also mount to the support structure.

(40) The basin **100** further comprises first and second basin steam outlets **130**, the basin steam outlets **130** located on the rear wall **112** of the basin **100**. The basin steam outlets **130** are separate components which mount within holes **132** in the basin **100**. A bezel **134** mounts to the basin steam outlets **130** to cover the holes **132**. Sealing elements **136** seal the basin steam outlets **130** to the rear wall **112** of the basin **100**. Grommets **138** extend through the bezel **134** and engage the basin steam outlets **130**. A cover **139** is mounted to the bezel **134** to secure the grommets **138** and further cover portions of the bezel **134** and the basin steam outlets **130**. The basin steam outlets **130** are configured for connection to the first and second

steam outlet conduits **40**. The basin steam outlets **130** may have a fitting **41** at each end. The fittings **41** may be threaded connection or any other suitable connection mechanism to provide a fluid-tight connection to the steam outlet conduits **40**.

(41) The basin steam outlets **130** are located above the mid-plane M-M and on opposite sides of the central plane C-C and may be inclined at an angle of approximately 6 degrees with respect to the top plane P-P. The basin steam outlets **130** are symmetric about the central plane C-C, between the mid-plane M-M and the top edge **102**. Thus, the basin steam outlets **130** are located between the mid-plane M-M and the top plane P-P. The bezel **134** and cover **139** are also symmetric about the central plane C-C, but extend from one side of the central plane C-C to an opposite side of the central plane C-C, intersecting the central plane C-C. Optionally, the basin steam outlets **130** may be inclined at greater or less than 6 degrees in order to better direct steam toward a user. The drain **108** and cover **109** are also symmetrical about the central plane C-C and extend through the central plane C-C, intersecting the central plane C-C. In some other implementations, the bezel **134**, cover **139**, drain **108**, and cover **109** may be multiple separate components which do not intersect the central plane C-C.

(42) The rear wall **112** of the basin **100** is divided into an inner wall portion **121** and an outer wall portion **122**. The inner wall portion **121** forms a portion of the inner surface **110**. The outer wall portion **122** is spaced from the inner wall portion **121** to form a rear wall cavity **123**. Apertures **124** are provided in the rear wall cavity **123**. The apertures **124** extend through a lower portion **125** of the rear wall **112** and provide access to the inner wall portion **121**. Thus, the rear wall **112** is formed such that the inner wall portion **121** joins the outer wall portion **122** at the top edge **102** of the basin **100**.

(43) The inner wall portion **121** and the outer wall portion **122** are also joined by the lower portion **125**, the lower portion **125** opposite the top edge **102** of the basin **100**. In other implementations, the rear wall **112** may be formed as a single wall with or without a lower portion **125**. The basin steam outlets **130** are located within the rear wall cavity **123** and extend through the holes **132** of the basin **100**. The holes **132** are formed through the inner wall portion **121**, but do not extend through the outer wall portion **122** or the lower portion **125**. The steam outlet conduits **40** extend through the apertures **124** into the rear wall cavity **123** and are coupled to the basin steam outlets **130** within the rear wall cavity **123**.

(44) The steam generator **200** comprises a housing **202**, the housing **202** having a generally rectangular shape. The housing **202** is configured to receive the fasteners **22** which connect the brackets **21** to the housing **202**. The steam generator **200** also comprises a water inlet **204**, a water outlet **206**, and first and second generator steam outlets **208**. The housing **202** is omitted from FIG. **8** for the sake of better illustrating internal features of the steam generator **200**.

(45) The basin **100** has a front portion **126** and a rear portion **127**. The front portion **126** and rear portion **127** are located on opposite sides of the drain **108**. Thus, the front portion **126** extends from the drain **108** up to and including an entirety of the front wall **114**. The rear portion **127** extends from the drain **108** up to and including an entirety of the rear wall **112**. An entirety of the steam generator **200** is positioned below the front portion **126** of the basin **100**. The steam outlet conduits **40** are positioned below both of the front portion **126** and the rear portion **127** of the basin **100**, extending past and on lateral sides of the opening of the drain **108**. The basin steam outlets **130** are located exclusively in the rear portion **127** of the basin **100**.

(46) FIG. **9** is a schematic illustrating both fluid and electrical connections made with the steam generator **200**. Connections made in solid lines indicate fluid connections while connections made in dotted lines indicate electrical connections via a wire, bus, or other means. The dotted lines may carry electrical power, signals, or a combination of the two.

