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FLUID CIRCULATION SYSTEM WITH A FILTER ELEMENT IN A WASHING MACHINE APPLIANCE

Abstract

A washing machine appliance includes a wash tub positioned within a cabinet and defining a wash chamber, a wash basket rotatably mounted within the wash tub for receiving a load of clothes, and a pump assembly in fluid communication with a sump of the wash tub. The pump assembly includes a recirculation conduit fluidly coupled to the sump, a pump for selectively urging a flow of wash fluid from the sump and through the recirculation conduit, and a filter positioned operably coupled to the recirculation conduit for filtering the flow of wash fluid.

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Background/Summary

FIELD OF THE INVENTION

[0001] The present subject matter relates generally to washing machine appliances, or more specifically, to filter assemblies of washing machine appliances.

BACKGROUND OF THE INVENTION

[0002] Washing machine appliances generally include a tub for containing water or wash fluid, e.g., water and detergent, bleach, and/or other wash additives. A basket is rotatably mounted within the tub and defines a wash chamber for receipt of articles for washing. During normal operation of such washing machine appliances, the wash fluid is directed into the tub and onto articles within the wash chamber of the basket. The basket or an agitation element can rotate at various speeds to agitate articles within the wash chamber, to wring wash fluid from articles within the wash chamber, etc. During a spin or drain cycle, a drain pump assembly may operate to discharge water from within sump.

[0003] Certain conventional washing machine appliances include dispensing assemblies that are configured to dispense water, wash fluid, and/or other additives into the wash chamber at various stages of the operating cycle to facilitate the cleaning of articles located therein. Notably, however, particles from the load of articles being cleaned, such as microfibers, tend to collect within the wash fluid. As the wash fluid is discharged through an external drain, these microfibers and particulates are discharged with the wastewater, which can result in environmental concerns. Conventional methods for filtering wash fluid include numerous pumps, complex diverter assemblies, or other features that are ineffective at filtering particles, are costly, or add undue complexity.

[0004] Accordingly, a washing machine appliance having features for facilitating improved filtering of wash fluid would be desirable. More specifically, a system for filtering wash fluid prior to discharging the wash fluid from the machine in an easy and cost-effective manner would be particularly beneficial.

BRIEF DESCRIPTION OF THE INVENTION

[0005] Aspects and advantages of the invention will be set forth in part in the following description, or may be apparent from the description, or may be learned through practice of the invention.

[0006] In one exemplary embodiment, a washing machine appliance is provided including a wash tub positioned within a cabinet and defining a wash chamber, a wash basket rotatably mounted within the wash tub for receiving a load of clothes, and a pump assembly in fluid communication with a sump of the wash tub. The pump assembly includes a recirculation conduit fluidly coupled to the sump, a pump for selectively urging a flow of wash fluid from the sump and through the recirculation conduit, and a filter positioned operably coupled to the recirculation conduit for filtering the flow of wash fluid.

[0007] In another exemplary embodiment, a pump assembly for a washing machine appliance is provided. The washing machine appliance includes a wash tub defining a sump for collecting wash fluid. The pump assembly includes a recirculation conduit fluidly coupled to the sump, a pump for selectively urging a flow of wash fluid from the sump and through the recirculation conduit, and a filter positioned operably coupled to the recirculation conduit for filtering the flow of wash fluid.

[0008] These and other features, aspects and advantages of the present invention will become better understood with reference to the following description and appended claims. The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] A full and enabling disclosure of the present invention, including the best mode thereof, directed to one of ordinary skill in the art, is set forth in the specification, which makes reference to the appended figures.

[0010] FIG. **1** provides a perspective view of a washing machine appliance according to an example embodiment of the present subject matter.

[0011] FIG. **2** provides a front view of the example washing machine appliance of FIG. **1** with a door in the open position according to an example embodiment of the present subject matter.

[0012] FIG. **3** provides a side cross-sectional view of the example washing machine appliance of FIG. **1** according to an example embodiment of the present subject matter.

[0013] FIG. **4** provides a schematic view of a fluid circulation assembly of the example washing machine appliance of FIG. **1** according to an example embodiment of the present subject matter.

