LAUNDRY TREATING APPLIANCE WITH BULK DISPENSER AND TREATING CHEMISTRY CARTRIDGE THEREFOR

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Appl. No.: 15/044,579
Filed: Feb. 16, 2016

ABSTRACT

A laundry treating appliance, such as a washing machine, either vertical or horizontal axis, can have a bulk dispenser assembly capable of dispensing multiple doses of treating chemistry from a bulk supply of treating chemistry. The bulk supply may be a solid block of treating chemistry held within a removable cartridge. A sensing assembly can be provided for determining the amount of treating chemistry that is dispensed from the bulk supply for a non-uniform dosing of treating chemistry.
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CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 62/116,970, filed Feb. 17, 2015, which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] Laundry treating appliances, such as clothes washers, refreshers, and non-aqueous systems, can have a configuration based on a rotating drum that defines a treating chamber in which laundry items are placed for treating. Historically, residential or home-use versions of these appliances have single dose dispensers provided with compartment or cups, typically in a drawer or under a cover, in which the user of the appliance would fill with a dose of treating chemistry that was sufficient for the cycle of operation to be selected. Recently, bulk dispensers, i.e. dispensers holding multiple doses of a treating chemistry, have become more common, yet with single dose dispensers still being dominate.

[0003] The bulk dispensers can be more convenient in that they relieve the user from having to fill the single dose dispenser for every cycle. However, the particular implementation of current bulk dispensers have created their own inconveniences. In some implementations, the bulk dispenser is configured to dispense a fixed dose of treating chemistry, which may not be sufficient for all cycles and load sizes. Further, some bulk dispensers can only accept and dispense one type of treating chemistry.

BRIEF SUMMARY

[0004] According to an embodiment of the invention, a laundry treating appliance for treating laundry in accordance with an automatic cycle of operation includes a tub defining an interior for retaining liquid, a liquid supply assembly in fluid communication with the tub and operable to supply liquid for use in treating laundry, and a dispenser assembly. The dispenser assembly includes a housing defining a chamber with a base, one or more support ribs located within the chamber and collectively defining an erosion platform located above the base that is configured to support a solid block of treating chemistry, a liquid flow channel extending at least partially along the one or more support ribs, a liquid inlet to the flow channel in fluid communication with the liquid supply assembly, and a liquid outlet from the flow channel in fluid communication with the tub. Liquid supplied to the liquid inlet enters the liquid flow channel and the liquid flow channel is configured to pass the liquid under the erosion platform to erode a portion of the solid block to form a mixture of liquid and treating chemistry, and the mixture is supplied to the tub through the liquid outlet.

[0005] According to another embodiment of the invention, a treating chemistry cartridge is provided for use in a dispenser assembly of a laundry treating appliance for treating laundry in accordance with an automatic cycle of operation. The treating chemistry cartridge includes a casing defining an interior chamber with a base and having a liquid inlet and a liquid outlet, one or more support ribs extending upwardly relative from the base, and collectively defining an erosion platform configured to support a solid block of treating chemistry within the interior chamber, and a liquid flow channel extending between the liquid inlet and the liquid outlet, at least partially defined by the one or more support ribs. Liquid supplied to the liquid inlet enters the liquid flow channel and passes under the erosion platform to erode a portion of the solid block.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] In the drawings:
[0007] FIG. 1 is a perspective view of a laundry treating appliance in the form of a washing machine having a dispenser assembly according to a first embodiment of the invention.
[0008] FIG. 2 is a schematic illustration of the washing machine from FIG. 1.
[0009] FIG. 3 is an exploded view of the dispenser assembly from FIG. 1.
[0010] FIG. 4 is a sectional view through the dispenser assembly of FIG. 3, showing the flow path of liquid to dispense treating chemistry.
[0011] FIG. 5 illustrates an insert for adapting the dispenser assembly of FIG. 3 to dispense a liquid treating chemistry;
[0012] FIG. 6 is a perspective view of a laundry treating appliance in the form of a washing machine having a dispenser assembly according to a second embodiment of the invention.
[0013] FIG. 7 is a schematic sectional view through a dispenser assembly according to a third embodiment of the invention.
[0014] FIG. 8 is a first perspective view of a dispenser housing of the dispenser assembly from FIG. 7.
[0015] FIG. 9 is a second perspective view of a dispenser housing of the dispenser assembly from FIG. 7.
[0016] FIG. 10 is a bottom perspective view of a casing for a cartridge of the dispenser assembly from FIG. 7.
[0017] FIG. 11 is a view similar to FIG. 7, showing the flow path through the dispenser assembly.
[0018] FIG. 12 is a schematic illustration of one embodiment of a sensing assembly for treating chemistry in a laundry treating appliance.
[0019] FIG. 13 is a schematic illustration of another embodiment of a sensing assembly for treating chemistry in a laundry treating appliance.
[0020] FIG. 14 is a schematic illustration of another embodiment of a dispenser assembly for a laundry treating appliance.
[0021] FIG. 15 is a schematic illustration of yet another embodiment of a dispenser assembly for a laundry treating appliance.

DETAILED DESCRIPTION

[0022] Embodiments of the invention relate to laundry treating appliances having a bulk dispensing apparatus configured to dispense a measured amount of treating chemistry. Using the various embodiments described herein, a correct dose of treating chemistry for each cycle of operation can be dispensed from the bulk supply.

[0023] In some embodiments, there are two main components of the bulk dispensing apparatus. One is the dispenser assembly, which can be an integral part of the laundry treating appliance. The other is the cartridge containing the treating chemistry, which is a consumable. The cartridge can be
replaced when necessary. In an alternate embodiment, the cartridge can be configured to be refillable, in which case the treating chemistry alone is considered to be a consumable. The cartridge treating chemistry can be in the form of a solid, consumable block. In accordance with some embodiments of the invention described below, the solid block of treating chemistry can be supported on an erosion platform, and a liquid passing under the erosion platform erodes a portion of the solid block to form a mixture of liquid and treating chemistry that is used for a cycle of operation. As used herein with respect to mixtures of liquid and treating chemistry, the mixture may, for example, be a solution or suspension of liquid and treating chemistry. The dispenser can also apply to other types of treating chemistries, such as gels, powders, pods, or liquids.

[0024] In other embodiments, the bulk dispensing apparatus can include a bulk supply of multiple treating chemistries, with the treating chemistries segregated from each other for timed dispensing at a desired phase of the cycle of operation.

[0025] In yet other embodiments, the bulk dispensing apparatus can be provided in conjunction with a sensing and control system for determining and controlling the amount of treating chemistry that is dispensed from a bulk supply. This permits a non-uniform dosing of treating chemistry tailored to the particular cycle of operation, the size of the laundry load, or the fabric composition of the laundry load.

[0026] As used herein, treating chemistry may be any type of aid for treating laundry, and examples may include, but are not limited to washing aids, such as detergents and oxidizers, including bleaches, and additives, such as fabric softeners, sanitizers, de-wrinklers, and chemicals for imparting desired properties to the fabric, including for example, stain resistance, water repellency, fragrance (e.g., perfumes), insect repellency, brighteners, whitening agents, builders, and UV protection.

