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Ryan et al.

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(54) **SYSTEMS FOR POSITIONAL FEEDBACK IN RACKS OF DISHWASHER APPLIANCES**

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A47L 15/22 (2006.01)
A47L 15/50 (2006.01)

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CPC ***A47L 15/505*** (2013.01); ***A47L 15/16*** (2013.01); ***A47L 15/22*** (2013.01); ***A47L 15/502*** (2013.01); ***A47L 15/507*** (2013.01); ***A47L 15/508*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,462,348	A	10/1995	Ellingson et al.	
9,161,677	B2	10/2015	Hofpeter et al.	
10,765,293	B2	9/2020	Hansen et al.	
2005/0242046	A1	11/2005	Lee	
2017/0049294	A1 *	2/2017	Boyer	A47L 15/50
2018/0206701	A1 *	7/2018	Ko	A47L 15/503
2019/0069753	A1 *	3/2019	Maddux	A47L 15/241
2020/0121159	A1 *	4/2020	Hansen	A47L 15/507

* cited by examiner

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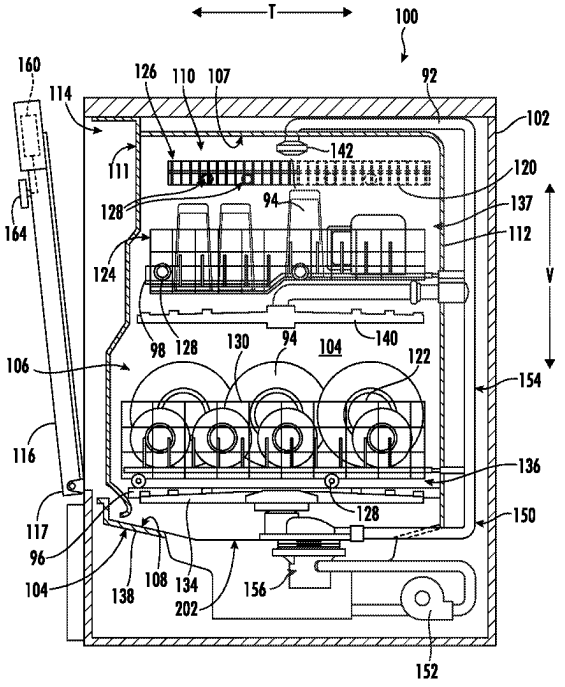
(57) **ABSTRACT**

A dishwasher appliance includes a tub defining a wash chamber. A second rack assembly is slidably positioned in the wash chamber above the first rack assembly. A third rack assembly is slidably positioned in the wash chamber above the second rack assembly. A third spray assembly is positioned over the third rack assembly and configured to direct wash fluid at articles located in the third rack assembly. The third rack assembly includes a wire framework defining the shape of the third rack assembly. The wire framework incudes a boundary wall at a first side portion and a boundary wall at a second side portion. A wire insert includes a wire floor portion. The wire insert is configured to translate along one of the lateral direction and the transverse direction. The wire framework includes one or more detents configured to provide positional feedback when the plurality of hooks of the wire insert pass over the detents.