[0014] FIG. **5** provides another schematic view of the example fluid circulation assembly of FIG. **4** illustrating a recirculation conduit according to an example embodiment of the present subject matter.

[0015] FIG. **6** provides a rear perspective view of a dispensing assembly of the example fluid circulation assembly of FIG. **4** according to an example embodiment of the present subject matter.

[0016] FIG. **7** provides a cross-sectional view of the example dispensing assembly of FIG. **6** according to an example embodiment of the present subject matter.

[0017] FIG. **8** provides a perspective view of a dispenser manifold of the example dispensing assembly of FIG. **6** according to an example embodiment of the present subject matter.

[0018] FIG. **9** provides a close-up perspective view of an inlet port of the example dispenser manifold of FIG. **8** according to an example embodiment of the present subject matter.

[0019] FIG. **10** provides a schematic view of various inlet ports that may be used with the example dispenser manifold of FIG. **8** according to an example embodiment of the present subject matter.

[0020] Repeat use of reference characters in the present specification and drawings is intended to represent the same or analogous features or elements of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0021] Reference now will be made in detail to embodiments of the invention, one or more examples of which are illustrated in the drawings. Each example is provided by way of explanation of the invention, not limitation of the invention. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope or spirit of the invention. For instance, features illustrated or described as part of one embodiment can be used with another embodiment to yield a still further embodiment. Thus, it is intended that the present invention covers such modifications and variations as come within the scope of the appended claims and their equivalents.

[0022] As used herein, the terms “includes” and “including” are intended to be inclusive in a manner similar to the term “comprising.” Similarly, the term “or” is generally intended to be inclusive (i.e., “A or B” is intended to mean “A or B or both”). Approximating language, as used herein throughout the specification and claims, is applied to modify any quantitative representation that could permissibly vary without resulting in a change in the basic function to which it is related. Accordingly, a value modified by a term or terms, such as “about,” “approximately,” and “substantially,” are not to be limited to the precise value specified. In at least some instances, the approximating language may correspond to the precision of an instrument for measuring the value. For example, the approximating language may refer to being within a **10** percent margin.

[0023] Referring now to the figures, FIG. **1** is a perspective view of an exemplary horizontal axis washing machine appliance **100**, FIG. **2** is a front view of washing machine appliance **100**, and FIG. **3** is a side cross-sectional view of washing machine appliance **100**. As illustrated, washing machine appliance **100** generally defines a vertical direction V, a lateral direction L, and a

transverse direction T, each of which is mutually perpendicular, such that an orthogonal coordinate system is generally defined. Washing machine appliance **100** includes a cabinet **102** that extends between a top **104** and a bottom **106** along the vertical direction V, between a left side **108** and a right side **110** along the lateral direction, and between a front **112** and a rear **114** along the transverse direction T.

[0024] Referring to FIGS. **2** and **3**, a wash basket **120** is rotatably mounted within cabinet **102** such that it is rotatable about an axis of rotation A. A motor **122**, e.g., such as a pancake motor, is in mechanical communication with wash basket **120** to selectively rotate wash basket **120** (e.g., during an agitation or a rinse cycle of washing machine appliance **100**). Wash basket **120** is received within a wash tub **124** and defines a wash chamber **126** that is configured for receipt of articles for washing. The wash tub **124** holds wash and rinse fluids for agitation in wash basket **120** within wash tub **124**. As used herein, "wash fluid" may refer to water, detergent, fabric softener, bleach, or any other suitable wash additive or combination thereof. Indeed, for simplicity of discussion, these terms may all be used interchangeably herein without limiting the present subject matter to any particular "wash fluid."

[0025] Wash basket **120** may define one or more agitator features that extend into wash chamber **126** to assist in agitation and cleaning articles disposed within wash chamber **126** during operation of washing machine appliance **100**. For example, as illustrated in FIG. **3**, a plurality of ribs **128** extends from basket **120** into wash chamber **126**. In this manner, for example, ribs **128** may lift articles disposed in wash basket **120** during rotation of wash basket **120**.