[0027] Embodiments of the description can be implemented in any laundry treating appliance that performs a cycle of operation to clean or otherwise treat items placed therein, non-limiting examples of which include a horizontal or vertical axis clothes washer; a combination washing machine and dryer; a tumbling or stationary refreshing/revitalizing machine; an extractor; a non-aqueous washing apparatus; and a revitalizing machine. Washing machines are typically categorized as either a vertical axis washing machine or a drum type washing machine such as a horizontal axis washing machine. As used herein, a “vertical axis” washing machine refers to a washing machine having a perforate or imperforate wash basket that holds fabric items, and a mover, such as an agitator, impeller, nutator, or the like within the wash basket that moves the fabric items. The mover moves within the wash basket to impart mechanical energy directly to the clothes or indirectly through wash liquid in the wash basket. The mover may typically be moved in a reciprocating or a rotational movement, or a combination thereof. In some vertical axis washing machines, the wash basket rotates about a vertical axis generally perpendicular to a surface that supports the washing machine. However, the rotational axis need not be vertical. The wash basket may rotate about an axis inclined relative to the vertical axis. As used herein, the “drum type” washing machine refers to a washing machine having a rotatable wash basket, perforated or imperforate that holds fabric items but lacks a separate mover. The wash basket may have vanes or the like, but mechanical energy is imparted directly to the clothes or indirectly through wash liquid solely by rotation of the wash basket. In some horizontal axis washing machines, the wash basket rotates about a horizontal axis generally parallel to a surface that supports the washing machine. However, the rotational axis need not be horizontal. The wash basket may rotate about an axis inclined relative to the horizontal axis. In horizontal axis washing machines, the clothes are lifted by the rotating wash basket and then fall in response to gravity to form a tumbling action. Mechanical energy is imparted to the clothes by the tumbling action formed by the repeated lifting and dropping of the clothes.

[0028] FIG. 1 is a perspective view of a laundry treating appliance 10 having a dispenser assembly 12 according to a first embodiment of the invention. The laundry treating appliance is illustrated in the form of a vertical axis washing machine 10, and shares many features of a traditional automatic washing machine, which will not be described in detail except as necessary for a complete understanding of illustrative embodiments in accordance with the present disclosure.

[0029] As illustrated in FIG. 1, the washing machine 10 can include a housing 14 defining an interior 16. The housing 14 can be a cabinet, chassis, or both. A door or lid 18 is operably coupled with the housing 14 and is selectively moveable between open and closed positions to close an opening in a top wall of the housing 14, which provides access to the interior 16 of the housing 14.

[0030] The housing 14 may also support the dispenser assembly 12 for dispensing treating chemistry during a cycle of operation. The dispenser assembly 12 may be configured as a drawer 20 which is accessed by opening the lid 18, as shown in FIG. 1. The drawer 20 can include one or more chambers for accommodating treating chemistry. At least one chamber 22 accommodates a bulk cartridge 24 containing a bulk supply of treating chemistry. As used herein, a bulk supply of treating chemistry is an amount of treating chemistry greater than that needed for a single cycle of operation in the appliance. In the illustrated embodiment, the drawer 20 includes two other chambers 26, 28 which each accommodate a single dose of treating chemistry. As used herein, a single dose or single dose supply of treating chemistry is an amount of treating chemistry needed for a single cycle of operation in the appliance. Additional details of the dispenser assembly 12 are explained below.

[0031] The cartridge 24 contains enough treating chemistry for multiple cycles of operation, i.e. to treat multiple loads of laundry. In an alternate embodiment, the cartridge 24 may be a single-dose cartridge containing enough treating chemistry for only a single cycle of operation. This is less preferred, because a user would need to replace the cartridge with each cycle. The cartridge 24 can contain various treating chemistries which improve particular aspects of the laundry treating quality. Multiple cartridges 24 containing different treating chemistries can be provided. One cartridge can promote one improvement in laundry treating quality, while another cartridge can promote a different improvement in laundry treating quality. The cartridges can of course promote any combination of these improvements as well. If different treatments are desired for different laundry loads, one cartridge can be exchanged for another between cycles of operation.

[0032] FIG. 2 is a schematic illustration of the washing machine 10 from FIG. 1. A tub 30 can be provided in the
interior 16 of the housing 14 and can be configured to hold liquid. The tub 30 can be supported within the housing 14 by a suitable suspension assembly (not shown). A rotatable basket 32 having an open top is disposed within the tub 30 and can define a treating chamber 34 for treating laundry. The rotatable basket 32 can include a plurality of perforations (not shown), such that liquid can flow between the imperforate tub 30 and the rotatable basket 32 through the perforations. The lid 18 (FIG. 1) can selectively provide access to the treating chamber 34.

While the illustrated washing machine 10 includes both the imperforate tub 30 and the rotatable basket 32, with the rotatable basket 32 defining the treating chamber 34, it is within the scope of the present disclosure for the washing machine 10 to include only one receptacle, with the receptacle defining both a tub and a treatment chamber for receiving laundry.

A clothes mover 36 is located in the treating chamber 34 to impart mechanical agitation to a load of laundry placed in the treating chamber 34. The basket 32 and the clothes mover 36 are driven by a drive assembly that includes a motor 38 operably coupled with the basket 32 and clothes mover 36. The motor 38 can be any suitable type of motor including an electrical motor.

A liquid supply assembly 40 is provided to supply liquid, such as water or a combination of water and one or more treating chemistries, into the treating chamber 34. Water may be supplied from a water source, such as a household water supply 42, to the dispenser assembly 12 by operation of at least one valve 44 controlling the flow of water through a supply conduit 46. An outlet conduit 48 extends from the dispenser assembly 12 to the tub 30 or to the treating chamber 34. Thus, any treating chemistry supplied from the dispenser assembly 12 may be supplied to the tub 30 via the outlet conduit 48. It is noted that the treating chemistry supplied can be supplied directly to the tub 30, such as via a space between the tub 30 and basket 32, or indirectly to the tub 30 via the treating chamber 34; for example, due to the perforations in the basket 32, treating chemistry in the treating chamber 34 will flow into the tub 30. While not shown, the liquid supply assembly 40 may be provided with additional conduits, valves, etc. for water to be supplied directly to the treating chamber by bypassing the dispenser assembly 12. Further, separate conduits, valves, etc. may be provided for each chamber 22, 26, 28 (FIG. 1) of the dispenser assembly 12 as needed.

A liquid recirculation assembly 50 may be provided for recirculating liquid from the tub 30 to the treating chamber 34. More specifically, a sump 52 is located in the bottom of the tub 30 and the liquid recirculation assembly 50 is configured to recirculate wash liquid from the sump 52 onto the top of a laundry load located in the treating chamber 34 via a recirculation conduit 54. A pump 56 is housed below the tub 30 and can have an inlet fluidly coupled with the sump 52 and an outlet configured to fluidly couple to either a household drain 58 or the recirculation conduit 54. In this configuration, the pump 56 is used to drain and recirculate wash liquid. The liquid recirculation assembly can include other types of recirculation assemblies, including one with separate pumps for recirculation and draining.

