



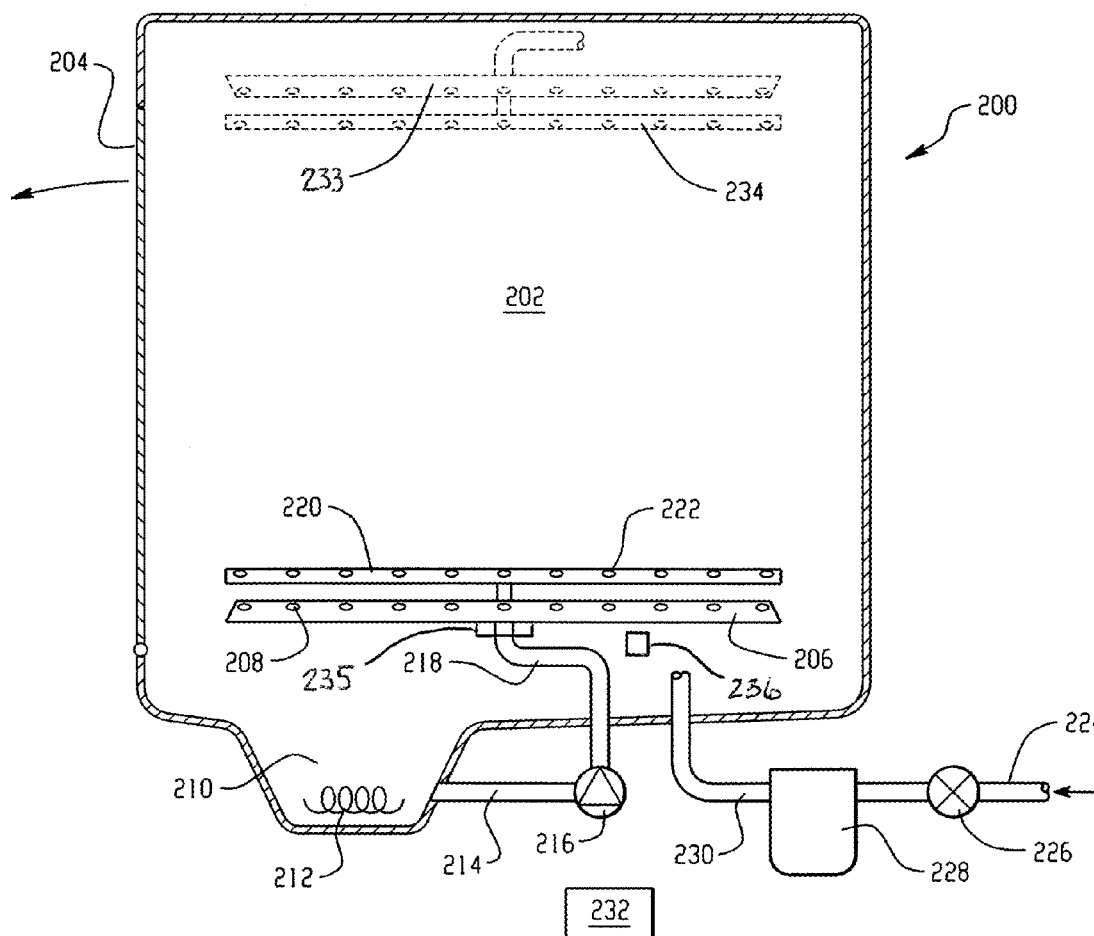
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(19) **United States**(12) **Patent Application Publication****Anim-Mensah et al.**(10) **Pub. No.: US 2019/0000300 A1**(43) **Pub. Date: Jan. 3, 2019**(54) **BOTTLEWASHER SYSTEM FOR
WAREWASHERS**(52) **U.S. Cl.**CPC *A47L 15/505* (2013.01); *A47L 15/4282*
(2013.01); *A47L 15/0076* (2013.01)(71) Applicant: **ILLINOIS TOOL WORKS INC.,**
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(57)

ABSTRACT(21) Appl. No.: **16/020,265**(22) Filed: **Jun. 27, 2018****Related U.S. Application Data**(60) Provisional application No. 62/525,810, filed on Jun.
28, 2017.**Publication Classification**(51) **Int. Cl.***A47L 15/50* (2006.01)*A47L 15/00* (2006.01)*A47L 15/42* (2006.01)

A bottlewasher rack assembly includes a mount hub for mounting to a lower wash and liquid feed system of a warewash machine, and a plurality of interconnected wash arms and rinse arms to which wash liquid and rinse liquid, respectively, are fed from the mount hub. A plurality of upwardly projecting wash feed tubes are provided, each wash feed tube having at least one wash spray nozzle. A plurality of upwardly projecting rinse feed tubes are provided, each rinse feed tube having at least one rinse spray nozzle. The wash feed tubes and the rinse feed tubes are arranged in a multiplicity of side-by-side pairs so that each pair can project upward within a respective upside down bottle placed thereon. A warewash machine incorporating the bottlewasher rack assembly is also described.