[0026] Referring generally to FIGS. **1** through **3**, cabinet **102** also includes a front panel **130** which defines a chamber opening **132** that permits user access to wash basket **120** of wash tub **124**. More specifically, washing machine appliance **100** includes a door **134** that is positioned over chamber opening **132** and is rotatably mounted to front panel **130**. In this manner, door **134** permits selective access to chamber opening **132** by being movable between an open position (FIG. **2**) facilitating access to a wash tub **124** and a closed position (FIG. **1**) prohibiting access to wash tub **124**.

[0027] A window **136** in door **134** permits viewing of wash basket **120** when door **134** is in the closed position, e.g., during operation of washing machine appliance **100**. Door **134** also includes a handle (not labeled) that, e.g., a user may pull when opening and closing door **134**. Further, although door **134** is illustrated as mounted to front panel **130**, it should be appreciated that door **134** may be mounted to another side of cabinet **102** or any other suitable support according to alternative embodiments.

[0028] Referring again to FIG. **3**, wash basket **120** also defines a plurality of perforations **140** in order to facilitate fluid communication between an interior of basket **120** and wash tub **124**. A sump **142** is defined by wash tub **124** at a bottom of wash tub **124** along the vertical direction V. Thus, sump **142** is configured for receipt of and generally collects wash fluid during operation of washing machine appliance **100**. For example, during operation of washing machine appliance **100**, wash fluid may be urged by gravity from basket **120** to sump **142** through plurality of perforations **140**.

[0029] A drain pump assembly **144** is located beneath wash tub **124** and is in fluid communication with sump **142** for periodically discharging soiled wash fluid from washing machine appliance **100**. Drain pump assembly **144** may generally include a drain pump **146** which is in fluid communication with sump **142** and with an external drain **148** through a drain hose **150**. During a drain cycle, drain pump **146** urges a flow of wash fluid from sump **142**, through drain hose **150**, and to external drain **148**. More specifically, drain pump **146** includes a motor (not shown) which is energized during a drain cycle such that drain pump **146** draws wash fluid from sump **142** and urges it through drain hose **150** to external drain **148**.

[0030] A spout (such as supply conduit **218**) may be configured for directing a flow of fluid into wash tub **124**. For example, supply conduit **218** may be in fluid communication with a water supply **154** (FIG. **2**) in order to direct fluid (e.g., clean water or wash fluid) into wash tub **124**. Supply conduit **218** may also be in fluid communication with the sump **142**. For example, pump

assembly **144** may direct wash fluid disposed in sump **142** to supply conduit **218** in order to circulate wash fluid in wash tub **124**.

[0031] As illustrated in FIG. **3**, a detergent drawer **156** is slidably mounted within front panel **130**. Detergent drawer **156** receives a wash additive (e.g., detergent, fabric softener, bleach, or any other suitable liquid or powder) and directs the fluid additive to wash tub **124** during operation of washing machine appliance **100**. According to the illustrated embodiment, detergent drawer **156** may also be fluidly coupled to supply conduit **218** to facilitate the complete and accurate dispensing of wash additive.

[0032] In addition, a water supply valve **158** may provide a flow of water from a water supply source (such as a municipal water supply **154**) into detergent dispenser **156** and into wash tub **124**. In this manner, water supply valve **158** may generally be operable to supply water into detergent dispenser **156** to generate a wash fluid, e.g., for use in a wash cycle, or a flow of fresh water, e.g., for a rinse cycle. It should be appreciated that water supply valve **158** may be positioned at any other suitable location within cabinet **102**. In addition, although water supply valve **158** is described herein as regulating the flow of "wash fluid," it should be appreciated that this term includes, water, detergent, other additives, or some mixture thereof.

[0033] A control panel **160** including a plurality of input selectors **162** is coupled to front panel **130**. Control panel **160** and input selectors **162** collectively form a user interface input for operator selection of machine cycles and features. For example, in one embodiment, a display **164** indicates selected features, a countdown timer, and/or other items of interest to machine users.

[0034] Operation of washing machine appliance **100** is controlled by a controller or processing device **166** (FIG. **1**) that is operatively coupled to control panel **160** for user manipulation to select washing machine cycles and features. In response to user manipulation of control panel **160**, controller **166** operates the various components of washing machine appliance **100** to execute selected machine cycles and features.