14 Claims, 9 Drawing Sheets



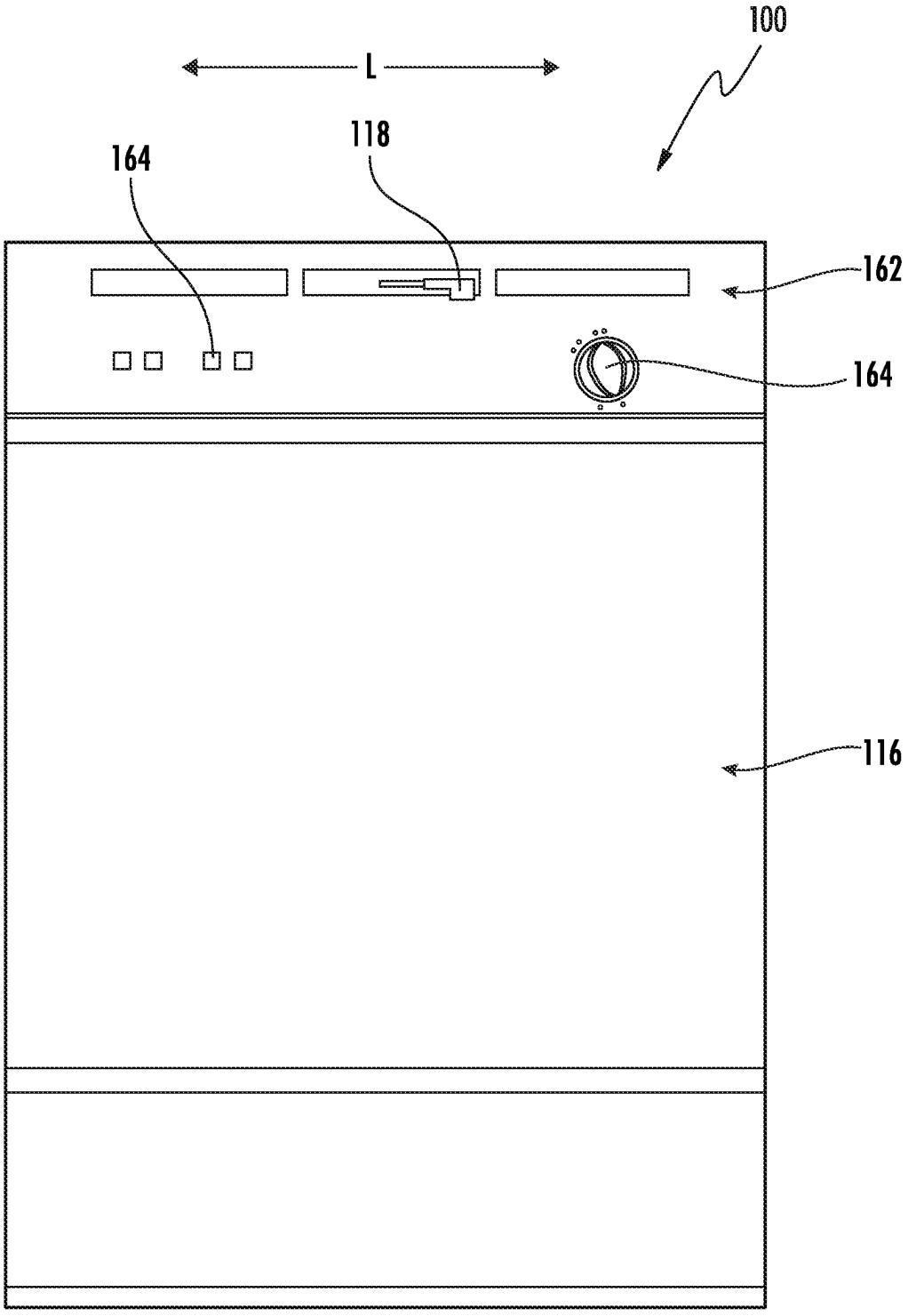


FIG. 1

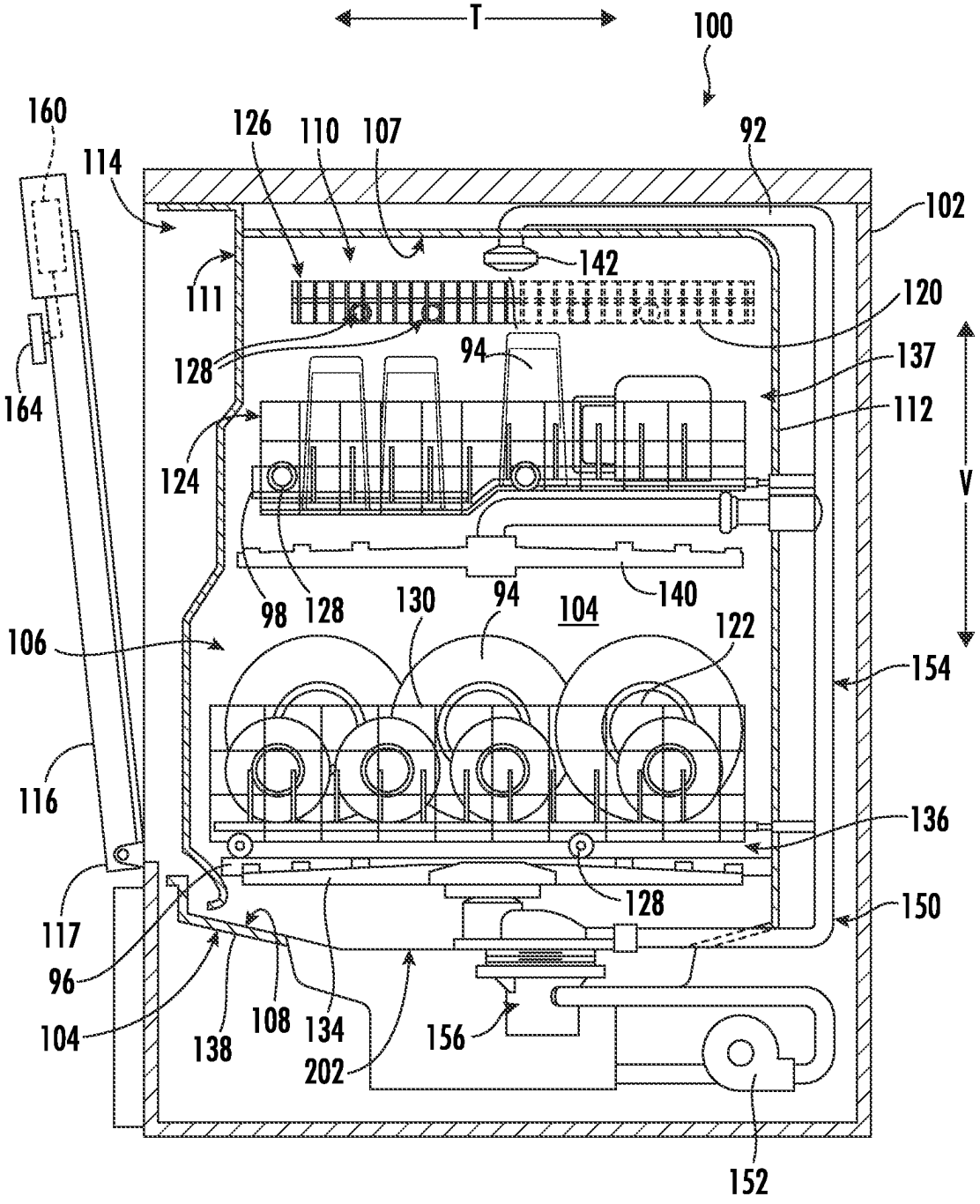

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FIG. 2