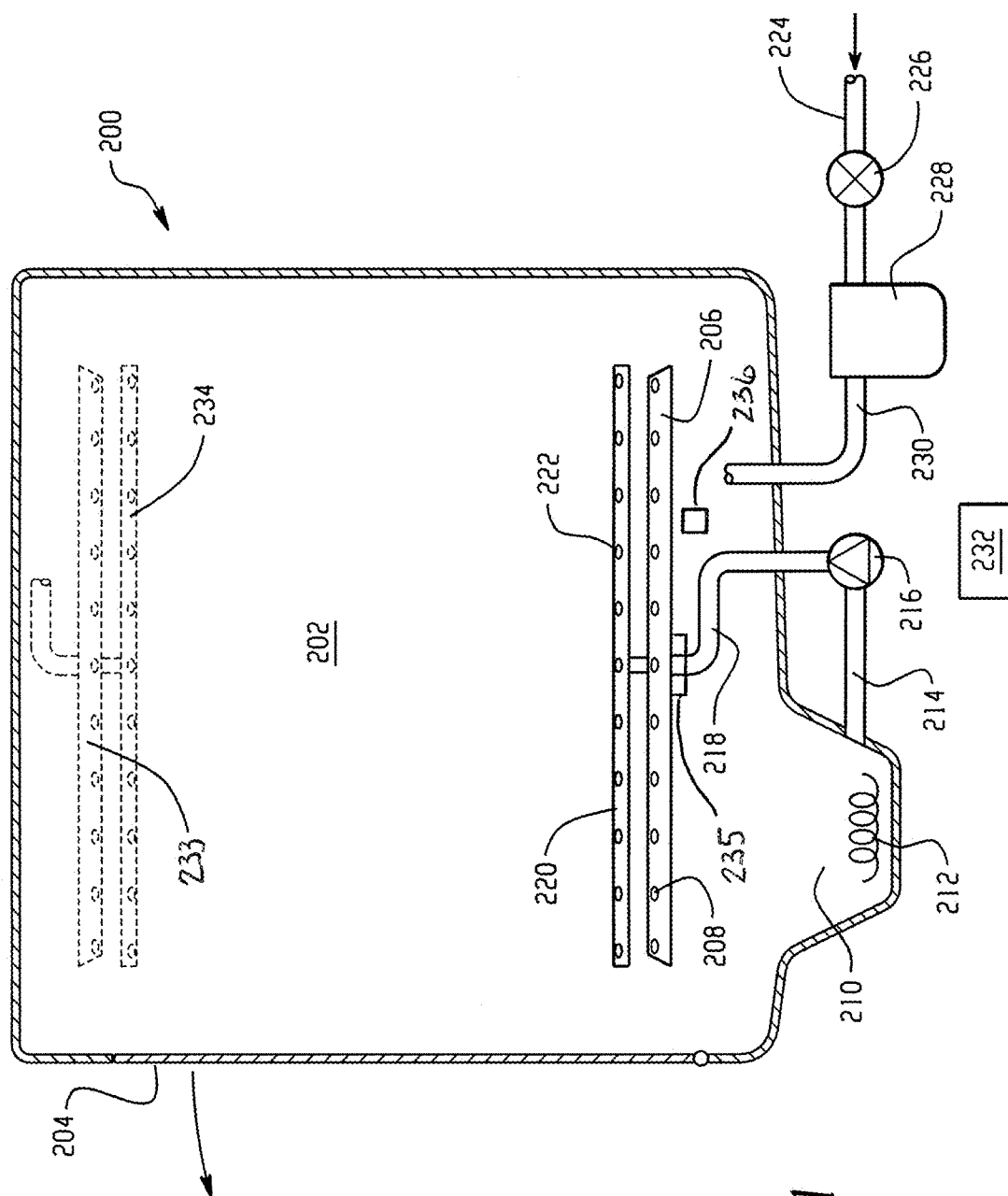


Fig. 1

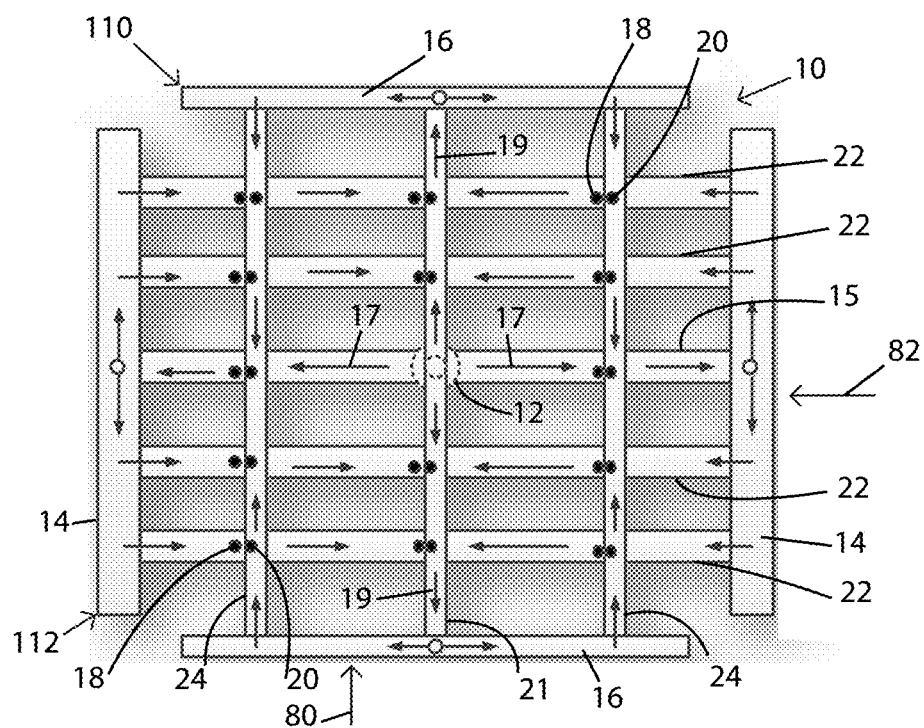


Fig. 2