[0035] Controller **166** may include a memory and microprocessor, such as a general or special purpose microprocessor operable to execute programming instructions or micro-control code associated with a cleaning cycle. The memory may represent random access memory such as DRAM, or read only memory such as ROM or FLASH. In one embodiment, the processor executes programming instructions stored in memory. The memory may be a separate component from the processor or may be included onboard within the processor. Alternatively, controller **166** may be constructed without using a microprocessor, e.g., using a combination of discrete analog and/or digital logic circuitry (such as switches, amplifiers, integrators, comparators, flip-flops, AND gates, and the like) to perform control functionality instead of relying upon software. Control panel **160** and other components of washing machine appliance **100** may be in communication with controller **166** via one or more signal lines or shared communication busses.

[0036] During operation of washing machine appliance **100**, laundry items are loaded into wash basket **120** through chamber opening **132**, and washing operation is initiated through operator manipulation of input selectors **162**. Wash tub **124** is filled with water, detergent, and/or other fluid additives, e.g., via supply conduit **218** and or detergent drawer **156**. One or more valves (e.g., water supply valve **158**) can be controlled by washing machine appliance **100** to provide for filling wash basket **120** to the appropriate level for the amount of articles being washed and/or rinsed. By way of example for a wash mode, once wash basket **120** is properly filled with fluid, the contents of wash basket **120** can be agitated (e.g., with ribs **128**) for washing of laundry items in wash basket **120**.

[0037] After the agitation phase of the wash cycle is completed, wash tub **124** can be drained. Laundry articles can then be rinsed by again adding fluid to wash tub **124**, depending on the particulars of the cleaning cycle selected by a user. Ribs **128** may again provide agitation within wash basket **120**. One or more spin cycles may also be used. In particular, a spin cycle may be applied after the wash cycle and/or after the rinse cycle in order to wring wash fluid from the

articles being washed. During a final spin cycle, basket **120** is rotated at relatively high speeds and drain pump assembly **144** may discharge wash fluid from sump **142**. After articles disposed in wash basket **120** are cleaned, washed, and/or rinsed, the user can remove the articles from wash basket **120**, e.g., by opening door **134** and reaching into wash basket **120** through chamber opening **132**.
[0038] While described in the context of a specific embodiment of horizontal axis washing machine appliance **100**, using the teachings disclosed herein it will be understood that horizontal axis washing machine appliance **100** is provided by way of example only. Other washing machine appliances having different configurations, different appearances, and/or different features may also be utilized with the present subject matter as well, e.g., vertical axis washing machine appliances.
[0039] Referring still to FIG. **1**, a schematic diagram of an external communication system **170** will be described according to an exemplary embodiment of the present subject matter. In general, external communication system **170** is configured for permitting interaction, data transfer, and other communications between washing machine appliance **100** and one or more external devices. For example, this communication may be used to provide and receive operating parameters, user instructions or notifications, performance characteristics, user preferences, or any other suitable information for improved performance of washing machine appliance **100**. In addition, it should be appreciated that external communication system **170** may be used to transfer data or other information to improve performance of one or more external devices or appliances and/or improve user interaction with such devices.
[0040] For example, external communication system **170** permits controller **166** of washing machine appliance **100** to communicate with a separate device external to washing machine appliance **100**, referred to generally herein as an external device **172**. As described in more detail below, these communications may be facilitated using a wired or wireless connection, such as via a network **174**. In general, external device **172** may be any suitable device separate from washing machine appliance **100** that is configured to provide and/or receive communications, information, data, or commands from a user. In this regard, external device **172** may be, for example, a personal phone, a smartphone, a tablet, a laptop or personal computer, a wearable device, a smart home system, or another mobile or remote device.
[0041] In addition, a remote server **176** may be in communication with washing machine appliance **100** and/or external device **172** through network **174**. In this regard, for example, remote server **176** may be a cloud-based server **176**, and is thus located at a distant location, such as in a separate state, country, etc. According to an exemplary embodiment, external device **172** may communicate with a remote server **176** over network **174**, such as the Internet, to transmit/receive data or information, provide user inputs, receive user notifications or instructions, interact with or control washing machine appliance **100**, etc. In addition, external device **172** and remote server **176** may communicate with washing machine appliance **100** to communicate similar information.
[0042] In general, communication between washing machine appliance **100**, external device **172**, remote server **176**, and/or other user devices or appliances may be carried using any type of wired or wireless connection and using any suitable type of communication network, non-limiting examples of which are provided below. For example, external device **172** may be in direct or indirect communication with washing machine appliance **100** through any suitable wired or wireless communication connections or interfaces, such as network **174**. For example, network **174** may include one or more of a local area network (LAN), a wide area network (WAN), a personal area network (PAN), the Internet, a cellular network, any other suitable short-or long-range wireless networks, etc. In addition, communications may be transmitted using any suitable communications devices or protocols, such as via Wi-Fi®, Bluetooth®, Zigbee®, wireless radio, laser, infrared, Ethernet type devices and interfaces, etc. In addition, such communication may use a variety of communication protocols (e.g., TCP/IP, HTTP, SMTP, FTP), encodings or formats (e.g., HTML, XML), and/or protection schemes (e.g., VPN, secure HTTP, SSL).
[0043] External communication system **170** is described herein according to an exemplary