A user interface 60 is included on the housing 14 and can have one or more knobs, switches, displays, and the like for communicating with the user, such as to receive input and provide output. A controller 62 is coupled with various working components of the washing machine 10, including the user interface 60, to control the operation of the working components. The controller 62 is provided with a memory 64 and a central processing unit (CPU) 66. The memory 64 is used for storing the control software that is executed by the CPU 66 in completing a cycle of operation using the washing machine 10 and any additional software. The memory 64 can also be used to store information, such as a database or table, and to store data received from the one or more components of the washing machine 10 that is communicably coupled with the controller 62.

The controller 62 is operably coupled with one or more components of the washing machine 10 for communicating with and/or controlling the operation of the components to complete a cycle of operation. For example, the controller 62 is coupled with the motor 38, valve 44, pump 56 and user interface 60. The controller 62 can also receive input from various sensors.

The washing machine 10 can be programmed to send enough liquid through the dispenser assembly 12 to dispense the amount of treating chemistry required in each cycle. This amount may vary, depending on load size, cycle selection, and other factors. For example, for a cycle treating a large load of laundry, more treating chemistry may be dispensed than for a cycle treating a small load of laundry. The washing machine 10 can be provided with a suitable apparatus for determining load size, such as a weight sensor coupled with the controller 62 and providing input to the controller 62 to control dispensing.

FIG. 3 is an exploded view of the dispenser assembly 12. The dispenser assembly 12 has various functions, the main functions being: (1) to support the cartridge 24 in the laundry treating appliance; (2) to provide controlled flow of water required for proper dilution of the treating chemistry at the right time during the cycle of operation; (3) to discharge the mixture resulting from dilution of the treating chemistry to a suitable area of the laundry treating appliance; and (4) other complementary functions. The basic function of the cartridge 24 is to contain the consumable treating chemistry.

The dispenser assembly 12 generally comprises a dispenser housing 68 that includes the drawer 20 and a drawer housing 70 for receiving the drawer 20. Other embodiments of the dispenser housing 68 are possible, including housings that do not include a drawer. The dispenser housing 68 defines at least one chamber; as described above, the illustrated dispenser housing includes three chambers 22, 26, 28 in the drawer 20. The drawer housing 70 may be a separate component that is mounted or fixed to the housing 14 of the washing machine 10 (FIG. 1), or may be formed with or provided by a portion of the housing 14 itself. The drawer housing 70 can include one or more pathways for directing liquid to the chambers 22, 26, 28 of the drawer 20.

The drawer 20 includes a drawer body 72 and a drawer front 74 defining a front of the drawer 20 and which also forms a handle which a user grasps to open the drawer 20. The chambers 22, 26, 28 can be provided as open-top receptacles or cups in the drawer body 72. The drawer body 72 further includes two side walls 76 extending from the drawer front 74, a rear wall 78 extend between the two side walls 76, and a bottom wall 80 which can define the base for one or more of the chambers 22, 26, 28. The drawer body 72 can further be subdivided into discrete chambers by one or more partitions; as shown, two partition walls 82 extend from the drawer front 74 to the rear wall 78 to divide the drawer body
72 into the three chambers 22, 26, 28. The bottom wall 80 of the drawer body 72 can be sloped downwardly in a direction away from the drawer front 74, such that liquid tends to flow toward the rear wall 78 of the drawer 20.

[0043] Each chamber 22, 26, 28 can be configured based on the type or form of treating chemistry to be dispensed from that chamber. In the embodiment illustrated herein, the chamber 26 is configured to receive a detergent for the main wash phase of a cycle and chamber 28 is configured to receive a fabric softener for the rinsing phase of a cycle. Each chamber 26, 28 can receive a single dose of treating chemistry, and is refilled manually by the user with each cycle of operation. The chamber 22 is configured to receive the bulk cartridge 24.

[0044] The bulk cartridge 24 includes a casing 84 containing a bulk supply of treating chemistry. The bulk supply can be provided in the form of a solid block 86 of treating chemistry. As used herein, a solid block of treating chemistry is a treating chemistry having a stable three-dimensional form. The solid block may have at least some degree of porosity. The solid block can have a uniform or a non-uniform composition, including layered or irregular compositions. Some non-limiting examples of the solid block include a compressed or sintered cake of granular powder treated chemistry with a dissolvable binder, or a cast block of treating chemistry. Further details of some non-limiting examples of solid block treating chemistries are disclosed in U.S. Pat. No. 2,927,900; U.S. Pat. No. 4,755,755; U.S. Pat. No. 4,725,376, and U.S. Pat. No. 5,490,949, all of which are incorporated herein by reference in their entirety.

[0045] The illustrated solid block 86 has a generally rectangular cuboid shape, with six quadrilateral faces, including a bottom face 88, a top face 90, and four side faces collectively defining a peripheral surface 92 of the block 86. Other three dimensional shapes of the block 86 are possible.

[0046] The illustrated casing 84 has a three dimensional shape that complements the solid block 86, and includes a top cover 94 and a bottom cover 96 that together define an interior chamber for receiving the solid block 86. The interior chamber includes an erosion platform 98 for supporting the block 86. When the cartridge 24 is inserted into the chamber 22, the bottom face 88 of the consumable block 86 is supported by the erosion platform 98, which is shaped to enable exposure of the block 86 to a controlled flow of water. This exposure will promote removal of treating chemistry from the consumable block 86 by erosion or similar mechanism. The total amount of treating chemistry removed from the block 86 can be the quantity of treating chemistry required for a particular load or cycle. As illustrated, the bottom cover 96 includes a plurality of support ribs 100 extending upwardly to free edges 102 that collectively define the erosion platform 98. The support ribs 100 can be formed as elongated, upstanding, and spaced walls on the bottom cover 96.

[0047] A liquid flow channel 104 for supplying liquid to the solid block 86 extends through the cartridge 24 and can extend at least partially between the support ribs 100. The ribs 100 can define multiple discrete flow paths therebetween, which collectively define liquid flow channel 104.

[0048] A liquid inlet 106 to the flow channel 104 is in fluid communication with the liquid supply assembly 40 (Fig. 2) and a liquid outlet 108 from the flow channel 104 is in fluid communication, either directly or indirectly, with the tub 30 (Fig. 2). The liquid inlet 106 of the chamber 22 is configured to receive liquid that is displaced by the solid block 86 through the casing 84. Liquid flows through the casing 84, passes through the flow channel 104, and out of the casing 84 through the outlet 108. As the liquid passes through the flow channel 104, it passes under the erosion platform 98 to erode a portion of the solid block 86 to form a mixture of liquid and treating chemistry, and the mixture is supplied through the outlet 108.

[0049] In the illustrated embodiment, the liquid inlet 106 is formed as an opening in the top cover 94 of the casing 84 and the liquid outlet 108 is formed as an opening in the bottom cover 96 of the casing 84. The top cover 94 may further include a depending wall or end flange 112 that covers an inlet side of the solid block 86 to limit the liquid exposure of the solid block 86 to the bottom face 88.