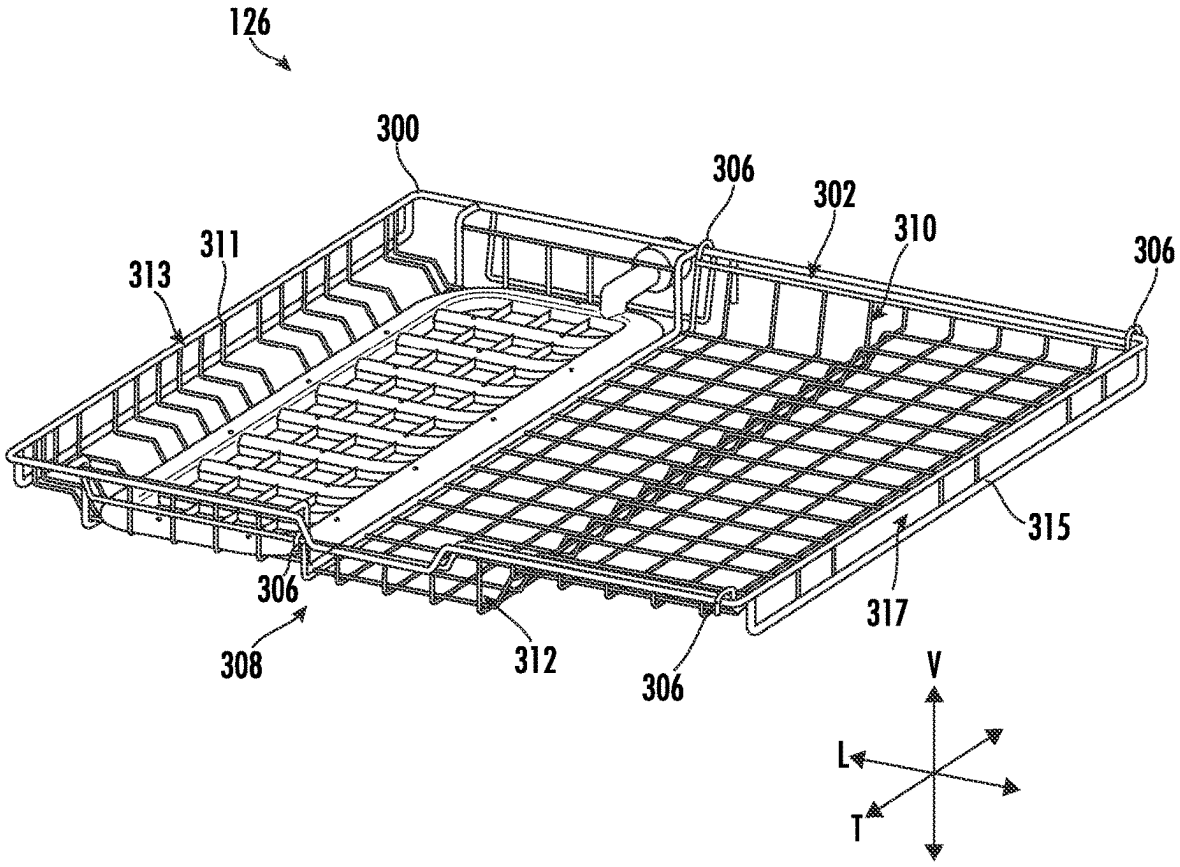

FIG. 3

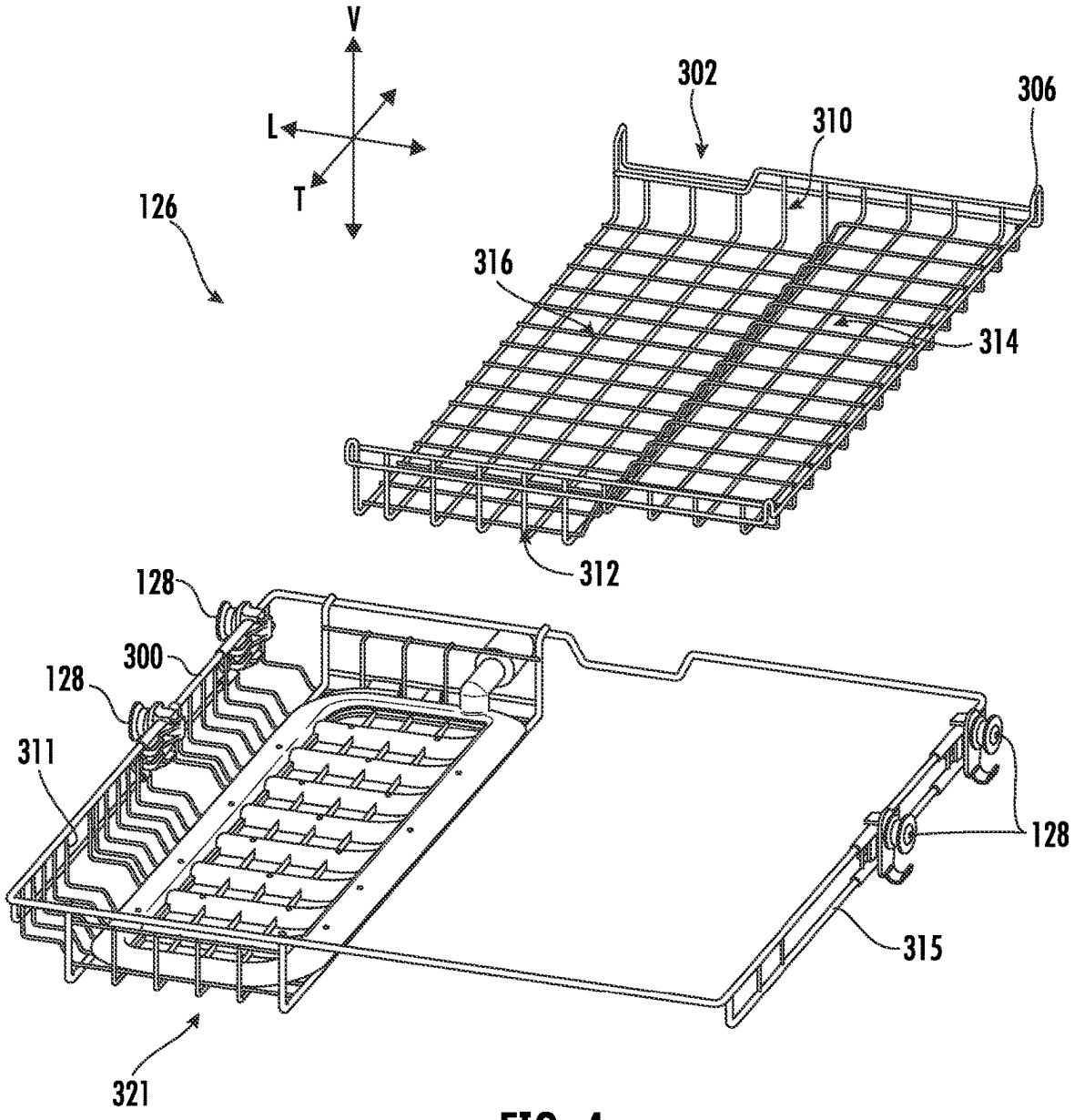

FIG. 4

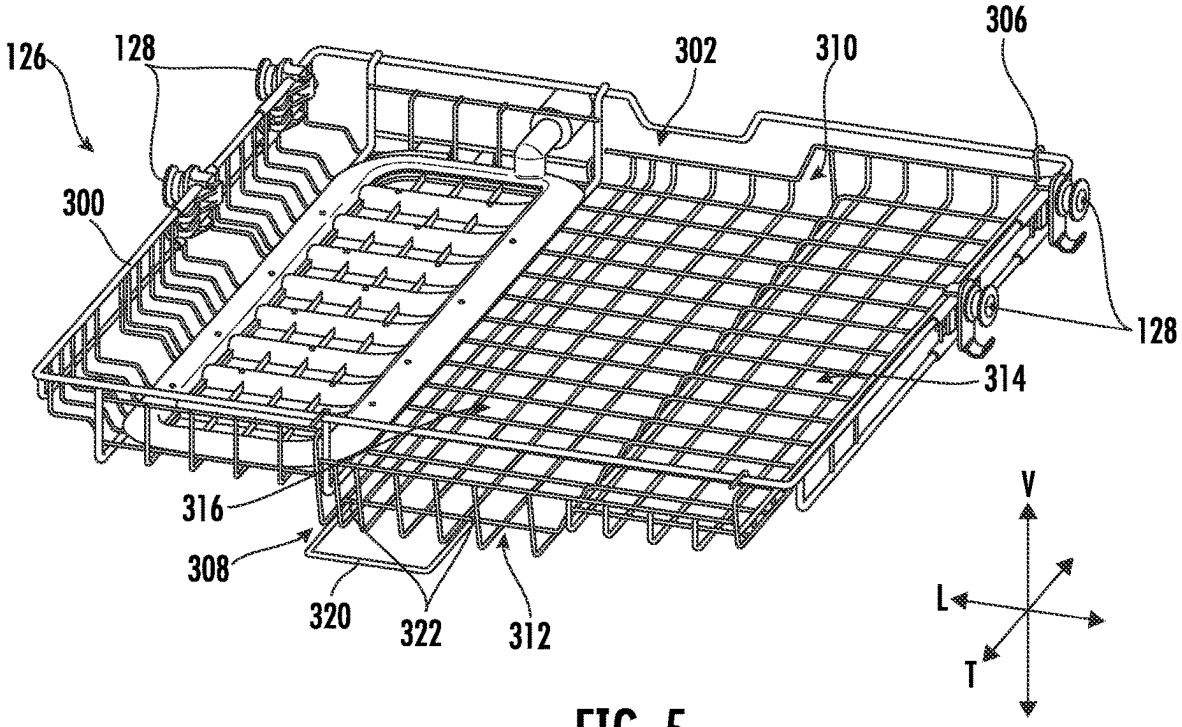