embodiment of the present subject matter. However, it should be appreciated that the exemplary functions and configurations of external communication system **170** provided herein are used only as examples to facilitate description of aspects of the present subject matter. System configurations may vary, other communication devices may be used to communicate directly or indirectly with one or more associated appliances, other communication protocols and steps may be implemented, etc. These variations and modifications are contemplated as within the scope of the present subject matter.

[0044] Referring now generally to FIGS. **4** through **10**, a fluid circulation assembly **200** that may be used with washing machine appliance **100** will be described according to example embodiments of the present subject matter. In general, fluid circulation assembly **200** may generally be configured for urging a flow of wash fluid (e.g., identified generally by reference numeral **202**) throughout washing machine appliance **100**. For example, the flow of wash fluid **202** may be water, detergent, additives, or some mixture thereof. According to example embodiments, fluid circulation assembly **200** may be configured to circulate the flow of wash fluid **202** within washing machine appliance **100** to facilitate cleaning of a load of articles or may be configured to discharge the flow of wash fluid **202** to an external drain **148**. Although fluid circulation assembly **200** will be described below according to an example embodiment, it should be appreciated that variations and modifications may be made while remaining within the scope of the present subject matter.

[0045] According to the illustrated embodiment, fluid circulation assembly **200** may generally include a dispensing assembly **210** that is configured to receive and distribute the flow of wash fluid **202**. For example, according to the illustrated embodiment, dispensing assembly **210** may generally include a dispenser manifold or a dispenser housing **212** that is positioned within or recessed within cabinet **102**, e.g., at a top corner of front panel **130**. According to the illustrated embodiment, dispenser housing **212** may be an open reservoir positioned at a bottom of dispensing assembly **210** and may include angled collecting wall **214** for directing fluids within dispenser housing **212** toward a discharge port **216**. As shown for example in FIGS. **4** and **5**, discharge port **216** may be fluidly coupled to a supply conduit **218** that is fluidly coupled to wash tub **124**. In this manner, the flow of wash fluid **202** that is passed into dispenser housing **212** may be directed to the force of gravity into wash tub **124**, e.g., to facilitate operation of washing machine appliance **100**.

[0046] As best illustrated in FIGS. **4** through **7**, dispensing assembly **210** may further include a shower plate **220** and a top cover **222** that is positioned over the shower plate **220** to define a water supply reservoir **224**. Dispensing assembly **210** may further include a plurality of freshwater supply inlets **226** that are positioned at a rear of shower plate **220** for providing flows of hot and/or cold water into water supply reservoir **224**, e.g., from water supply **154**. In general, shower plate **220** may include a plurality of apertures or perforations for discharging the freshwater from water supply reservoir **224** down into dispenser housing **212**. In this manner, fresh water and/or additives may be showered or flooded within dispenser housing **212** where they may be mix prior to passing into wash tub **124** through supply conduit **218**.

[0047] In addition, as described briefly above, dispensing assembly **210** may include a detergent drawer **156** that is slidably mounted within dispenser housing **212** for receiving one or more wash additives or detergents. In this regard, a user may slide detergent drawer **156** out from front **112** of cabinet **102** for supplying wash additives needed for a wash cycle. Detergent drawer **156** may then slide back into dispensing assembly **210** where water supply **154** may selectively dispense fresh water to flush out one or more compartments of detergent drawer **156** and to create the flow of wash fluid **202**.