[0050] In operation, liquid is supplied to the chambers 22, 26, 28 by the liquid supply assembly (Fig. 2). Liquid can be supplied to each chamber 22, 26, 28 at different times of the cycle of operation in order to dispense the treating chemistry held by a particular chamber 22, 26, 28 at a particular time or phase of the cycle. For example, detergent in the chamber 26 can be dispensed during the main wash portion of the cycle, while fabric softener in the chamber 28 is dispensed later for a rinse phase of the cycle. Liquid can be supplied to chamber 22 at various times during the cycle, depending on what type of treating chemistry is held in the cartridge 24.

[0051] FIG. 4 is a sectional view through the dispenser assembly 12, taken through the cartridge 24, and shows the flow path of liquid through the cartridge 24 to dispense treating chemistry from the solid block 86. The cartridge 24 is placed in the chamber 22 of the drawer 20, and the drawer 20 is closed, i.e., within the drawer housing 70. With the bottom wall 80 of the drawer 20 being sloped downwardly, i.e., toward the rear wall 78, the cartridge 24 resting on the bottom wall 80 also takes on a sloped orientation, such that the flow channel 104 slopes downwardly toward the outlet 108.

[0052] The drawer housing 70 includes a supply conduit 120 for directing liquid from the supply conduit 46 of the liquid supply assembly into the chamber 22. The supply conduit 120 extends through the drawer housing 70 along the top of the chamber 22 to an outlet, which may be defined by one or more orifices 122 in the housing 70. The orifices 122 are aligned with the liquid inlet 106, such that liquid in the supply conduit 120 falls into the inlet 106. Due to the flange 112, the incoming liquid does not immediately contact the block 86, but rather is directed downwardly into the flow channel 104 between the ribs 100. The liquid flowing through the flow channel 104 passes under the erosion platform 98 to erode a portion of the bottom face 88 of the solid block 86 to form a mixture of liquid and treating chemistry. Due to the slope of the bottom wall 80, the mixture flows by gravity through the outlet 108 at the rear of the cartridge 24.

[0053] The chamber 22 can include an opening 124 that is aligned with the outlet 108 when the cartridge 24 is received by the chamber 22. The opening 124 can be formed in the rear wall 78 or bottom wall 80 of the drawer body 72, or a combination of both such that the opening 124 is at a rear lower corner of the drawer body 72. The slope of the bottom wall 80 naturally directs liquid in the chamber 22 toward the opening 124.

[0054] The drawer housing 70 further includes a discharge conduit 126 for directing the mixture from the opening 124 into the tub 30. The discharge conduit 126 extends along the bottom of the chamber 22, beneath the drawer 20 to an outlet 128 in the housing 70 in fluid communication with outlet conduit 48 to the tub 30.
The casing 84 protects the solid block 86 on all sides, so that dissolution only occurs on the bottom face 88 of the block 86 as liquid flows across the bottom face 88 in one direction, as guided by the ribs 100 which extend in one direction. The liquid will erode the solid block 86 away from the bottom up, with the solid block 86 naturally remaining against the erosion platform 98. The bottom face 88 of the block 86 can be flat as shown, or can alternatively be shaped to erode in a manner that will maintain the block 86 in contact with the erosion platform 98 to ensure proper dosing; this may be determined by variable such as the erosion rate of the treating chemistry that the block 86 is made of, the flow characteristics of the liquid through the dispenser assembly 12, or the geometry of the erosion platform 98.

The cartridge 24 can be discarded after use, i.e. once the solid block 86 is used up. In other embodiments, the cartridges 24 can be reusable and refillable. A reusable cartridge can be configured to be returned to the manufacturer for replenishment or recycling. A refillable cartridge can be configured to be refilled with treating chemistry by the end user of the laundry treating appliance. It is also noted that a disposable cartridge can be made from recyclable material.

The dispenser assembly 12 can also be configured to operate to dispense treating chemistry from the chamber 22 without the cartridge 24. In the absence of the cartridge 24, treating chemistry can be placed directly in the chamber 22. Alternatively, an insert can be provided for adapting the chamber 22 to dispense other treating chemistry. For example, FIG. 5 shows the drawer 20 with the cartridge removed and an insert 130 placed in chamber 22. The insert 130 is configured to adapt the chamber 22 to dispense a liquid treating chemistry, and includes a tray 132 having a siphon 134 configured to be aligned with a siphon hole 136 in the chamber 22 (FIG. 3). The siphon hole 136 is positioned forwardly of the opening 124 in the chamber 22, and the insert 130 blocks the opening 124 when inserted into the chamber 22.

When it is time to dispense the treating chemistry, liquid is supplied to the tray 132 via the supply path through the drawer housing 70 described for FIG. 4. The supplied liquid raises the overall level of liquid in the tray 132, and triggers discharge through the siphon 134. Similar inserts can be provided for adapting the other chambers 26, 28 to dispense liquid treating chemistry.

FIG. 6 is a perspective view of the dispenser assembly 12 provided on a horizontal axis washing machine 150 in accordance with a second embodiment of the invention. As illustrated in FIG. 6, the washing machine 150 can include a housing 154 defining an interior. The housing 154 can be a cabinet, chassis, or both. A door 158 may be mounted to the housing 154 to selectively close an access opening to the interior. The housing 154 may also support the dispenser assembly 12 for dispensing treating chemistry during a cycle of operation. The dispenser assembly 12 can be provided on an exterior or interior of the housing 154 and is shown as a drawer configuration that pulls out from the exterior of the housing 154. The drawer 20 may include a different configuration of the chambers 22, 26, 28 in order to adapted to the horizontal axis configuration of the washing machine 150, but is otherwise substantially identical to the dispenser assembly 12 described above for the first embodiment. For instance, treating chemistry from the cartridge 24 is dispensed substantially as described for FIG. 4.

FIG. 7 is a schematic sectional view through a dispenser assembly 160 in accordance with a third embodiment of the invention. The dispenser assembly 160 may be provided in a laundry treating appliance 162, such as the vertical axis washing machine 10 or the horizontal axis washing machine 150 described above, and shares many features in common with the dispenser assembly 12. The laundry treating appliance 162 is illustrated schematically, and shares many features of a traditional automatic washing machine, which will not be described in detail except as necessary for a complete understanding of illustrative embodiments in accordance with the present disclosure. As shown, the laundry treating appliance 162 includes a tub 164 configured to hold liquid and liquid supply assembly 166 is provided to supply liquid, such as water or a combination of water and one or more treating chemistries, into the tub.

The dispenser assembly 160 generally comprises a dispenser housing 168 that accommodates a bulk cartridge 170 containing a bulk supply of treating chemistry. The dispenser assembly 160 has various functions, the main functions being: (1) to support the cartridge 170 in the laundry treating appliance 162; (2) to provide controlled flow of liquid required for proper dilution of the treating chemistry at the right time during the cycle of operation; (3) to discharge the mixture resulting from dilution of the treating chemistry to a suitable area of the laundry treating appliance 162, such as the tub 164; and (4) other complementary functions. The basic function of the cartridge 170 is to contain the consumable treating chemistry.