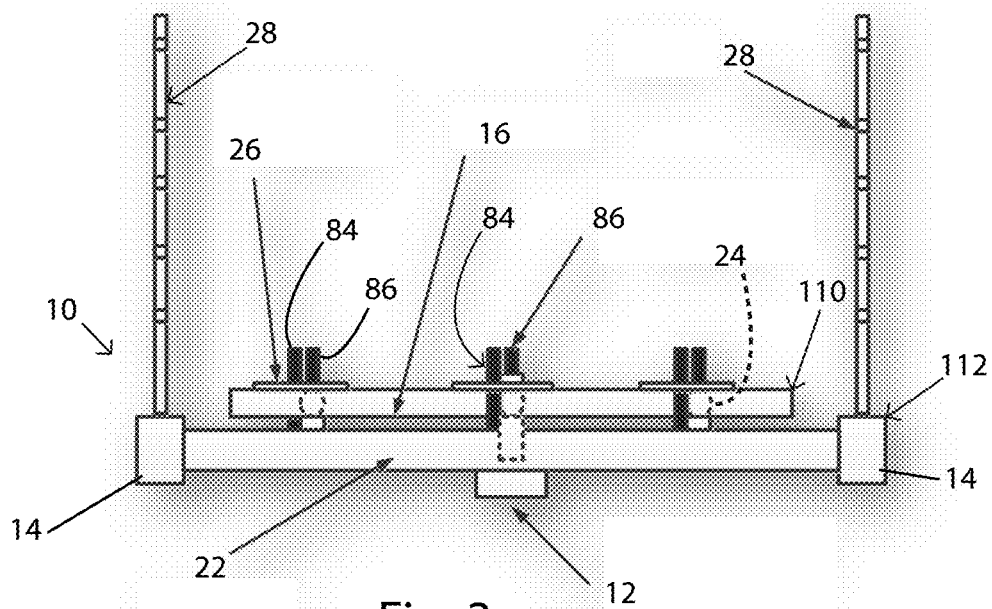


Fig. 3

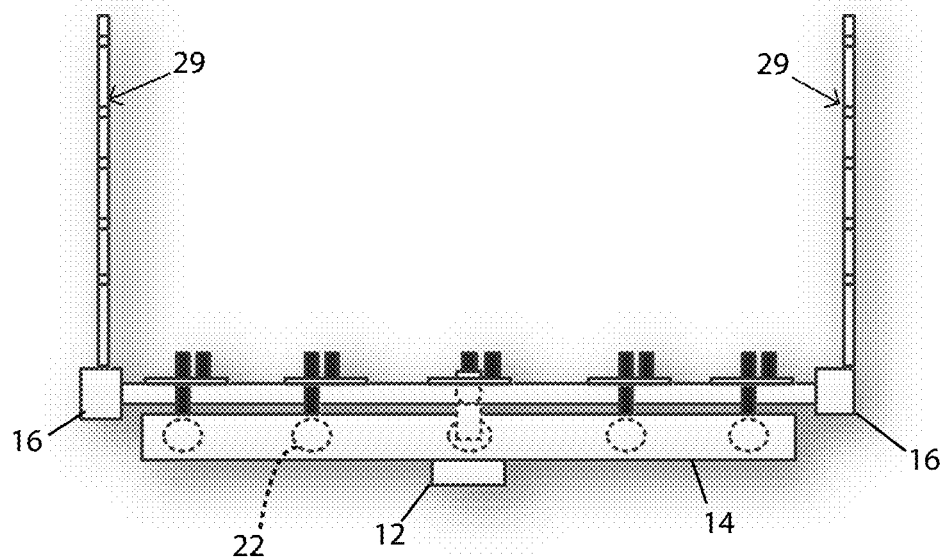


Fig. 4