[0048] Notably, as explained briefly above, dispensing assembly **210** may tend to collect residue, grime, or other build up due to its frequent exposure to the flow of wash fluid **202**, detergent, and other additives. Over time, this residue may result in the buildup of mold or mildew, thereby resulting in musty smells resulting in consumer dissatisfaction and/or repeated maintenance and cleaning. Accordingly, it may be desirable to periodically flush dispensing assembly **210** with water

to facilitate the cleaning of this grime and build up. Conventional methods for flushing and cleaning dispensing assembly **210** may include the supply of fresh water from water supply **154**. However, the use of freshwater for cleaning in this manner may deteriorate the water efficiency of the unit. In addition, variance in water supply pressure may result in inconsistent cleaning. Accordingly, aspects of the present subject matter may be directed to improved systems and methods for flushing out and cleaning dispensing assembly **210**.

[0049] For example, according to the illustrated embodiment, fluid circulation assembly **200** may further include a recirculation conduit **230** that is fluidly coupled to dispensing assembly **210**. In this regard, for example, recirculation conduit **230** may provide fluid communication between sump **142** and an inlet port **232** that is defined on a rear wall **234** of dispenser housing **212**. However, it should be appreciated that inlet port **232** could be positioned at other locations as well, such as on the sidewalls or front wall of dispenser housing **212**. In addition, fluid circulation assembly **200** may include a recirculation pump **236** for selectively urging the flow of wash fluid **202** from sump **142**, through recirculation conduit **230**, and into dispenser housing **212** through inlet port **232**.

[0050] As shown for example in FIG. **7**, detergent drawer **156** may further include a filtering chamber **238** which is configured to receive a filter element **240**. In general, filter element **240** may be a pleated filter, a mesh screen, a carbon filter, a sponge filter, or any other suitable filtering element for extracting undesirable particulates or other matter from the flow of wash fluid **202**. For example, according to the illustrated embodiment, filter element **240** is a screen filter that lines a perimeter of a filter cage **242** (FIG. **7**). According to the illustrated embodiment, filter cage **242** may be slidably received within detergent drawer **156**. In this manner, filter cage **242** may be periodically removed and cleaned to remove collected particulates and maintain filtering efficiency. In this manner, the flow of wash fluid **202** that passes into dispenser housing **212** may be cleaned or filtered prior to flushing out dispensing assembly **210**.

[0051] According to the illustrated embodiment, filter element **240** is removably received within dispensing assembly **210**. However, it should be appreciated that according to alternative embodiments, filter element **240** may be mounted within fluid circulation system **200** in any other suitable manner. For example, filter element **240** may be mounted inline within recirculation conduit **230**, may be mounted at an intake or discharge of recirculation pump **236**, or may be fluidly coupled in any other location within fluid circulation system **200** where the flow of wash fluid **202** is circulated.

[0052] In general, recirculation pump **236** may be any suitable type and configuration of fluid pump for urging the flow of wash fluid **202**. For example, according to an example embodiment, recirculation pump **236** may be a bidirectional direct current (DC) pump. According to such an embodiment, fluid circulation assembly **200** may further include a drain conduit fluidly coupled to an external drain (e.g., such as drain hose **150** coupled to external drain **148**). According to such an embodiment, recirculation pump **236** may be fluidly coupled to both recirculation conduit **230** and drain hose **150** for selectively urging the flow of wash fluid **202** through one or both of drain hose **150** and recirculation conduit **230**. For example, recirculation pump **236** may operate in one direction to discharge wash fluid **202** through drain hose **150** to external drain **148** and may operate in the other direction to recirculate the flow of wash fluid **202** through recirculation conduit **230**. It should be appreciated that according to alternative embodiments, a dedicated drain pump may be used to discharge wash fluid **202** instead of relying on recirculation pump **236**.

[0053] According to example embodiments of the present subject matter, dispensing assembly **210** may include additional features for improving the distribution and flow of wash fluid **202** to facilitate improved cleaning of dispenser housing **212** and dispensing assembly **210**. For example, inlet port **232** may generally be fan-shaped or may increase in width from recirculation conduit **230** to improve the distribution of the flow of wash fluid **202** out of inlet port **232**.