The dispenser housing 168 may be a separate component that is mounted or fixed to a housing of the appliance 162, or may be formed with or provided by a portion of the appliance housing itself. The liquid supply assembly 166 can include one or more pathways for directing liquid and from the dispenser housing 168.

Referring additionally to FIGS. 8-9, the dispenser housing 168 defines at least one chamber 172 that receives the cartridge 170. The chamber 172 includes an erosion platform 174 for supporting the cartridge 170. As illustrated, the housing 168 includes a base 176 on which the erosion platform 174 is provided, and a peripheral wall 178 extending upwardly from the base 176 to an open top. Other embodiments of the dispenser housing 168 are possible. While not shown, the dispenser assembly 160 can be configured to dispense additional treating chemistries from single dose chambers, like the dispenser assembly 12 described above.

As illustrated, the base 176 includes a plurality of support ribs 180 extending upwardly to free edges 182 that collectively define the erosion platform 174. The support ribs 180 can be formed as elongated, upstanding, and spaced walls on the base 176.

Referring to FIG. 7, the bulk cartridge 170 includes a casing 184 containing a bulk supply of treating chemistry. The bulk supply can be provided in the form of a solid block 186 of treating chemistry. The illustrated solid block 186 has a generally rectangular cuboid shape, with six quadrilateral faces, including a bottom face 188, a top face 190, and four side faces collectively defining a peripheral surface 192 of the block 186. Other three dimensional shapes of the block 186 are possible.

The cartridge 170 contains enough treating chemistry for multiple cycles of operation, i.e. to treat multiple loads of laundry. In an alternate embodiment, the cartridge 170 may be a single-dose cartridge containing enough treating chemi-
istry for only a single cycle of operation. This is less preferred, because a user would need to replace the cartridge with each cycle. The cartridge 170 can contain various treating chemistries which improve particular aspects of the laundry treating quality. Multiple cartridges 170 containing different treating chemistries can be provided. One cartridge can promote one improvement in laundry treating quality, while another cartridge can promote a different improvement in laundry treating quality. The cartridges can of course promote any combination of improvements at will as well. If different treatments are desired for different laundry loads, one cartridge can be exchanged for another between cycles of operation.

Referring additionally to FIG. 10, the illustrated cartridge casing 184 has a three dimensional shape that complements the solid block 186, and includes a cover 194 with a depending peripheral wall 196 that defines an open-bottomed interior chamber 198 for receiving the solid block 186. The peripheral wall 196 includes a bottom edge 200 defining the open bottom of the casing 184 through which the solid block 186 is received. Tabs 202 can be provided on the bottom edge 200 to aid in insertion and removal of the cartridge 170 into and from the dispenser housing 168.

The solid block 186 can be received in the interior chamber 198 with the bottom face 188 of the block 186 substantially flush with the bottom edge 200 of the casing 184. The block 186 may fit somewhat loosely in the casing 184, with some play between the peripheral surface 192 of the block 186 and the peripheral wall 196 of the casing 184 so that the block 186 can move downwardly within the casing 184 as the treating chemistry is eroded from the bottom face 188, as described in further detail below. The solid block 186 may be separately formed and then inserted into the casing 184. Alternatively, the block 186 may be formed in the casing 184.

A liquid flow channel 204 for supplying liquid to the solid block 186 extends through the dispenser assembly 160, and can extend at least partially between the support ribs 180. The ribs 180 can define multiple discrete flow paths therebetween, which collectively define liquid flow channel 204.

A liquid inlet 206 to the flow channel 204 is in fluid communication with a liquid supply assembly 166 and a liquid outlet 208 from the flow channel 204 is in fluid communication with the solid block 186, either directly, or indirectly via a basket or treating chamber of the appliance 162. The inlet and outlet 206, 208 can be formed in the housing 168, such that liquid flows into the housing 168 through the inlet 206, passes through the flow channel 204, and out of the housing 168 through the outlet 208. As the liquid passes through the flow channel 204, it passes under the erosion platform 174 to erode a portion of the solid block 186 to form a mixture of liquid and treating chemistry, and the mixture is supplied through the outlet 208.

In the illustrated embodiment, the liquid inlet 206 is formed as an inlet conduit formed in the dispenser housing 168 laterally of the block chamber 172, and defined by the peripheral wall 178 and an inner wall or end flange 210 spaced inwardly from the peripheral wall 178. The flange 210 separates the block chamber 172 from the inlet 206. The flange 210 is spaced from the base 176 of the dispenser housing 168 to provide passage for liquid into the flow channel 204. The flange 210 also covers an inlet side of the solid block 186 to limit the liquid exposure of the solid block 186 to the bottom face 188. The liquid outlet 208 is likewise formed by a space between the peripheral wall 178 and the base 176 of the dispenser housing 168, but at an opposite end of the dispenser housing 138 from the inlet 206.

The base 176 includes a bottom support 212 and angled wall forming bottom wall 214 of chamber 172 from which the ribs 180 extend. The bottom wall 214 is angled relative to the horizontal, with horizontal being defined by the surface on which the appliance 162 rests. The bottom wall 214 slopes downwardly from the inlet 206 to the outlet 208, such liquid in the flow channel 204 tends to flow toward the outlet 208. The bottom wall 214 include a downwardly curved lip 216 at the outlet 208. The bottom support 212 can be wedge-shaped and can taper in the direction of the outlet 208 in order to provide the bottom wall 214 with a slope toward the outlet 208. With the ribs 180 extending upwardly from the bottom wall 214, the ribs 180 will take on the slope of the bottom wall 214.

Other locations or configurations for the liquid inlet 206 are possible. For example, the inlet 206 can be over the block chamber 172 rather than lateral to the block chamber 172, can rain down directly on top of the cartridge 170, and then flow underneath the cartridge 170 to pass under the erosion platform 174. The casing 184 protects the solid block 186 on all sides, so that dissolution only occurs on the bottom face 188 of the block 186 as liquid flows across the bottom face 188 in one direction, as guided by the ribs 180 which extend in one direction. The liquid will erode the solid block 186 away from the bottom up, with the solid block 186 naturally remaining against the erosion platform 174. The bottom face 188 of the block 186 can be flat as shown, or can alternatively be shaped to erode in a manner that will maintain the block 186 in contact with the erosion platform 174 to ensure proper dosing; this may be determined by variable such as the erosion rate of the treating chemistry that the block 186 is made of, the flow characteristics of the liquid through the dispenser assembly 160, or the geometry of the erosion platform 174.

FIG. 11 is a sectional view similar to FIG. 7, and shows the flow path of liquid through the dispenser assembly 160 to dispense treating chemistry from the cartridge 170. In operation, liquid is supplied to the dispenser assembly 160 by the liquid supply assembly 166. Liquid can be supplied to dispenser assembly 160 at various times during the cycle of operation, depending on what type of treating chemistry is held in the cartridge 170. The cartridge 170 is placed in the chamber 172 of the dispenser housing 168, with the bottom wall 214 and ribs 180 being sloped, the cartridge 170 resting on the erosion platform 174 also takes on a sloped orientation. The tabs 202 can be received by slots 218 (FIG. 8-9) in the dispenser housing 168 to secure the cartridge 170 in place.