(47) The steam generator **200** has a tank **210**, first and second heaters **220**, and a printed circuit board (or "PCB") **230**. The tank **210** further incorporates a low water level sensor **212** and a high water level sensor **214**. An inlet **235** supplies water to a faucet **237** and the tank **210** via a water supply line **239**, the water supply line having an angle valve **238** fluidly coupled to the inlet **237**. The angle valve **238** is also fluidly coupled to the faucet **237** via a tee or other component in the water supply line **239**, the faucet **237** being downstream of the angle valve **238** in the water supply line **239**. The angle valve **238** permits manual operation by a user or service technician to shut off water to the faucet **237** and the steam generator **200**.

(48) A first solenoid valve **234** is also fluidly connected to the water supply line **239** downstream of the angle valve **238**, the first solenoid valve **234** being electrically operated to open and close, allowing water

to flow to the tank **210** when the first solenoid valve **234** is in an open state and preventing water from flowing to the tank **210** when the first solenoid valve **234** is in a closed state. As can be seen, the tank **210** is fluidly coupled to the first solenoid valve **234** via the water supply line **239**. The water inlet **204** of the steam generator may preferably be located along the water supply line **239** between the tee for the faucet **237** and the first solenoid valve **234**. However, in other implementations, the first solenoid valve **234** may be located external to the housing **202** and may be upstream of the water inlet **204**. In the present implementation, the first solenoid valve **234** is a normally closed valve, but in other implementations the first solenoid valve **234** may be a normally open valve.

(49) In addition, a water drain line **240** fluidly couples the tank **210** to a second solenoid valve **234** then on to an outlet **236** which is fluidly coupled to a drain pipe, sewer line, or the like. The second solenoid valve **234** is also electrically operated to open and close, allowing water to flow from the tank **210** when the second solenoid valve **234** is in an open state and preventing water from flowing from the tank **210** when the second solenoid valve **234** is in a closed state. Preferably, the water outlet **206** is located at the outlet **236**, though it may be differently located along the water drain line **240** if the second solenoid valve **234** is mounted external to the housing **202**. In the present implementation, the second solenoid valve **234** is a normally closed valve, but in other implementations the second solenoid valve **234** may be a normally open valve.

(50) A third solenoid valve **232** is also fluidly coupled to the tank **210**. The third solenoid valve **232** is a three port solenoid valve, with a first port connected to the tank **210**, a second port connected to atmosphere, and a third port connected to the water drain line **240** and ultimately to the outlet **236**. The third solenoid valve **232** is both normally open and normally closed. Stated differently, when the third solenoid valve **232** is in an inactive state, the first and second ports are fluidly coupled and the third port is not fluidly coupled to either of the first or second ports. When the third solenoid valve **232** is in an active state, the first and third ports are fluidly coupled while the second port is not fluidly coupled to either of the first or third ports. In other implementations, the third solenoid valve **232** may be omitted, differently configured with respect to the ports being normally open and normally closed, or may be substituted for an air admittance valve, check valve, or other similar components.

(51) The tank **210** may be selectively filled or emptied as determined by user input or other functions implemented on the PCB **230**. The control panel **60** is electrically connected to the PCB **230** and allows for the transmission of user input to the PCB **230**. In addition, the control panel **60** can receive and display output generated by the PCB **230**. The control panel **60** may provide a variety of functions as discussed in greater detail below.

(52) The tank **210** is fluidly connected to the heaters **220**. The heaters **220** may have a water heating cavity to allow more efficient heating of the water for the purposes of steam generation. Instead of heating all water in the tank **210**, only a portion of the water from the tank **210** may be heated, reducing the time to generate steam. Steam may exit via the generator steam outlets **208**. Optionally, the PCB **230** may operate only one of the two heaters **220** at a time, generating steam from only one of the generator steam outlets **208**.

(53) The generator steam outlets **208** may be fluidly connected internal to the steam generator **200**, ensuring that steam exits both first and second steam outlet conduits **40** and both basin steam outlets **130**. In other implementations, the generator steam outlets **208** may not be fluidly connected, such that heat from a single heater **220** exits a single generator steam outlet **208** and there is no mixing of steam between generator steam outlets **208**. Optionally, water may be flowed through the generator steam outlets **208** to flush out any dirt or debris that may enter the basin steam outlets **130**, steam outlet conduits **40**, or the steam generator **200**.