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FIG. 5

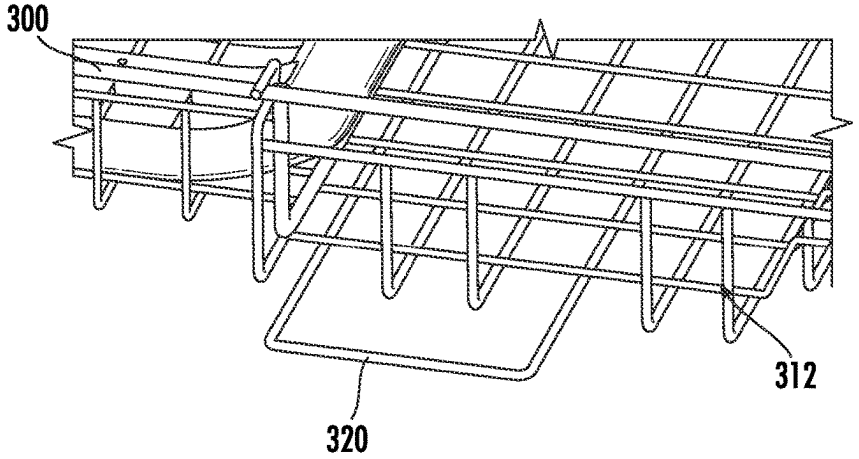
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FIG. 6