[0054] In addition, as shown for example in FIG. **10**, inlet port **232** may include various fluid

oscillators circuits **244** which are designed to randomize the flow of wash fluid **202** exiting inlet port **232**. Examples of such fluid oscillators circuits **244** are illustrated in FIG. **10**, but these illustrations are not intended to be limiting. In general, fluid oscillators circuits **244** operate by passing the flow of wash fluid **202** through various supply lines and mixing chambers to agitate or create oscillations within the flow of wash fluid **202** exiting inlet port **232**. One skilled in the art will understand that various other fluid oscillators circuits **244** are possible and within the scope of the present subject matter.

[0055] In addition, referring now specifically to FIGS. **8** and **9**, dispensing assembly **210** may further include one or more dispersion fins **250** that extend from dispenser housing **212** adjacent inlet port **232** for directing the flow of wash fluid **202**. For example, dispersion fins **250** may include a single flat plate positioned above inlet port **232** for preventing the flow of wash fluid **202** from passing upward as it exits inlet port **232**. According to still other embodiments, dispersion fins **250** may be angled downward to direct the flow of wash fluid **202** onto angled collecting wall **214** and improve the flushing of dispensing assembly **210**. It should be appreciated that the number, size, shape, and configuration of dispersion fins **250** may vary while remaining within the scope of the present subject matter. For example, dispersion fins **250** may have an arcuate profile, may include additional fins or water directing features, etc.

[0056] As shown for example in FIGS. **8** and **9**, dispenser housing **212** may further define one or more distribution ribs **252** that extend from dispenser housing **212** for directing a flow of wash fluid throughout dispenser housing **212**. For example, distribution ribs **252** may be aligned along angled collecting wall **214** for directing a flow of wash fluid **202** into regions where grime build-up is common or where frequent cleaning is desired. It should be appreciated that dispenser housing **212** may include additional features and geometries to facilitate improved cleaning of dispensing assembly **210**.

[0057] It should be appreciated that various features of dispensing assembly **210** may be formed from any suitably rigid material. For example, according to exemplary embodiments, dispenser housing **212**, shower plate **220**, and top cover **222** may be formed by injection molding, e.g., using a suitable plastic material, such as injection molding grade Polybutylene Terephthalate (PBT), Nylon 6, high impact polystyrene (HIPS), acrylonitrile butadiene styrene (ABS), polypropylene, or any other suitable blend of polymers. Alternatively, according to the exemplary embodiment, these components may be compression molded, e.g., using sheet molding compound (SMC) thermoset plastic or other thermoplastics. According to still other embodiments, portions of dispensing assembly **210** may be formed from any other suitable rigid material. In addition, it should be appreciated that one or more features of dispenser housing **212** may be integrally molded as a single component (e.g., such as dispersion fins **250**, distribution ribs **252**, etc.).

[0058] As explained herein, aspects of the present subject matter are generally directed to a washing machine with a DC drain pump to run in both a forward and a reverse direction, thereby directing a flow of water from the wash tub to either an external drain when the pump run in forward direction or to channel the water from the wash tub to a port on a dispenser assembly when pump run in reverse direction. Upon reaching the dispenser assembly, water may flow through a filter member, facilitating the separation of impurities/particles present in wash fluid. Subsequently, the filtered water may flow out from the discharge hole of the dispenser assembly, ready to be recirculated in the wash tub.

[0059] The present subject matter provides several advantages over existing dispensing assembly designs. For example, the bidirectional rotation pump provides two circulation paths for the wash fluid, e.g., a recirculation route through a filter and a drain route to an external drain standpipe, while using a single pump motor and impeller. Alternate methods may include using a single pump with a diverter valve or two pumps in a common manifold hydraulically connected to the tub. The diverter valve may add costs and result in a greater risk of clogging, while the two-pump approach is simply more costly.