(54) Each of the heaters **220** may incorporate a temperature sensor **222** and a thermostat **224**. The temperature sensor **222** may provide information to the PCB **230** on the current state of the water within the heater **220**. The thermostat may be used to control the heat output of the heater **220** or the water flow into the heater **220** and may be controlled via the PCB **230** or may function via mechanical or other automatic means not reliant on control from the PCB **230**. In yet other configurations, the steam generator **200** may further incorporate a dispenser which delivers essential oils or other aromatic liquids to the tank **210** so that they can be vaporized with the water in the tank **210**, optimizing the steam experience provided by the washbasin.

(55) Turning to FIGS. 10-13, the steam generator **200** is illustrated in greater detail. As discussed above, the steam generator **200** has a tank **210**, two heaters **220**, first, second, and third solenoid valves **232**, **234**, and a PCB **230**. Generator steam outlets **208** deliver steam from the steam generator **200** while water is received via the water inlet **204**. Water may exit via the water outlet **206**. In other implementations, only a single heater **220** is utilized.

(56) FIGS. 14-21 illustrate the basin **100**, steam outlet conduits **40**, and coupling elements **20** in greater detail. As can be seen, the basin **100** has a main body **101** that has a top edge **102**, a top plane P-P extending along the top edge **102** as discussed above. The basin **100** further incorporates a drain **108** and cover **109** covering the drain **108**. In addition, a plurality of basin steam outlets **130** are positioned symmetrically about a central plane C-C, above a mid-plane M-M, and below the top plane P-P.

(57) The basin **100** has a cavity **106** which is bounded by an inner surface **110**. The inner surface is defined by a rear wall **112**, a front wall **114** opposite the rear wall **112**, and left and right walls **116**, **118**. The rear, front, left, and right walls **112**, **114**, **116**, **118** all meet at a floor **120**. The drain **108** extends through the floor **120** to a drain outlet **111** that may be fluidly coupled to a sewer pipe or the like.

(58) As discussed above, the rear wall **112** has a rear wall cavity **123** with apertures **124** provided in the rear wall cavity **123** and extending through a lower portion **125** of the rear wall **112**. The apertures **124** extend through a lower portion **125** of the rear wall **112** and provide access to the inner wall portion **121**. The rear wall **112** is formed such that the inner wall portion **121** joins the outer wall portion **122** at the top edge **102** of the basin **100**. The steam outlet conduits **40** extend through the apertures **124** to deliver steam to the basin steam outlets **130**.

(59) The inner wall portion **121** and the outer wall portion **122** are also joined by the lower portion **125**, the lower portion **125** opposite the top edge **102** of the basin **100**. In other implementations, the rear wall **112** may be formed as a single wall with or without a lower portion **125**. The basin steam outlets **130** are located within the rear wall cavity **123** and extend through the holes **132** of the basin **100**. The holes **132** are formed through the inner wall portion **121**, but do not extend through the outer wall portion **122** or the lower portion **125**. The steam outlet conduits **40** extend through the apertures **124** into the rear wall cavity **123** and are coupled to the basin steam outlets **130** within the rear wall cavity **123**.

(60) Coupling elements **20** engage features in the basin **100** such as threaded holes, through holes, or the like, to allow coupling of the coupling elements **20** to the basin **100**. These features are formed into tabs **128** extending from the floor **120** beneath the front wall **114** and rear wall **112**. The tabs **128** may be integrally formed with the main body **101** of the basin **100** such that the main body **101** basin **100** is a single, unitary, integrally formed, monolithic component. The coupling elements **20** may be formed as brackets **21** and fasteners **22**, the brackets **21** having one or more slots, one or more holes, or the like to accommodate the fasteners **22** and permit adjustable mounting of the coupling elements **20** to the basin **100** and the steam generator **200**.

(61) Turning to FIGS. 22-28, the steam generator **200** is illustrated. As discussed previously, the steam generator **200** has a housing **202** which is generally rectangular in shape. The housing **202** may be constructed of sheet metal or another sheet material such as plastic or a composite material. In yet other implementations, the housing **202** may be molded or otherwise formed to facilitate low cost of manufacture and high durability. The steam generator **200** has a water inlet **204**, a water outlet **206**, and steam outlets **208** as discussed above.

(62) Turning to FIG. 29, the control panel **60** is shown. The control panel **60** has a user interface portion **61**, an upper housing portion **62**, a mounting portion **63**, and a base surface **64**. The control panel **60** is configured for mounting such that it is spaced and isolated from the basin **100** and the steam generator **200**. The user interface portion **61** may have one or more user input features such as buttons, sliders, switches, or the like. The user interface portion **61** may also incorporate display features such as lights, alphanumeric displays, or other features which can communicate information to the user.