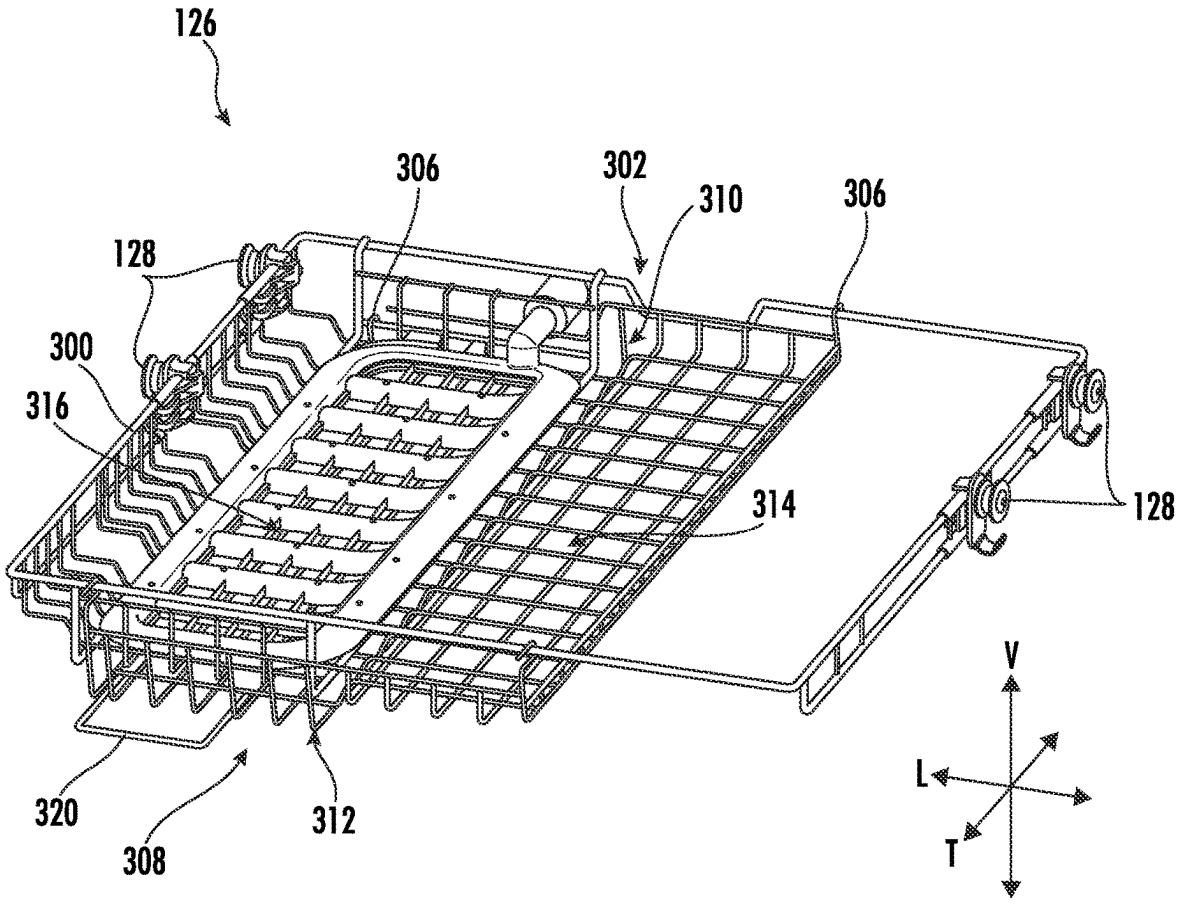

FIG. 7

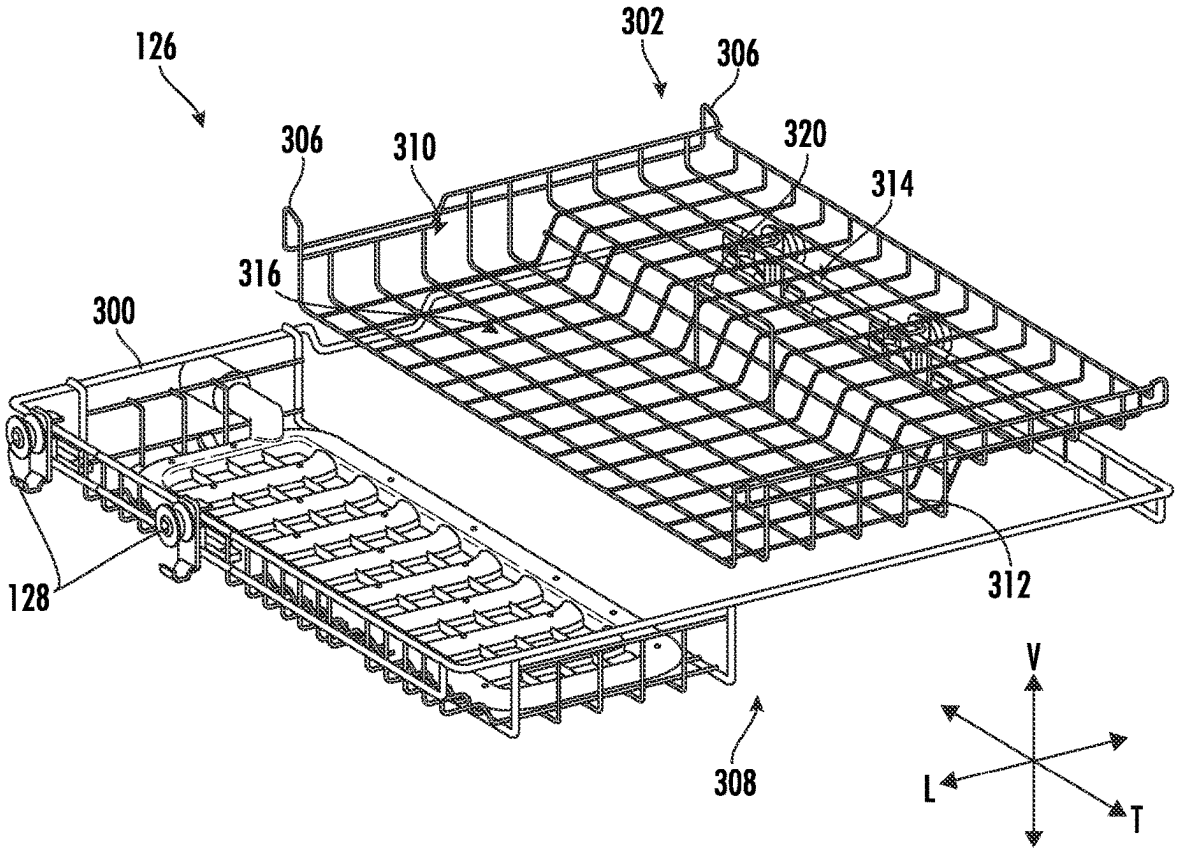

FIG. 8

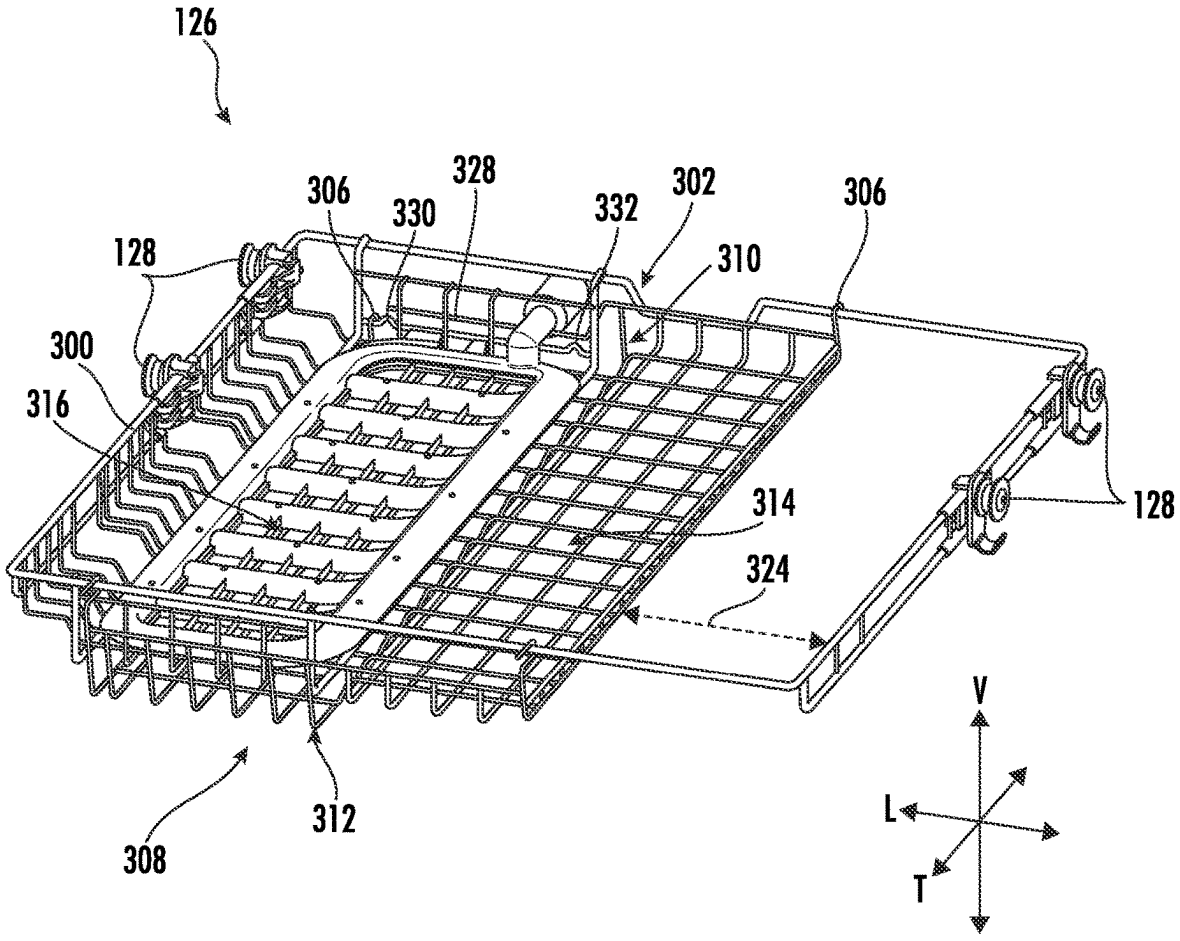