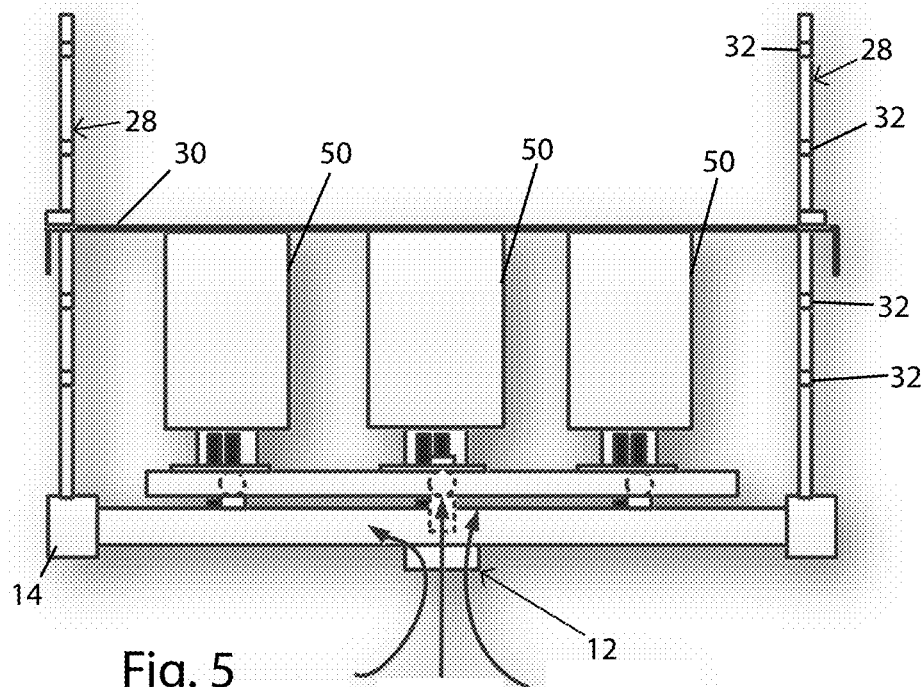
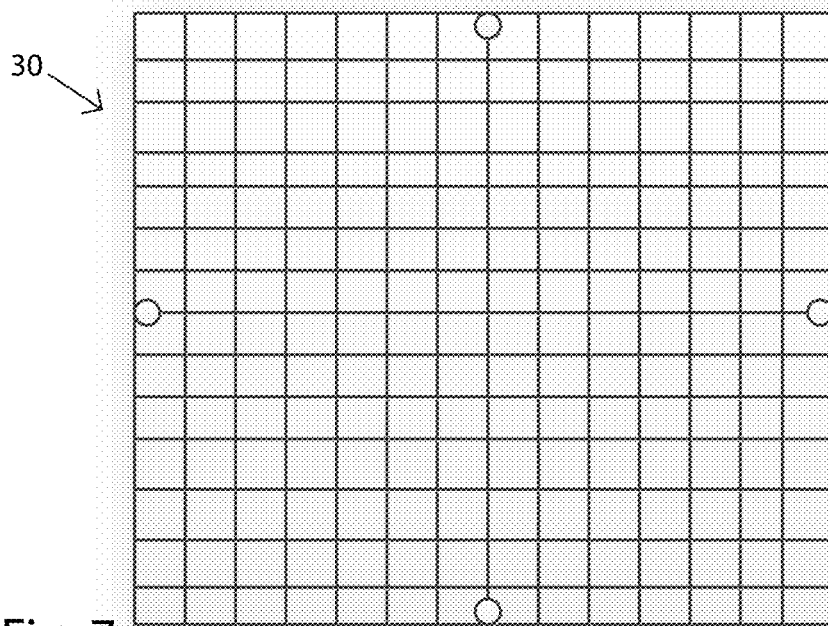
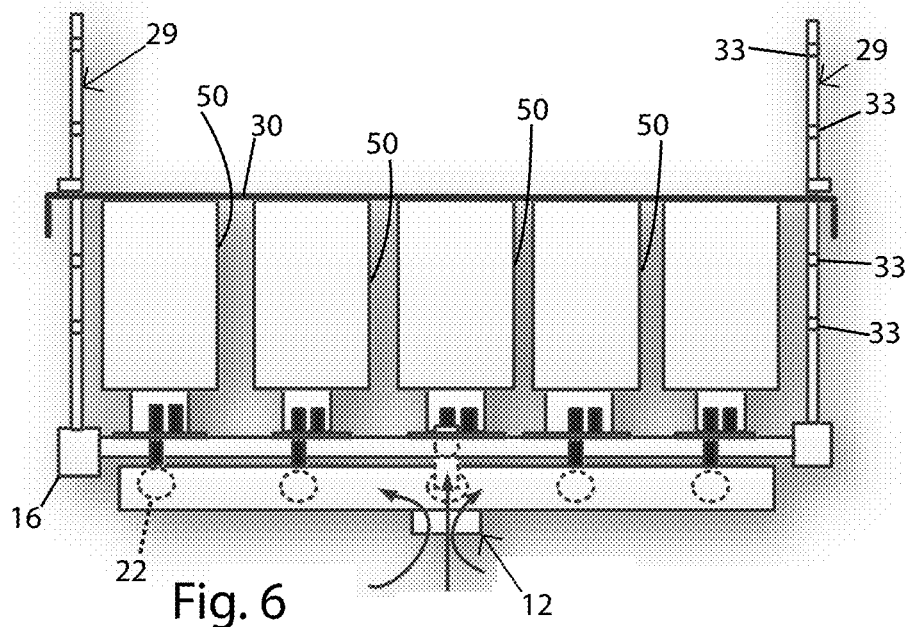