When the cartridge 170 is inserted into the dispenser assembly 160, the bottom face 188 of the consumable block 186 is supported by the erosion platform 174, which is shaped to enable exposure of the block 186 to a controlled flow of liquid. The liquid supply assembly 166 directs the controlled flow of liquid into the inlet 206. Due to the flange 210 and the lateral spacing of the inlet 206 from the cartridge 170, the incoming liquid does not immediately contact the block 186, but rather is directed downwardly into the flow channel 204 between the ribs 180. The liquid flowing through the flow channel 204 passes under the erosion platform 174 to expose only the bottom face 188 of the block 186 to liquid. This exposure will promote removal of material from the consumable block 186 by erosion or similar mechanism. The amount of treating chemistry removed from the block 186 is the
quantity of treating chemistry required for a particular load or cycle. The eroded treating chemistry forms a mixture with the supplied liquid and, due to the slope of the bottom wall 214, the mixture flows by gravity through the outlet 208 and into the tub 164.

[0076] The cartridge 170 can be discarded after use, i.e. once the solid block 186 is used up. In other embodiments, the cartridges 170 can be reusable and refillable. A reusable cartridge can be configured to be returned to the manufacturer for replenishment or recycling. A refillable cartridge can be configured to be refilled with treating chemistry by the end user of the laundry treating appliance. It is also noted that a disposable cartridge can be made from recyclable material.

[0077] The laundry treating appliance 162 can be programmed to send enough liquid through the dispenser assembly 160 to dispense the amount of treating chemistry required in each cycle. This amount may vary, depending on load size, cycle selection, and other factors. For example, for a cycle treating a large load of laundry, more treating chemistry may be dispensed than for a cycle treating a small load of laundry. The appliance 162 can be provided with a suitable apparatus for determining load size, such as a weight sensor coupled with a controller.

[0078] The dispenser assemblies of any of the embodiments disclosed herein can be provided in conjunction with a sensing and control system. For example, the amount of treating chemistry that is dissolved for a single cycle can be controlled by controlling the amount of time that water flows past the block. This time can be determined based on the flow rate of the water and the rate at which a particular treating chemistry dissolves into water, as well as the size of the flow chamber and the size of the area of the block that is exposed to water.

[0079] FIG. 12 is a schematic illustration of one embodiment of a sensing assembly 230 for treating chemistry in a laundry treating appliance. If the treating chemistry changes the surface tension or viscosity of liquid supplied to the appliance, such as water, the laundry treating appliance itself can be used as a gross type of viscometer. The sensing assembly 230 is shown and described in the context of the vertical axis washing machine 10 from FIG. 2, but it is understood that the sensing assembly 230 can be applied to any of the laundry treating appliances. The viscometer sensing assembly 230 is a rotating plate viscometer having one plate 232 that stays in place while another plate 234 rotates. In this case, the non-moving plate 232 can be provided on the tub 30, or can be the tub 30 itself, and the rotating plate 234 can be provided on the basket 32, or can be the basket 32 itself. During operation, wash liquid between the tub 30 and basket 32 provides a liquid sample 236 between the plates 232, 234. The drag caused by the relative motion of the liquid sample 236 and the rotating plate 234 is a measure of the viscosity of the wash liquid, and can be determined from torque feedback on the motor 30 used to rotate the basket 32. By comparing the viscosity of the liquid sample 236 to a reference point, such as the viscosity of water without treating chemistry, the amount of treating chemistry that has been dispensed can be determined. This information can be used, for example, to determine when to halt the introduction of liquid into the dispenser assembly, or when to divert liquid around the dispenser assembly. In addition to controlling the amount of treating chemistry dispensed per cycle, the sensing assembly 230 can also be used to provide feedback to the user when the treating chemistry has been used up. It is noted that this viscometer sensing assembly 230 is usable with any type of treating chemistry dispenser, not just the bulk dispensers disclosed herein.

[0080] FIG. 13 is a schematic illustration of another embodiment of a sensing assembly 240 for treating chemistry in a laundry treating appliance. The sensing assembly 240 is shown and described in the context of the vertical axis washing machine 10 having the dispenser assembly 12 from FIG. 2, but it is understood that the sensing assembly 240 can be applied to any of the laundry treating appliances or dispenser assemblies disclosed herein. For FIG. 13, the amount of treating chemistry that is dissolved for a single cycle can be controlled by detecting a physical property of the wash liquid within the tub 30. For example if the treating chemistry from the cartridge 24 changes the conductivity of water, the change in conductivity can be used to detect the amount of treating chemistry dispensed from the cartridge 24. Some non-limiting examples of treating chemistries which change the conductivity of water include metal salts.

[0081] The sensing assembly 240 includes a conductivity sensor 242 positioned to contact wash liquid. The sensor 242 is shown in the sump 52 of the tub 30, but other locations are possible. Some other exemplary positions of the sensor 242 include at the outlet of the dispenser assembly 12, in the outlet conduit 48, or other locations fluidly downstream of the dispenser assembly 12. The sensor 242 can be coupled with the controller 62, and the controller 62 can use feedback from the conductivity sensor 242 to determine when to stop providing liquid through the dispenser assembly 12 or when to divert liquid around the dispenser assembly 12. The sensor 242 can be calibrated against the background conductivity of the liquid supplied to the washing machine 10 without treating chemistry. In addition to controlling the amount of treating chemistry dispensed per cycle, the sensing assembly 240 can also be used to provide feedback to the user when the treating chemistry in the cartridge 24 has been used up.

[0082] FIG. 14 is a schematic illustration of another embodiment of a dispenser assembly 250 for a laundry treating appliance. The dispenser assembly 250 is configured to provide segregated and timed dispensing of off-the-shelf chemistry similar to pods that are commercially available today. The dispenser assembly 250 allows a user to load time-dispensable segregated treating chemistry for multiple cycles at one time. Targeted treating chemistry can be dispensed at a desired phase of the cycle of operation.

[0083] The dispenser assembly 250 included a segregated storage container or pod 252 and a mixing chamber 254. The segregated storage pod 252 includes multiple chemistry chambers for storing a bulk supply of treating chemistry. Each chamber is partitioned from the others, and is fillable and refillable with treating chemistry, including powders, gels, and/or liquid treating chemistries. As shown, the pod 252 is divided into four chambers I, II, III, and IV.

[0084] The pod 252 can be removed from the appliance to manually load or siphon treating chemistry into the chambers I-IV of the pod 252. Alternatively, treating chemistry can be manually loaded or siphoned into the chambers I-IV of the pod 252 with the pod 252 still in place on the appliance. Unlike the pods that are commercially available today, which are completely used up after one cycle, the pod 252 is reusable and refillable for many cycles of operation.

[0085] The mixing chamber 254 defines an interior 256 for receiving treating chemistry from the pod 252. The mixing chamber includes a stirrer 258 within the interior 256, which
mixes the treating chemistry dispensed from the storage pod 252 with liquid to create a mixture of treating chemistry and of treating chemistry and liquid.