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FIG. 9

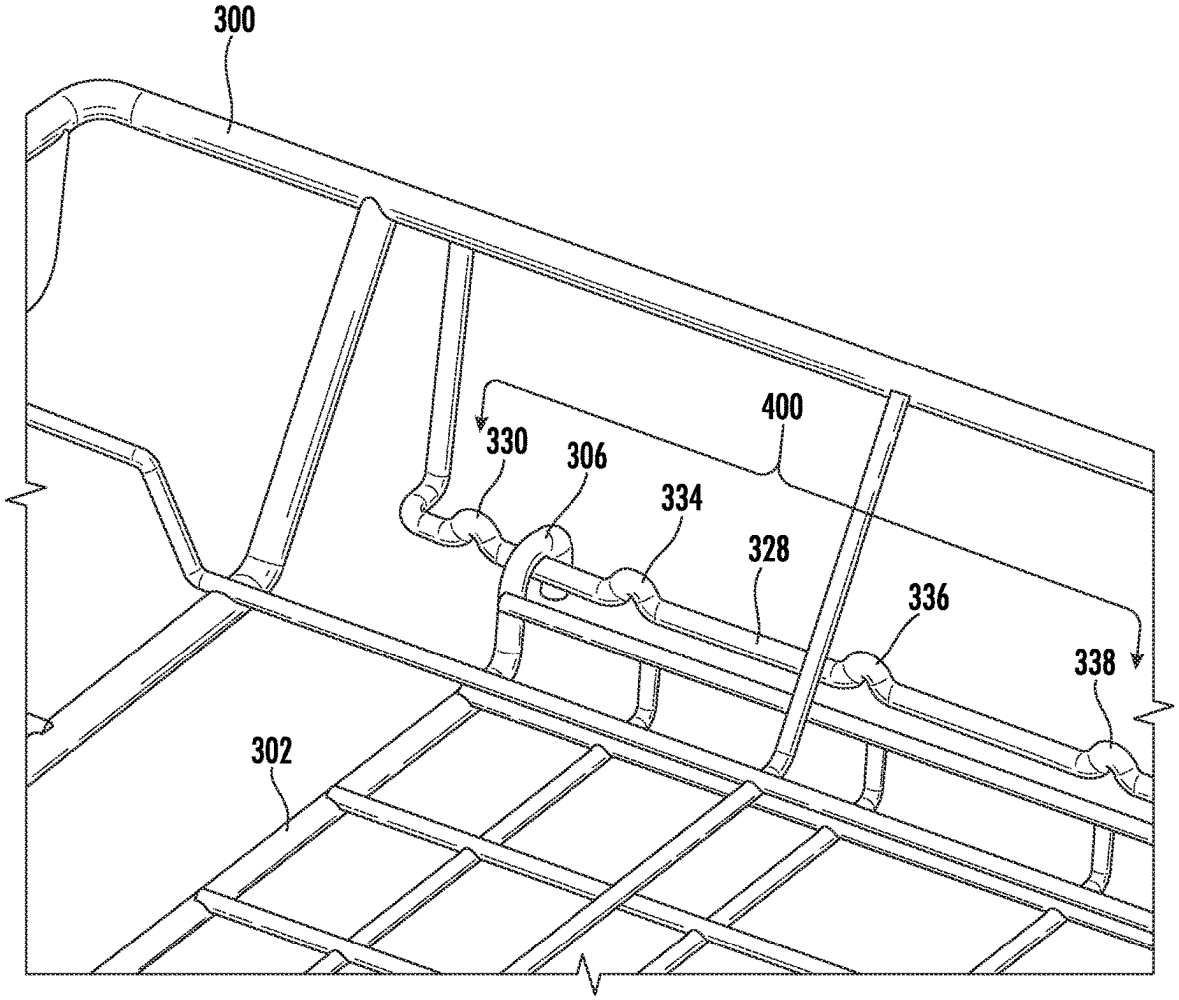
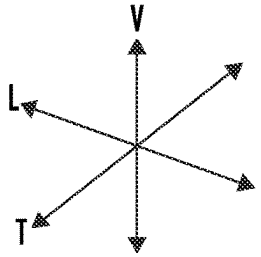