Fig. 5



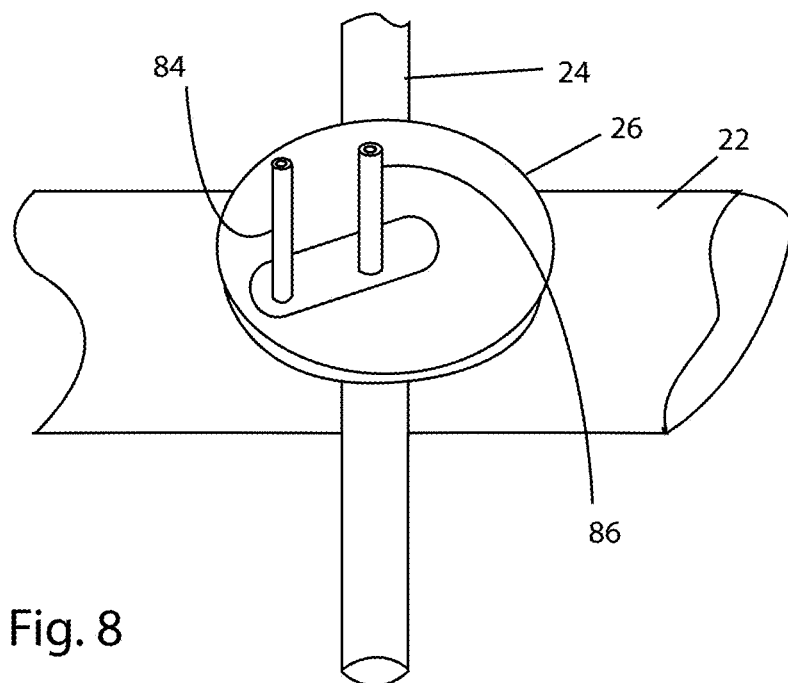


Fig. 8

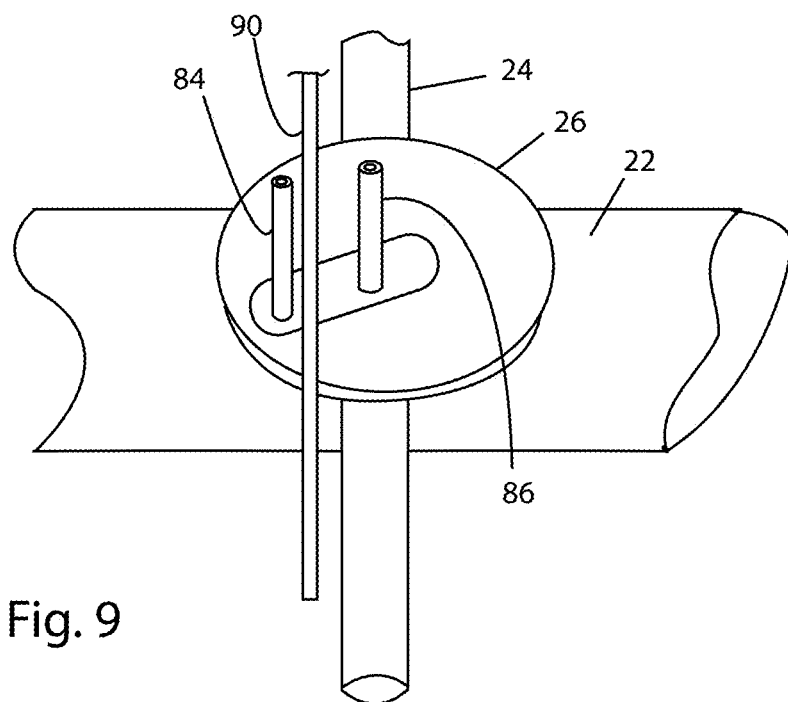


Fig. 9

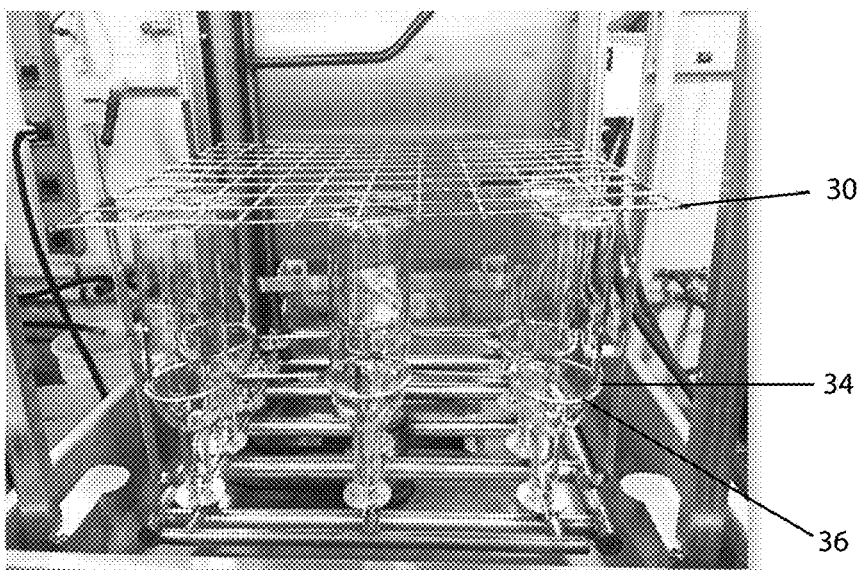


Fig. 10

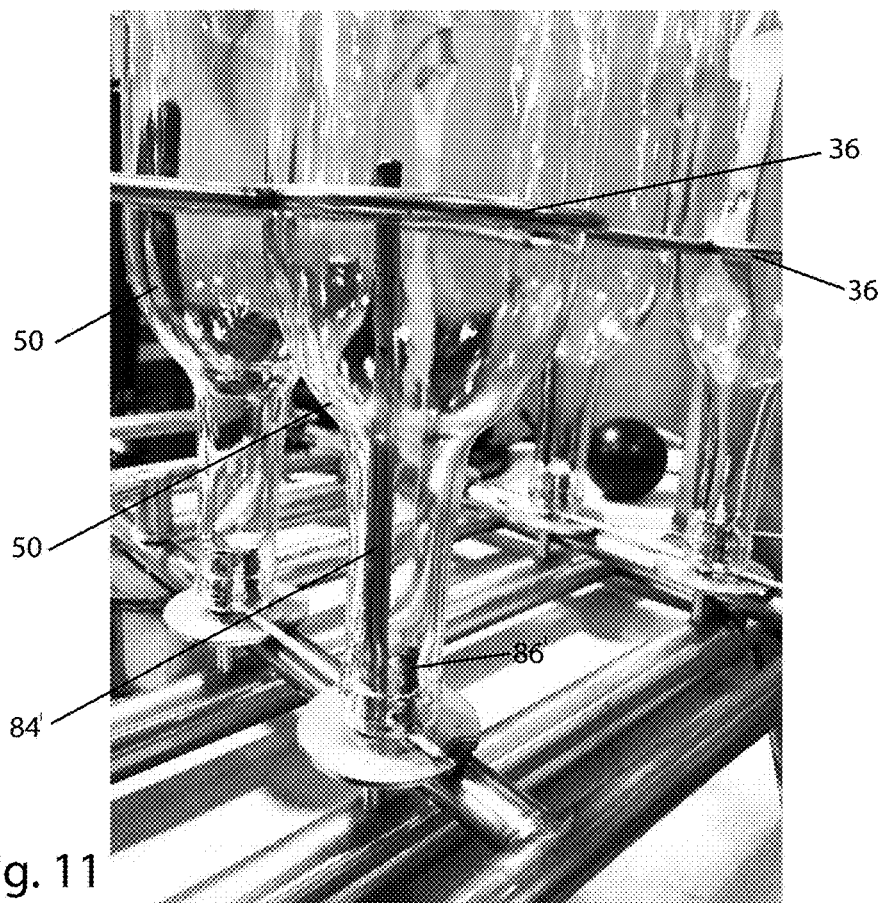
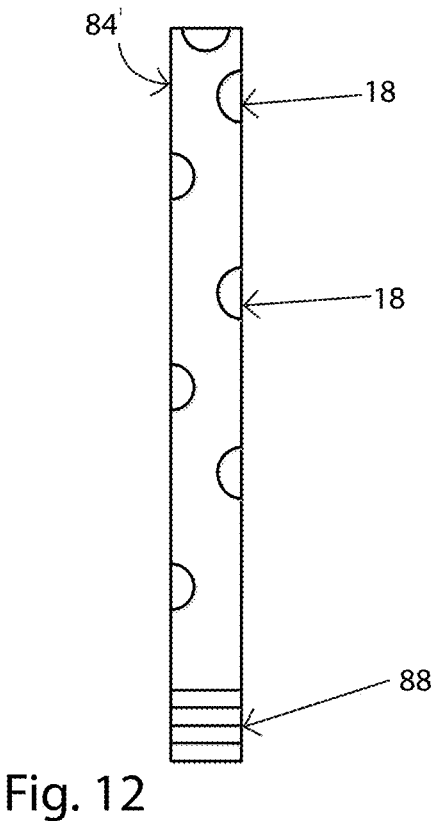