[0060] The present subject matter provides several advantages over existing dispensing assembly designs. For example, the system described herein does not disrupt the flow of water from the water valves, through the shower plate, and into the dispenser. Instead, it allows these geometries and flows to be optimized for the purpose of delivering wash additives to the wash tub, and is an additional feature that then cleans any residual residue. The system utilizes water that is already in the washing machine hydraulic circuit, and does not require additional water to be added to the cycle, thus minimizing impact on water efficiency (e.g., the Integrated Water Factor, Water Efficiency Ratio, etc.). In addition, the system provides high pressure water to the internal portion of the dispenser, and does not rely on home water pressure which can be quite low and/or unstable.
[0061] This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they include structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

Claims

1. A washing machine appliance comprising: a wash tub positioned within a cabinet and defining a wash chamber; a wash basket rotatably mounted within the wash tub for receiving a load of clothes; and a pump assembly in fluid communication with a sump of the wash tub, the pump assembly comprising: a recirculation conduit fluidly coupled to the sump; a pump for selectively urging a flow of wash fluid from the sump and through the recirculation conduit; and a filter positioned operably coupled to the recirculation conduit for filtering the flow of wash fluid.
2. The washing machine appliance of claim 1, wherein the pump assembly further comprises: a drain conduit fluidly coupled to an external drain, wherein the pump is a bi-directional pump for selectively urging a flow of wash fluid through the drain conduit or the recirculation conduit.
3. The washing machine appliance of claim 1, further comprising: a dispensing assembly mounted within the cabinet for selectively adding wash fluid into the wash tub, wherein the recirculation conduit is fluidly coupled to the dispensing assembly and the filter is positioned within the dispensing assembly.
4. The washing machine appliance of claim 3, wherein the dispensing assembly comprises: a dispenser housing defining an inlet port, wherein the recirculation conduit is fluidly coupled to the inlet port.
5. The washing machine appliance of claim 4, wherein the inlet port is defined on a back wall of the dispenser housing.
6. The washing machine appliance of claim 4, wherein the dispensing assembly comprises: a filter cage positioned within the dispenser housing for receiving the filter.
7. The washing machine appliance of claim 6, wherein the filter cage is removable to facilitate cleaning of the filter and removal of collected particulates.
8. The washing machine appliance of claim 4, wherein the dispenser housing defines a discharge aperture for discharging the flow of wash fluid into the wash tub after the filter has removed collected particulates.
9. The washing machine appliance of claim 4, wherein the inlet port defines a fan-shaped geometry to spread the flow of wash fluid.
10. The washing machine appliance of claim 1, wherein the filter is a screen mesh filter that lines a perimeter of a filter cage.
11. The washing machine appliance of claim 1, wherein the pump is a direct current (DC) bi-

directional pump.

12. A pump assembly for a washing machine appliance, the washing machine appliance comprising a wash tub defining a sump for collecting wash fluid, the pump assembly comprising: a recirculation conduit fluidly coupled to the sump; a pump for selectively urging a flow of wash fluid from the sump and through the recirculation conduit; and a filter positioned operably coupled to the recirculation conduit for filtering the flow of wash fluid.

13. The pump assembly of claim 12, further comprising: a drain conduit fluidly coupled to an external drain, wherein the pump is a bi-directional pump for selectively urging a flow of wash fluid through the drain conduit or the recirculation conduit.

14. The pump assembly of claim 12, wherein the washing machine appliance further comprises: a dispensing assembly mounted within a cabinet for selectively adding wash fluid into the wash tub, wherein the recirculation conduit is fluidly coupled to the dispensing assembly and the filter is positioned within the dispensing assembly.

15. The pump assembly of claim 14, wherein the dispensing assembly comprises: a dispenser housing defining an inlet port, wherein the recirculation conduit is fluidly coupled to the inlet port.

16. The pump assembly of claim 15, wherein the inlet port is defined on a back wall of the dispenser housing.

17. The pump assembly of claim 15, wherein the dispensing assembly comprises: a filter cage positioned within the dispenser housing for receiving the filter.

18. The pump assembly of claim 17, wherein the filter cage is removable to facilitate cleaning of the filter and removal of collected particulates.

19. The pump assembly of claim 12, wherein the filter is a screen mesh filter that lines a perimeter of a filter cage.

20. The pump assembly of claim 12, wherein the pump is a direct current (DC) bi-directional pump.