(63) The upper housing portion **62** covers the electronics required for the user interface portion **61**, provides a clean aesthetic appearance, and protects the electronics from moisture. The upper housing portion **62** terminates in a base surface **64** which is configured to engage a horizontal surface such as a counter-top of a vanity or other support structure. The mounting portion **63** may be a threaded pipe or tube which, in combination with a nut or other securing device, may be used to securely clamp the control panel **60** to the support structure. In addition, the mounting portion **63** has a hollow passage which allows



electrical wiring to pass therethrough, providing power transmission and communication functions to the control panel **60**.

(64) During use of the washbasin **10**, the control panel **60** may be operated by the user in a variety of ways. For example, when the user powers on the washbasin **10**, the washbasin **10** may perform self-test and self-check functions by operating the components in the washbasin **10**, making measurements of sensor outputs, or measuring electrical characteristics of the components when they are operated. It is further contemplated that the washbasin **10** may have a self-cleaning function. The self-cleaning function may operate by flowing excess water into the tank **210** of the steam generator, and then continuing to flow water until water overflows the tank **210**, and flows through the heaters **220**. Water then runs out of the steam outlets **208**, through the steam outlet conduits **40**, and out of the basin steam outlets **130**. This function can be utilized to clean the washbasin **10**'s internal components and ensure that no dirt, dust, or other debris or contamination is present in the system.

(65) In other implementations, the washbasin **10** may allow a low mode or a high mode. In the low mode, the steam generator **200** is operated such that only one heater **220** is actively providing heat to generate steam. As noted above, the steam outlets **208** may be connected such that steam flows out of both of the steam outlets **208**. In other implementations, the steam outlets **208** may be isolated from one another so that steam only flows from a single steam outlet **208**. In some implementations, a different one of the heaters **220** is operated in the low mode. For example, the first heater **220** may be operated for a period of time or number of cycles of low mode operation, then the second heater **220** may be operated for a period of time or number of cycles of low mode operation. This serves to balance heater usage and ensure that one heater does not fail prematurely. In a high mode of operation, both heaters **220** may be operated simultaneously. Thus, the maximum steam output of the washbasin **10** is provided, delivering rapid steam generation and rapidly filling the room with steam.

(66) In yet another operating mode, an auto-clean function allows the washbasin **10** to automatically clean itself. In one implementation, a button on the control panel **60** may be held for three seconds to activate the auto-clean function. In another implementation, auto-clean is activated upon initial power-up, at predetermined intervals, or upon receiving another input from the user. Upon activation of the auto-clean function, the washbasin may flow water into the tank **210**, continuing to allow water to flow into the tank **210** for 30 seconds. No water is drained via the water drain line **240**, so water flows through the heaters **220** and out of the steam outlets **208**. Water is then flushed through the basin steam outlets **130**, ensuring that the steam generator **200**, steam outlet conduits **40**, and basin steam outlets **130** are cleaned. During the 30 second flush period, water is delivered through the basin steam outlets **130**, the volume of water being sufficient to ensure thorough cleaning.

(67) As can be seen, the control panel **60** may have a power button, a sensitive mode button, a normal mode button, and an auto-clean button. The power button may be used to power on the washbasin **10**. The sensitive mode button may activate the low mode described above. The normal button may activate the high mode described above. The auto-clean button may be used to activate the auto-clean function described above. Alternately, one or more buttons may have multiple functions. For instance, the power button may be used to operate the auto-clean function. Other configurations may be implemented as desired.

(68) Exemplary Claim Set

(69) Exemplary claim **1**: A washbasin comprising a basin comprising a drain and a basin steam outlet; a steam generator, the steam generator comprising: a water inlet; a tank configured to store water received at the water inlet; a heater configured to heat the water to generate steam; and a generator steam outlet configured to output the steam; coupling elements which couple the steam generator to the basin; and a steam outlet conduit fluidly connecting the generator steam outlet to the basin steam outlet; wherein the basin steam outlet is located on a rear wall of the basin.

(70) Exemplary claim **2**: The washbasin of claim **1** wherein the steam generator is suspended from the basin.

(71) Exemplary claim **3**: The washbasin of claim **2** wherein the basin further comprises a front portion opposite the rear wall of the basin, the steam generator suspended beneath the front portion of the basin.