Fig. 11



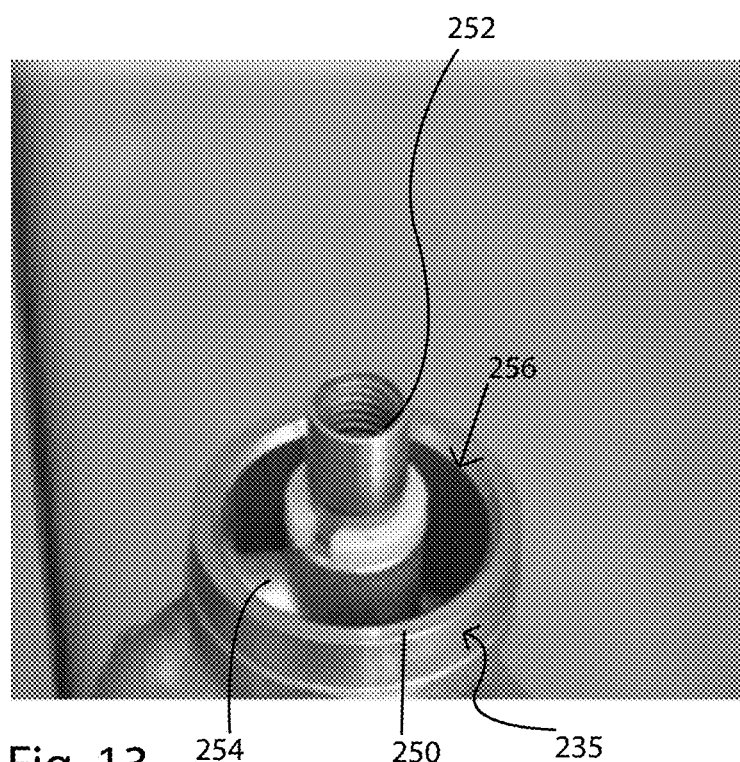


Fig. 13

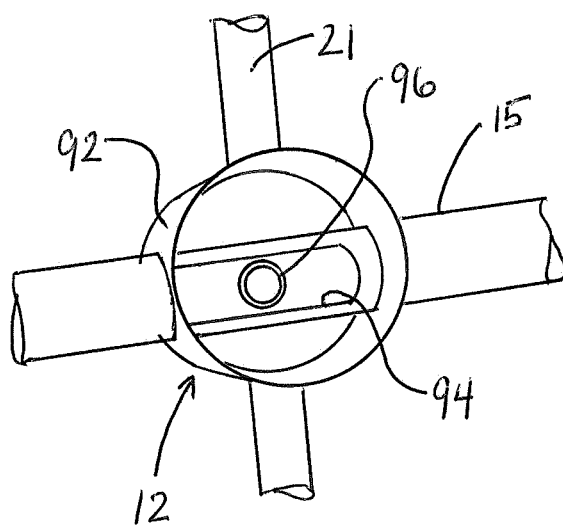


Fig. 14

BOTTLEWASHER SYSTEM FOR WAREWASHERS

TECHNICAL FIELD

[0001] This application relates generally to warewashers such as those used in commercial applications such as cafeterias and restaurants and, more particularly, to a bottle-washer assembly and system for such warewashers.

BACKGROUND

[0002] Commercial warewashers (aka dishwashers) typically include a housing defining an internal chamber in which wares are received for cleaning by sprays of wash liquid followed by spraying of rinse liquid. In box-type or batch-type machines, upper and lower rotating spray arms are commonly used to provide the liquid sprays. Most warewash machines encounter difficulties when it comes to washing bottles, especially the internal surfaces of bottles, due to the difficulties of achieving appropriate and adequate spraying within the bottles.

[0003] It would be desirable to provide a warewash machine with an associated bottlewasher assembly and system that provides effective bottle cleaning.

SUMMARY

[0004] In one aspect, a bottlewasher rack assembly includes a mount hub for mounting to a lower wash and liquid feed system of a warewash machine, and a plurality of interconnected wash arms and rinse arms to which wash liquid and rinse liquid, respectively, are fed from the mount hub. A plurality of upwardly projecting wash feed tubes are provided, each wash feed tube having at least one wash spray nozzle. A plurality of upwardly projecting rinse feed tubes are provided, each rinse feed tube having at least one rinse spray nozzle. The wash feed tubes and the rinse feed tubes are arranged in a multiplicity of side-by-side pairs so that each pair can project upward within a respective upside down bottle placed thereon.

[0005] In another aspect, a method is provided for configuring a warewash machine to wash bottles, where the machine includes a lower feed mount that feeds wash liquid to a lower rotating wash arm and rinse liquid to a lower rotating rinse arm. The method involves: removing the lower wash arm and the lower rinse arm from the lower feed mount; and installing a bottlewasher rack assembly with a feed mount upon the lower feed mount, wherein the feed mount includes wash liquid paths to multiple upright wash feed tubes and rinse liquid paths to multiple upright rinse liquid tubes, wherein at least some of the wash liquid tubes and rinse liquid tubes are arranged in side-by-side pairs.

[0006] In a further aspect, a method of utilizing a warewash machine having a lower feed mount that feeds wash liquid from one path and rinse liquid from another path, the method involving: mounting a lower rotating wash arm and a lower rinse arm to the lower feed mount; carrying out a ware cleaning cycle in which wash liquid is sprayed from wash arm nozzles and rinse liquid is sprayed from rinse arm nozzles; removing the lower wash arm and the lower rinse arm from the lower feed mount; installing a bottlewasher rack assembly with a rack feed mount upon the lower feed mount, wherein the rack feed mount includes at least one wash liquid path to multiple upright wash feed tubes and at least one rinse liquid path to multiple upright rinse liquid

tubes; and carrying out a bottle cleaning cycle in which wash liquid is sprayed from the wash feed tubes and rinse liquid is sprayed from the rinse feed tubes.

[0007] The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other features, objects, and advantages will be apparent from the description and drawings, and from the claims.

DESCRIPTION

[0008] Referring to FIG. 1, a schematic depiction of an exemplary batch-type warewasher 200 is shown, and includes a chamber 202 in which wares are placed for cleaning via opening of a pivoting access door 204. At the bottom of the chamber 202, a rotatable wash arm 206 is provided and includes multiple nozzles 208 that eject wash liquid during a cleaning operation. The wash liquid contacts the wares for cleaning and then falls back down into a collection sump 210 that may include a heater element 212. At least some of the wash liquid is sprayed in a manner that causes the arm to rotate. A recirculation path is provided via piping 214, pump 216 and piping 218 to move the wash liquid back to the wash arm 206. A rotatable rinse arm 220 with nozzles 222 is also shown, to which fresh rinsing liquid may be fed via a rinse line made up of fresh water input line 224, valve 226, boiler 228 and line 230. A controller 232 is also shown, which may typically be programmed to carry out one or more selectable ware cleaning cycles that generally each include at least a washing step (e.g., that may run for 30-150 seconds, followed by a rinsing step (e.g., that may run for 7-30 seconds), though many other variations are possible. The illustrated machine 200 includes lower arms, and such machines may also include upper rinse and wash arms shown schematically as 234 and 233. Such machines may also include other features, such as blowers for a drying step at the end of a ware cleaning cycle. Machines with hood type doors, as opposed to the illustrated pivoting door, are also known. Wares may typically be moved in and out of the chamber in racks.