FIG. 10



SYSTEMS FOR POSITIONAL FEEDBACK IN RACKS OF DISHWASHER APPLIANCES

FIELD OF THE INVENTION

The present subject matter relates generally to dishwasher appliances, and more particularly to a dishwasher appliance with a third rack.

BACKGROUND OF THE INVENTION

Dishwasher appliances generally include rack assemblies for positioning various articles for cleaning within a wash chamber. One or more devices, such as nozzles or spray assemblies, may be included at various locations relative to the rack assemblies for purposes of delivering fluids as part of the cleaning process. During the cleaning cycle, the rack assemblies can support and position the articles while also having openings that allow fluid to pass through to the articles. Factors, such as the velocity of the fluid, orientation of the fluid spray or stream relative to the articles, the shape and density of the articles in the rack assemblies, and others, can impact the effectiveness of the cleaning cycle.

One or more rack assemblies may be used in dishwasher appliances for user convenience. Multiple rack assemblies on multiple levels within dishwasher appliances may allow users to place articles of differing heights and sizes in optimal positions to allow for proper cleaning of the articles. Some dishwasher appliances may include one or more baskets which may also be provided for holding articles, particularly smaller or for more narrow articles, such as silverware. Additionally, the user may have the option of, e.g., placing articles, such as silverware, within a basket on a lower rack assembly or placing the silverware directly (without the basket) onto an upper rack assembly specially configured for the receipt of such articles.

The positioning of articles within a dishwasher appliance can affect the fluid dynamics to which the articles are exposed during the cleaning process. For example, articles placed in a lower rack assembly may be subjected to different spray assemblies with different spray patterns, velocities, and spray duration than articles placed in a higher rack assembly. Additionally, the use of multiple racks, such as an upper rack assembly, may limit the size of articles that fit in each rack of the dishwasher appliance. The size of articles that may be placed in a middle rack assembly, for example, may be limited by the addition of an upper rack positioned above the middle rack in the wash chamber.

BRIEF DESCRIPTION OF THE INVENTION

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.

In one example embodiment, a dishwasher appliance includes a tub defining a wash chamber. A first rack assembly is slidably positioned within the wash chamber. A first spray assembly is positioned in the wash chamber and configured to direct wash fluids at the first rack assembly. A second rack assembly is slidably positioned in the wash chamber above the first rack assembly. A second spray assembly is positioned in the wash chamber and configured to direct wash fluids at the second rack assembly. A third rack assembly is slidably positioned in the wash chamber above the second rack assembly. A third spray assembly is positioned over the third rack assembly and configured to direct wash fluid at articles located in the third rack assembly. The third rack assembly includes a wire framework defining the shape of the third rack assembly. The wire framework incudes a boundary wall at a first side portion and a boundary wall at a second side portion. A wire insert that includes a wire floor portion. The wire insert is configured to translate one of longitudinally in the lateral direction and transversely in the transverse direction. The wire framework includes one or more of a detent configured to provide positional feedback when the wire insert passes over the detent.

In another example embodiment, a dishwasher appliance includes a tub defining a wash chamber. A first rack assembly is slidably positioned within the wash chamber. A first spray assembly is positioned in the wash chamber and configured to direct wash fluids at the first rack assembly. A second rack assembly is slidably positioned in the wash chamber above the first rack assembly. A second spray assembly is positioned in the wash chamber and configured to direct wash fluids at the second rack assembly. A third rack assembly is slidably positioned in the wash chamber above the second rack assembly. A third spray assembly is positioned over the third rack assembly and configured to direct wash fluid at articles located in the third rack assembly. The third rack assembly includes a wire framework defining the shape of the third rack assembly. The wire framework incudes a boundary wall at a first side portion and a boundary wall at a second side portion. A wire insert that is configured to removably couple to the wire framework. The wire insert includes a wire floor portion. The wire insert is configured to translate one of longitudinally in the lateral direction and transversely in the transverse direction. The wire framework includes a first detent that is proximate the boundary wall at the first side portion, and a second detent proximate the boundary wall at the second side portion. The first detent and the second detent are configured to provide feedback indicative of the wire insert in a normal position and an open position, respectively.