[0086] The treating chemistry can be dispensed through a valve assembly 260 which can multiple one-way valves or membranes, and which can be triggered via appropriate opening mechanisms. The valve assembly 260 may include one valve or membrane per chamber I-IV. Treating chemistry may be dispensed into the mixing chamber 254 by gravity feed, and the valve assembly 260 can be provided in the supply line between the pod 252 and mixing chamber 254 to control the feed of treating chemistry from the chambers I-IV into the mixing chamber 254.

[0087] The valve assembly 260 may operate sequentially to dispense treating chemistry from each chamber I-IV. Alternatively, the valve assembly 260 may dispense from a particular chamber or chambers I-IV as needed, depending on the cycle of operation and the type of treating chemistry needed. For example, one cycle may only need a detergent and a fabric softener, and so may dispense from two chambers only, while another cycle may need a detergent, a fabric softener, and bleach, and so will dispense from three chambers, and so on. The dispenser assembly 250 may be operatively controlled with a controller of the appliance to time the operation of the valve assembly 260 and stirrer 258 in accordance with the cycle of operation, such that treating chemistry targeted for specific phases of the cycle is dispensed at the correct time.

[0088] Alternative assemblies for controlling the provision of treating chemistry into the mixing chamber 254 are possible, including pumps or blowers. In another embodiment, the storage pod 252 may rotate to bring one of the chambers I-IV into a loading position relative to the mixing chamber 254, with the chamber in the loading position also being in operative alignment with an appropriate opening mechanism.

[0089] A liquid supply assembly 262 of the laundry treating appliance supplies liquid, such as water, from a liquid source, such as a household water supply, to the mixing chamber 254 through a supply conduit 264. An outlet conduit 266 extends from the mixing chamber 254 to supply the mixture of treating chemistry and liquid to a tub 268 of the appliance. It is noted that the treating chemistry supplied can be supplied directly to the tub 268 or indirectly to the tub 268, such as via a basket or treating chamber of the appliance.

[0090] In operation, treating chemistry is dispensed from one of the chambers I-IV of the storage pod 252 into the mixing chamber 254 by operation of the valve assembly 260. This may be done before, after, or simultaneously with the supply of liquid to the mixing chamber 254 through the supply conduit 264. The stirrer 258 mixes the treating chemistry in the mixing chamber 254 with the supplied liquid to create a mixture of liquid and treating chemistry. The mixing ratio of liquid to treating chemistry may be pre-determined by the chemistry type and/or cycle type, and may be controlled by an algorithm executed by the controller of the appliance. The mixture exits the mixing chamber and is supplied to the tub 268 via the outlet conduit 266. This dispensing operation may be repeated during a cycle of operation to dispense treating chemistry from one or more of the other chambers I-IV. Between dispensing operations, the mixing chamber 254 may be flushed with plain liquid from the liquid supply assembly 262 in order to remove any residual treating chemistry from a prior dispensing operation.

[0091] The benefits of the dispenser assembly 250 according to the described embodiment include: (1) The use of segregated treating chemistry. The segregated storage pod 252 allows potentially incompatible treating chemistries to be stored together; (2) The timed/targeted dispensing of different treating chemistries at different phases of the cycle of operation; and (3) Bulk storage of segregated, treating chemistry. The dispenser assembly 250 can accommodate multiple doses of multiple treating chemistries at a time, such that a user need only periodically load the dispenser assembly 250, rather than having to load it for each cycle of operation.

[0092] FIG. 15 is a schematic illustration of another embodiment of a dispenser assembly 280 for a laundry treating appliance. The dispenser assembly 280 is configured to facilitate the use of pods in bulk, and also to provide timed dispensing of the segregated treating chemistry in various phases of a cycle of operation. The dispenser assembly 280 also enables the use of multiple pods in the same cycle, or even in the same phase of the cycle, based on the load size and soil level of the laundry load.

[0093] The dispenser assembly 280 includes a pod storage chamber 282 and a holding plate 284. The pod storage chamber 282 defines an interior 286 for storing multiple pods 288, and can store the pods 288 in a linear column as shown, or in other configurations. The chamber 282 includes a nut 290 aligned with the holding plate 284.

[0094] The interior 286 is fillable and refillable with pods 288, and the storage chamber 282 can be removed from the appliance to manually load pods 288 into the interior 286. Alternatively, pods 288 can be manually loaded into the interior 286 with the chamber 282 still in place on the appliance. Unlike the pod dispensers that are commercially available today, which must be loaded by the user for every cycle, the dispenser assembly 280 stores a bulk supply of pods 288 for many cycles of operation.

[0095] As used for the present embodiment, the term "pod" denotes a laundry treatment unit having multiple different treating chemistries formed as a single package or pack. The illustrated pods 288 include multiple chemistries, each segregated from each other in the pod 288. As shown, the pod 288 is divided into four sealed segments 292, each holding a treating chemistry. The segments 292 are shown equal in size, but it is understood that the segments 292 may differ in size in order to accommodate a smaller or larger volume of treating chemistry as needed. The segments 292 may be formed of a material that can be punctured, as described in further detail below. Some non-limiting examples include a thin casing or film of polyvinyl alcohol, ethylene vinyl alcohol or other water-soluble polymers. Using a water soluble material for the segments 292 has the added advantage of automatically dissolving in the present of water, so that a user does not have to clean out the dispenser assembly 280 between cycles. The pods 288 can be off-the-shelf pods that are commercially available today, or can be specially configured for use with the dispenser assembly 280.

[0096] The holding plate 284 is rotatable about an axis 294, and can be coupled with a suitable drive assembly, such as a motor 296. The rotational axis 294 of the holding plate 284 can be substantially parallel to the direction that a pod 288 is dispensed through the outlet 290 of the chamber 282, and may further be coaxial with this direction such that the dispensed pod 288 is centered on the plate 284.

[0097] A puncturing arm 298 is provided adjacent to the holding plate 284 and is equipped with hollow piercing
The piercing needle 300 includes a sharp terminal end 302 configured to pierce the pod 288, and its hollow interior is in fluid communication with a liquid supply assembly 304 of the laundry treating appliance. The liquid supply assembly 304 supplies liquid, such as water, from a liquid source, such as a household water supply, through a supply conduit 306 and to the hollow interior of the piercing needle 300.

The puncturing arm 298 can move toward the pod 288 on the holding plate 284 to pierce one of the segments 292 with the needle 300. The holding plate 284 can rotate and position the pod 288 relative to the puncturing arm 298 as needed to puncture each segment 292 of the pod 288 individually with the sharp end 302 of the needle 300. The needle 300 can pierce the pod selectively. After each puncturing, liquid flows through the needle 300 to pass the treating chemistry into an outlet conduit 308. The outlet conduit 308 extends to a tub 310 of the appliance to supply the mixture of treating chemistry and liquid to the tub 310. It is noted that the treating chemistry supplied can be supplied directly to the tub 310, or indirectly to the tub 310 via a basket or treating chamber of the appliance.

The holding plate 284 may include one or more openings therein for passing the mixture to the outlet conduit 308. For example, the holding plate 284 may be formed as a holding chamber which is configured to expose only one segment 292 at a time to the piercing needle 300, and the chamber may include one or more passages leading to the outlet conduit 308.