[0009] The rotating wash and/or rinse arms of such machines are commonly removable (e.g., for inspection, cleaning and/or replacement). Many arrangements of removable spray arms are known and/or possible. Machine 200 includes a central mount hub 235 that includes both wash liquid and rinse liquid feed paths, as will be described in more detail below.

[0010] In the case of the present application, a bottle rack assembly adapted for cleaning bottles is configured to mount to the lower wash and rinse path feeds of a machine when the lower wash and rinse arms are removed. This assembly results in machines/systems that can be readily changed from a normal wash configuration (e.g., lower and upper arms installed and operational) to a bottle wash configuration (e.g., lower arms removed, bottle rack installed and operational, and upper arms installed and operational). The bottle wash configuration of the machine provides the ability to clean both the internal and external surfaces of a number of bottles within a single cleaning cycle of a machine when needed. In some implementations, the controller of the machine may be configured with one or more cleaning cycles that are specific to bottles. In addition, the machine may include a sensor or sensors 236 (e.g., optical, magnetic, mechanical contact, etc.) to detect when bottle rack assembly is mounted in the machine, with the controller 232 configured to responsively enable a bottle specific cleaning

cycle that is not enabled when the bottle rack assembly is not mounted in the machine. The controller 232 may likewise disable cleaning cycles that are not specific to bottles when the bottle rack assembly is detected.

[0011] FIG. 2 shows a top plan schematic view of one embodiment of a bottle rack assembly 10 with wash liquid headers 14 at opposed sides of the assembly and rinse liquid headers 16 at opposed sides of the assembly. The opposite wash liquid flow directions 17 from a central feed mount 12 and along tube 15 to the outer wash headers 14 is shown, and the opposite rinse liquid flow directions 19 from the feed mount 12 and along tube 21 to the outer rinse headers 16 is also shown. From the headers, the flow of the fluids along interconnected wash arms 22 and rinse arms 24 to wash nozzles 18 and rinse nozzles 20 are shown by the various arrows, where the wash and rinse nozzles are arranged in adjacent pairs.

[0012] The assembly 10 includes a rinse frame 110 made up of interconnected tubes 21, 24 and headers 16, and a wash frame made up of interconnected tubes 15, 22 and headers 14. The two frames 110, 112 may be rigidly connected together (e.g., as by welding between tubes of the two frames and/or by each frame being fixed to the feed mount 12 and/or by straps or clips between the two frames). Here, the rinse frame 110 sits atop the wash frame 112 so that the tubes and headers of the frame 110 run in a direction transverse (e.g., substantially perpendicular) to the running direction of the tubes and headers of the frame 112.

[0013] FIGS. 3 and 4 show schematic side elevation views of FIG. 2 in direction 80 and direction 82 of FIG. 2 respectively. The rack 10 is formed by interconnected rinse and wash frames 110, 112. Tubes 84, 86 carry respective nozzles 18 and 20 and project upward to be capable of fitting into upside down bottles loaded in the rack, per FIG. 5. A support pad 26 on the rinse arms about each pair of nozzle tubes 84, 86 may be soft to prevent bottle lip cracking as well as seat bottles comfortably. The pad may be planar and plate-like, but may also be porous or include numerous openings (e.g., mesh configuration) to better enable liquids to drain from the interiors of the bottles. Upright rack side support frames or posts 28, 29 are also shown at the sides of the assembly, each extending up from a respective header. In other embodiments, the support pad may be absent, and the bottle lips may sit on the rinse frame tubes.

[0014] Per the side views of FIGS. 5 and 6, bottles 50 may be held in position during cleaning by an upper retainer 30 (e.g., wire frame or grid or mesh so that sprays from upper arms readily pass through the retainer 30). The retainer is engaged with the side supports 28 and/or 29. The side frames may include a plurality of mount notches 32, 33 (or other mount structures) along their heights to enable selectively varying the height of the retainer 30 according to bottle height. A schematic top plan view of the retainer 30 is shown in FIG. 7.

[0015] FIGS. 8 and 9 show exemplary embodiments of support pads, where in FIG. 8 the bottle lip would sit directly atop the pad 26, but in FIG. 9 an additional thin rod 90 is provided between the nozzle tubes 84 and 86 to support the bottle lip above the top surface of the pad 26.

[0016] FIGS. 10 and 11 show an exemplary embodiment with multiple installed bottles 50, a top retainer 30 and an intermediate support frame 34 with bottle rings 36 above each nozzle pair to stabilize the bottles 50. Per FIG. 11, each wash liquid spray tube 84' extends further upward than each

rinse liquid spray tube 86'. In particular, each wash liquid spray tube 84' extends upward beyond the extent of the bottle neck and into the main body of the bottle 50 and may extend upward into the bottle at least twenty-five percent of the bottle height (e.g., at least thirty percent or at least forty percent).

[0017] Per FIG. 12, each wash liquid spray tube 84' (and/or each rinse liquid spray tube) may include multiple nozzles 18 arranged to promote swirling liquid flow in the nozzles. Here, multiple nozzles 18 are distributed at different locations along the tube height and around the tube periphery. The base of each spray tube may include a threaded region 88 to facilitate connection into a threaded opening of the wash or rinse tube to which it is mounted. A slanted orientation of the bottles themselves could also be used to promote swirling liquid flow in the bottles.

[0018] FIG. 13 shows an exemplary central mount hub 235 of a warewash machine that includes a cylindrical body 250 and a central tube 252. The central tube 252 receives rinse liquid via a path 254 and an annular space 256 between the tube 252, and the body 250 receives wash liquid from another path (as described above). FIG. 14 shows an exemplary bottlewasher rack assembly from the underside, where mount hub 12 includes a cylindrical wall 92 sized to fit over the body 250 of the washing machine mount hub 235. Here, the wash tube 15 passes diametrically through the wall 92 and includes a cutout 94 so that wash liquid can flow into the tube 15 from the annular space 256. The tube 15 is also intersected by a connecting pipe 96 that is configured to engage with the tube 252 of the washing machine mount so as to receive rinse liquid. The pipe 96 runs to the central rinse tube 21. Thus, the bottle rack includes a mount hub assembly 12 that configured to engage with the machine wash and liquid feeds so that the respective liquids are delivered to the proper wash and rinse paths of the rack.