(72) Exemplary claim **4**: The washbasin of any one of claims **1** to **3** further comprising a second basin steam outlet, a second steam outlet conduit, and a second generator steam outlet, the second steam outlet

conduit fluidly connecting the second generator steam outlet to the second basin steam outlet.

(73) Exemplary claim 5: The washbasin of claim 4 further comprising a central plane, the basin being symmetric about the central plane, and wherein the steam outlet conduit and the second steam outlet conduit are symmetrical about the central plane.

(74) Exemplary claim 6: The washbasin of claim 4 or claim 5 wherein the generator steam outlet and the second generator steam outlet are fluidly coupled within the steam generator.

(75) Exemplary claim 7: The washbasin of any one of claims 1 to 6 wherein the basin comprises a hole extending through the rear wall of the basin, the hole receiving the basin steam outlet.

(76) Exemplary claim 8: The washbasin of any one of claims 1 to 7 wherein the basin steam outlet is located above a mid-plane, the mid-plane extending parallel to a top edge of the basin and located halfway between the top edge of the basin and the drain.

(77) Exemplary claim 9: The washbasin of any one of claims 1 to 8 wherein the steam generator comprises a second heater, the steam generator configured to operate in a low mode where the heater is operated and a high mode where both the heater and the second heater are operated.

(78) Exemplary claim 10: The washbasin of any one of claims 1 to 9 wherein the washbasin comprises a control panel, the control panel spaced and isolated from the basin and the steam generator.

(79) Exemplary claim 11: A method of generating steam, the method comprising: providing a washbasin, the washbasin comprising a basin and a steam generator coupled to the basin; generating steam within the steam generator; transmitting steam from a generator steam outlet of the steam generator to a basin steam outlet via a steam outlet conduit, the basin steam outlet positioned on a rear wall of the basin.

(80) Exemplary claim 12: The method of claim 11 wherein the step of transmitting further comprises transmitting steam from a second generator steam outlet of the steam generator to a second basin steam outlet via a second steam outlet conduit.

(81) Exemplary claim 13: The method of claim 12 wherein the basin further comprises a central plane, the basin being symmetric about the central plane, and wherein the steam outlet conduit and the second steam outlet conduit are symmetrical about the central plane.

(82) Exemplary claim 14: The method of claim 12 or claim 13 wherein the generator steam outlet and the second generator steam outlet are fluidly coupled within the steam generator.

(83) Exemplary claim 15: The method of any one of claims 11 to 14 wherein the steam generator is configured to operate in a low mode and a high mode, the low mode generating a first volume flow rate of steam and the high mode generating a second volume flow rate of steam, the first volume flow rate being less than the second volume flow rate.

(84) Exemplary claim 16: A washbasin comprising: a basin comprising a drain, a basin steam outlet, a front portion, and a rear portion, wherein the front portion and the rear portion located on opposite sides of the drain; a steam generator, the steam generator comprising: a water inlet; a tank configured to store water received at the water inlet; a heater configured to heat the water to generate steam; and a generator steam outlet configured to output the steam; coupling elements which couple the steam generator to the basin; and a steam outlet conduit fluidly connecting the generator steam outlet to the basin steam outlet; wherein the steam generator is suspended beneath the front portion of the basin by the coupling elements, the steam outlet conduit extending from beneath the front portion of the basin to the basin steam outlet.

(85) Exemplary claim 17: The washbasin of claim 16 wherein the coupling elements comprise a first bracket, a second bracket, and a plurality of fasteners.

(86) Exemplary claim 18: The washbasin of claim 17 wherein the coupling elements are directly coupled to the basin and to the steam generator.

(87) Exemplary claim 19: The washbasin of any one of claims 16 to 18 wherein the basin steam outlet is located above a mid-plane, the mid-plane extending parallel to a top edge of the basin and located halfway between the top edge of the basin and the drain.

(88) Exemplary claim 20: The washbasin of any one of claims 16 to 19 wherein the basin further comprises a rear wall, the basin steam outlet located on the rear wall of the basin.

(89) While the foregoing description and drawings represent examples of the present invention, it will be understood that various additions, modifications and substitutions may be made therein without departing from the spirit and scope and range of equivalents of the accompanying claims. In particular, it will be clear to those skilled in the art that the present invention may be embodied in other forms, structures,

arrangements, proportions, sizes, and with other elements, materials, and components, without departing from the spirit or essential characteristics thereof. In addition, numerous variations in the methods/processes as applicable described herein may be made without departing from the spirit of the invention. One skilled in the art will further appreciate that the invention may be used with many modifications of structure, arrangement, proportions, sizes, materials, and components and otherwise, used in the practice of the invention, which are particularly adapted to specific environments and operative requirements without departing from the principles of the present invention. The presently disclosed examples are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being defined by the appended claims and equivalents thereof, and not limited to the foregoing description or examples. Rather, the appended claims should be construed broadly, to include other variants of the invention, which may be made by those skilled in the art without departing from the scope and range of equivalents of the invention.