The pods 288 are individually dispensable, though more than one pod 288 may be dispensed for a cycle of operation, depending on factors such as load size and soil level of the laundry load. One pod 288 can be dispensed to the holding plate 284 via appropriate opening mechanism 312 at the outlet 290 of the chamber 282. The opening mechanism 312 can include any valve, door, or membrane at the outlet 290. The opening mechanism 312 is open, a pod 288 is dispensed to the holding plate via gravity feed. After a pod 288 is dispensed the outlet 290 is closed.

In operation, a number of pods 288 are loaded in the pod storage chamber 282. A pod 288 is dispensed from the chamber 282 onto the holding plate 284 by opening the outlet 290 with the opening mechanism 312, which can rotate and position the pod 288 for the puncturing arm 298 to puncture each segment 292 of the pod 288 individually. The holding plate 284 may rotate in one direction to dispense treating chemistry sequentially from each segment 292 in order. Alternatively, the plate 284 may rotate in either direction as needed to dispense from the segments 292 in a non-sequential order, depending on the cycle of operation and the type of treating chemistry needed. The dispenser assembly 280 may be operatively coupled with a controller of the appliance to time the operation of the opening mechanism 312 and holding plate 284 in accordance with the cycle of operation, such that treating chemistry targeted for specific phases of the cycle is dispensed at the correct time.

After each puncturing, liquid flowing through the needle 300 passes the treating chemistry into the tub 310. Based on the load size and soil level, multiple pods 288 can be deposited on the holding plate 284 and used during a cycle. Preferably, the pod 288 is configured to be completely used up during the cycle, with the treating chemistry being used to treat the laundry and the remaining portion of the pod 288, i.e. the segments 292 being formed of a water soluble material that will dissolve into the wash liquid and flushed into the tub 310. Otherwise, unused pods 288 can be removed by the user after the cycle of operation.

The benefits of the dispenser assembly 280 according to the described embodiment include: (1) Bulk storage and use of pods; (2) Ability to use existing, commercially available pods; (3) Timed/targeted dispensing of treating chemistry within the pods; and (4) Metering pod dispensing based on the load size and soil level.

To the extent not already described, the different features and structures of the various embodiments can be used in combination with each other as desired. That one feature is not illustrated in all of the embodiments is not meant to be construed that it cannot be, but is done for brevity of description. Thus, the various features of the different embodiments can be mixed and matched as desired to form new embodiments, whether or not the new embodiments are expressly described. All combinations or permutations of features described herein are covered by this disclosure.

This written description uses examples to disclose the invention, including the best mode, and 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 can 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 have 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.

What is claimed is:

1. A laundry treating appliance for treating laundry in accordance with an automatic cycle of operation comprising:
   - a tub defining an interior for retaining liquid;
   - a liquid supply assembly in fluid communication with the tub and operable to supply liquid for use in treating laundry; and
   - a dispenser assembly comprising:
     - a housing defining a chamber with a base;
     - one or more support ribs located within the chamber and collectively defining an erosion platform located above the base that is configured to support a solid block of treating chemistry;
     - a liquid flow channel extending at least partially along the one or more support ribs;
     - a liquid inlet to the flow channel in fluid communication with the liquid supply assembly; and
     - a liquid outlet from the flow channel in fluid communication with the tub;
   wherein liquid supplied to the liquid inlet enters the liquid flow channel and the liquid flow channel is configured to pass the liquid under the erosion platform to erode a portion of the solid block to form a mixture of liquid and treating chemistry, and the mixture is supplied to the tub through the liquid outlet.

2. The laundry treating appliance of claim 1, wherein the one or more support ribs extend upwardly from the base of the chamber.

3. The laundry treating appliance of claim 1, wherein the base of the chamber is sloped toward the liquid outlet.

4. The laundry treating appliance of claim 1, wherein the chamber defines opposing first and second ends, with the base
extending between the opposing first and second ends, and the liquid inlet is provided at the first end and the liquid outlet is provided at the second end.

5. The laundry treating appliance of claim 4, wherein the base of the chamber is sloped between the first and second ends, toward the liquid outlet.

6. The laundry treating appliance of claim 1, wherein the liquid flow channel slopes downwardly between the liquid inlet and the liquid outlet.

7. The laundry treating appliance of claim 1, wherein the one or more support ribs comprises multiple support ribs, and the support ribs are spaced from each other to form the liquid flow channel between the support ribs.

8. The laundry treating appliance of claim 7, wherein the support ribs comprise elongated, upstanding, and spaced walls, with at least two discrete flow paths therebetween defining the liquid flow channel.

9. The laundry treating appliance of claim 8, wherein the walls have opposing ends, with the liquid inlet provided at one of the opposing ends and the liquid outlet provided at the other of the opposing ends.

10. The laundry treating appliance of claim 1, wherein the dispenser assembly further comprises a cartridge defining an interior chamber for receipt of the solid block of treating chemistry, wherein the cartridge is receivable within the chamber.

11. The laundry treating appliance of claim 10, wherein the erosion platform is provided with the cartridge.

12. The laundry treating appliance of claim 10, wherein the cartridge comprises a casing having multiple sides that form a block chamber in conjunction with the erosion platform for receipt of the solid block of treating chemistry.

13. The laundry treating appliance of claim 12, wherein the casing comprises an open bottom configured to confront the one or more support ribs, such that the solid block rests directly on the erosion platform.

14. A treating chemistry cartridge for use in a dispenser assembly of a laundry treating appliance for treating laundry in accordance with an automatic cycle of operation, the treating chemistry cartridge comprising:

a casing defining an interior chamber with a base and having a liquid inlet and a liquid outlet;

one or more support ribs extending upwardly relative from the base, and collectively defining an erosion platform configured to support a solid block of treating chemistry within the interior chamber; and

a liquid flow channel extending between the liquid inlet and the liquid outlet, at least partially defined by the one or more support ribs;

wherein, liquid supplied to the liquid inlet enters the liquid flow channel and passes under the erosion platform to erode a portion of the solid block.

15. The treating chemistry cartridge of claim 14, wherein the liquid outlet is provided in the base, and the base is sloped toward the liquid outlet.

16. The laundry treating appliance of claim 14, wherein the one or more support ribs comprises multiple support ribs, and the support ribs are spaced from each other to form the liquid flow channel between the support ribs.

17. The treating chemistry cartridge of claim 16, wherein the support ribs comprise elongated, upstanding, and spaced walls, with at least two discrete flow paths therebetween defining the liquid flow channel.

18. The treating chemistry cartridge of claim 14 and further comprising a solid block of laundry treating chemistry sufficient for multiple cycles of operation of the laundry treating appliance, wherein the solid block is received within the casing and is supported by the erosion platform.

19. The treating chemistry cartridge of claim 18, wherein the casing encloses multiple sides of the solid block.

20. The treating chemistry cartridge of claim 19, wherein the solid block comprises a top face, a bottom face, and a peripheral surface between the top and bottom faces, and wherein casing encloses the top face and peripheral surface of the solid block.

21. The treating chemistry cartridge of claim 14, wherein the liquid inlet comprises an end flange on the casing, with the end flange configured to overlie at least a portion of the solid block.

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