[0019] In operation, this bottlewasher assembly fits into the machine in place of the lower rinse and wash arms. The bottlewasher assembly could be loaded with bottles either when mounted in the machine or when the assembly is outside the machine. Once the bottles are on the rack assembly, the upper retainer is put in place and secured as (e.g., using clips, straps or a bolt and nut system) to ensure the bottles do not lift during cleaning. The bottlewasher ensures the internal surfaces of the bottle are washed and rinsed while the upper wash and rinse arms of the machine clean the external surfaces. To better ensure the reduced diameter neck areas of the bottles are cleaned, the bottlewasher assembly may include wash and/or rinse nozzles located externally of the bottle mount locations (i.e., so that they are not fitted within any bottle during cleaning operations).

[0020] In the illustrated assemblies, the wash and rinse systems are maintained separate (e.g., separate flow paths). It is straightforward to disengage the assembly for cleaning. Washing both bottles and other ware together in the same cycle is possible.

[0021] The bottlewasher rack/assembly advantageously allows machines to wash both wares and bottles in different cycles and/or simultaneously.

[0022] U. S. Patent Publication No. 20130206179 is incorporated herein by reference in its entirety.

[0023] It is to be clearly understood that the above description is intended by way of illustration and example only, is not intended to be taken by way of limitation, and that other

changes and modifications are possible. For example, while wash feed tubes and rinse feed tubes of approximately the same height are primarily shown, it may be advantageous to provide wash feed tubes that are substantially taller so that the wash nozzles do not quickly become submerged within liquids within the bottles, as per FIG. 11. In such cases, one or more of the wash nozzles of the wash feed tube are located up beyond the neck region of the bottle, whereas the rinse feed tube is shorter. Moreover, while a rigid retainer 30 is shown, a flexible retainer could be used that would more readily adapt to cleaning different height bottles simultaneously.

What is claimed is:

1. A bottlewasher rack assembly, comprising:
 - a mount hub for mounting to a lower wash and liquid feed system of a warewash machine;
 - a plurality of interconnected wash arms and a plurality of interconnected rinse arms to which wash liquid and rinse liquid, respectively, are fed from the mount hub;
 - a plurality of upwardly projecting wash feed tubes, each wash feed tube having at least one wash spray nozzle;
 - a plurality of upwardly projecting rinse feed tubes, each rinse feed tube having at least one rinse spray nozzle;
 - wherein the wash feed tubes and the rinse feed tubes are arranged in a multiplicity of side-by-side pairs so that each pair can project upward within a respective upside down bottle placed thereon.
2. The bottlewasher rack assembly of claim 1 wherein, for one or more of the pairs, the wash feed tube projects upward higher than the rinse feed tube.
3. The bottlewasher rack assembly of claim 2 wherein, for one or more of the pairs, the wash feed tube includes multiple wash spray nozzles arranged to promote a swirling flow of wash liquid within the bottle.
4. The bottlewasher rack assembly of claim 1, further comprising a bottle support disposed about each pair.
5. The bottlewasher rack assembly of claim 4 wherein the bottle support is angled from horizontal and/or the bottle support is configured with pores or openings to facilitate bottle draining.
6. The bottlewasher rack assembly of claim 1, further comprising an upper bottle retainer.
7. The bottlewasher rack assembly of claim 6 wherein a height of the upper bottle retainer is adjustable.
8. The bottlewasher rack assembly of claim 6, further comprising an intermediate bottle stabilizing frame with multiple bottle rings aligned over respective ones of the pairs of wash and rinse tubes.
9. The bottlewasher rack assembly of claim 1 wherein the plurality of interconnected wash arms form a wash frame of the assembly, the plurality of interconnected rinse arms form a rinse frame of the assembly, and the rinse frame is rigidly mounted to the wash frame.

10. The bottlewasher rack assembly of claim 9 wherein the rinse frame is mounted on top of the wash frame and the mount hub extends downward from an underside of the wash frame.

11. A warewash machine including the bottlewasher rack assembly of claim 1, wherein the machine includes a mount hub that engages the mount hub of the assembly.

12. The warewash machine of claim 11 including a controller configured with at least one bottle specific ware cleaning cycle.

13. The warewash machine of claim 12 further comprising at least one sensor for detecting the bottlewasher rack assembly.

14. The warewash machine of claim 13 wherein the controller is configured to enable the bottle specific cleaning cycle if the bottle rack assembly is detected by the sensor.

15. The warewash machine of claim 14 wherein the controller is configured to disable the bottle specific cleaning cycle if the bottlewasher rack assembly is not detected by the sensor.

16. A method of configuring a warewash machine to wash bottles, the machine including a lower feed mount that feeds wash liquid to a lower rotating wash arm and rinse liquid to a lower rotating rinse arm, the method comprising:

removing the lower wash arm and the lower rinse arm from the lower feed mount;

installing a bottlewasher rack assembly with a rack feed mount upon the lower feed mount, wherein the rack feed mount includes at least one wash liquid path to multiple upright wash feed tubes and at least one rinse liquid path to multiple upright rinse liquid tubes, wherein at least some of the wash liquid tubes and rinse liquid tubes are arranged in side-by-side pairs for projecting into upside down bottles.

17. A method of utilizing a warewash machine having a lower feed mount that feeds wash liquid from one path and rinse liquid from another path, the method comprising:

mounting a lower rotating wash arm and a lower rinse arm to the lower feed mount;

carrying out a ware cleaning cycle in which wash liquid is sprayed from wash arm nozzles and rinse liquid is sprayed from rinse arm nozzles;

removing the lower wash arm and the lower rinse arm from the lower feed mount;

installing a bottlewasher rack assembly with a rack feed mount upon the lower feed mount, wherein the rack feed mount includes at least one wash liquid path to multiple upright wash feed tubes and at least one rinse liquid path to multiple upright rinse liquid tubes;

carrying out a bottle cleaning cycle in which wash liquid is sprayed from the wash feed tubes and rinse liquid is sprayed from the rinse feed tubes.

* * * * *