## Claims

1. A washbasin comprising: a basin comprising a drain and a basin steam outlet; a steam generator, the steam generator comprising: a water inlet; a tank configured to store water received at the water inlet; a heater configured to heat the water to generate steam; and a generator steam outlet configured to output the steam; coupling elements which couple the steam generator to the basin; and a steam outlet conduit fluidly connecting the generator steam outlet to the basin steam outlet; wherein the basin steam outlet is located on a rear wall of the basin.
2. The washbasin of claim 1 wherein the steam generator is suspended from the basin.
3. The washbasin of claim 2 wherein the basin further comprises a front portion opposite the rear wall of the basin, the steam generator suspended beneath the front portion of the basin.
4. The washbasin of claim 1 further comprising a second basin steam outlet, a second steam outlet conduit, and a second generator steam outlet, the second steam outlet conduit fluidly connecting the second generator steam outlet to the second basin steam outlet.
5. The washbasin of claim 4 further comprising a central plane, the basin being symmetric about the central plane, and wherein the steam outlet conduit and the second steam outlet conduit are symmetrical about the central plane.
6. The washbasin of claim 4 wherein the generator steam outlet and the second generator steam outlet are fluidly coupled within the steam generator.
7. The washbasin of claim 1 wherein the basin comprises a hole extending through the rear wall of the basin, the hole receiving the basin steam outlet.
8. The washbasin of claim 1 wherein the basin steam outlet is located above a mid-plane, the mid-plane extending parallel to a top edge of the basin and located halfway between the top edge of the basin and the drain.
9. The washbasin of claim 1 wherein the steam generator comprises a second heater, the steam generator configured to operate in a low mode where the heater is operated and a high mode where both the heater and the second heater are operated.
10. The washbasin of claim 1 wherein the washbasin comprises a control panel, the control panel spaced and isolated from the basin and the steam generator.
11. A method of generating steam, the method comprising: providing a washbasin, the washbasin comprising a basin and a steam generator coupled to the basin; generating steam within the steam generator; transmitting steam from a generator steam outlet of the steam generator to a basin steam outlet via a steam outlet conduit, the basin steam outlet positioned on a rear wall of the basin.
12. The method of claim 11 wherein the step of transmitting further comprises transmitting steam from a second generator steam outlet of the steam generator to a second basin steam outlet via a second steam outlet conduit.
13. The method of claim 12 wherein the basin further comprises a central plane, the basin being symmetric about the central plane, and wherein the steam outlet conduit and the second steam outlet conduit are symmetrical about the central plane.
14. The method of claim 12 wherein the generator steam outlet and the second generator steam outlet are

fluidly coupled within the steam generator.

15. The method of claim 11 wherein the steam generator is configured to operate in a low mode and a high mode, the low mode generating a first volume flow rate of steam and the high mode generating a second volume flow rate of steam, the first volume flow rate being less than the second volume flow rate.

16. A washbasin comprising: a basin comprising a drain, a basin steam outlet, a front portion, and a rear portion, wherein the front portion and the rear portion located on opposite sides of the drain; a steam generator, the steam generator comprising: a water inlet; a tank configured to store water received at the water inlet; a heater configured to heat the water to generate steam; and a generator steam outlet configured to output the steam; coupling elements which couple the steam generator to the basin; and a steam outlet conduit fluidly connecting the generator steam outlet to the basin steam outlet; wherein the steam generator is suspended beneath the front portion of the basin by the coupling elements, the steam outlet conduit extending from beneath the front portion of the basin to the basin steam outlet.

17. The washbasin of claim 16 wherein the coupling elements comprise a first bracket, a second bracket, and a plurality of fasteners.

18. The washbasin of claim 17 wherein the coupling elements are directly coupled to the basin and to the steam generator.

19. The washbasin of claim 16 wherein the basin steam outlet is located above a mid-plane, the mid-plane extending parallel to a top edge of the basin and located halfway between the top edge of the basin and the drain.

20. The washbasin of claim 16 wherein the basin further comprises a rear wall, the basin steam outlet located on the rear wall of the basin.

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