In another example embodiment, a dishwasher appliance includes a tub defining a wash chamber. A first rack assembly is slidably positioned within the wash chamber. A first spray assembly is positioned in the wash chamber and configured to direct wash fluids at the first rack assembly. A second rack assembly is slidably positioned in the wash chamber above the first rack assembly. A second spray assembly is positioned in the wash chamber and configured to direct wash fluids at the second rack assembly. A third rack assembly is slidably positioned in the wash chamber above the second rack assembly. A third spray assembly is positioned over the third rack assembly and configured to direct wash fluid at articles located in the third rack assembly. The third rack assembly includes a wire framework defining the shape of the third rack assembly. The wire framework incudes a boundary wall at a first side portion and a boundary wall at a second side portion. A fourth spray assembly is positioned within the wire framework. The fourth spray assembly is a first portion of a floor of the third rack assembly. A wire insert includes a plurality of hooks configured to removably couple to the wire framework. The wire insert includes a wire floor portion. The wire insert is a second portion of the floor of the third rack assembly. The wire insert is configured to translate one of longitudinally in the lateral direction and transversely in the transverse direction. The wire framework includes a plurality of detents spaced between a first detent and a second detent. The first detent is proximate the boundary wall at the first side portion, and the second detent is proximate the boundary

wall at the second side portion. The first detent and the second detent are configured to provide feedback indicative of the wire insert in a normal position and an open position, respectively. The plurality of detents are indicative of different positions of the wire insert on the wire framework.

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.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** provides a perspective view of an example embodiment of a dishwashing appliance of the present disclosure.

FIG. **2** provides a side, cross sectional view of the example dishwashing appliance of FIG. **1**.

FIG. **3** provides a perspective view of an example embodiment of a rack of the dishwashing appliance of FIG. **1**.

FIG. **4** provides a perspective view of the example rack of FIG. **3** with a wire insert removed from the rack.

FIG. **5** provides a perspective view of an example embodiment of a rack of the dishwashing appliance of FIG. **1**.

FIG. **6** provides a perspective view of an example embodiment of a handle on the rack of FIG. **5**.

FIG. **7** provides a perspective view of the example rack of FIG. **5** with the wire insert in a translated position.

FIG. **8** provides a perspective view of an example embodiment of a rack of the dishwashing appliance of FIG. **1**.

FIG. **9** provides a perspective view of an example embodiment of a rack of the dishwashing appliance of FIG. **1**.

FIG. **10** provides a perspective view of an example embodiment of the rack of FIG. **9**.

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

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.

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.

As used herein, the term "article" may refer to, but need not be limited to dishes, pots, pans, silverware, and other cooking utensils and items that can be cleaned in a dishwashing appliance. The term "wash cycle" is intended to refer to one or more periods of time during which a dishwashing appliance operates while containing the articles to be washed and uses a detergent and water, preferably with agitation, to e.g., remove soil particles including food and other undesirable elements from the articles. The term "rinse cycle" is intended to refer to one or more periods of time during which the dishwashing appliance operates to remove residual soil, detergents, and other undesirable elements that were retained by the articles after completion of the wash cycle. The term "drain cycle" is intended to refer to one or more periods of time during which the dishwashing appliance operates to discharge soiled water from the dishwashing appliance. The term "cleaning cycle" is intended to refer to one or more periods of time that may include a wash cycle, rinse cycle, and/or a drain cycle. The term "wash fluid" refers to a liquid used for washing and/or rinsing the articles and is typically made up of water that may include other additives such as detergent or other treatments.

FIGS. **1** and **2** depict an example domestic dishwasher or dishwashing appliance **100** that may be configured in accordance with aspects of the present disclosure. For the particular embodiment of FIGS. **1** and **2**, the dishwasher appliance **100** includes a cabinet **102** (FIG. **2**) having a tub **104** therein that defines a wash chamber **106** for receipt of articles **94** for washing. As shown in FIG. **2**, tub **104** extends between a top **107** and a bottom **108** along a vertical direction V, between a pair of opposing side walls **110** along a lateral direction L, and between a front side **111** and a rear side **112** along a transverse direction T. Each of the vertical direction V, lateral direction L, and transverse direction T are mutually perpendicular to one another.

In this regard, as used herein, the terms "cabinet," "housing," and the like are generally intended to refer to an outer frame or support structure for appliance **100**, e.g., including any suitable number, type, and configuration of support structures formed from any suitable materials, such as a system of elongated support members, a plurality of interconnected panels, or some combination thereof. It should be appreciated that cabinet **102** does not necessarily require an enclosure and may simply include open structure supporting various elements of appliance **100**. By contrast, cabinet **102** may enclose some or all portions of an interior of cabinet **102**. It should be appreciated that cabinet **102** may have any suitable size, shape, and configuration while remaining within the scope of the present subject matter.

The tub **104** includes a front opening **114** and a door **116** hinged at its bottom **117** for movement between a normally closed vertical position (shown in FIG. **1**), wherein the wash chamber **106** is sealed shut for washing operation, and a horizontal open position for loading and unloading of articles from the dishwasher appliance **100**. According to example embodiments, dishwasher appliance **100** further includes a door closure mechanism or assembly **118** that is used to lock and unlock door **116** for accessing and sealing wash chamber **106**.

At least one rack assembly is slidably positioned within wash chamber **106** and is configured for the receipt of articles for cleaning. For the example embodiment shown in FIG. **2**, opposing tub sidewalls **110** accommodate a plurality of rack assemblies. More specifically, guide rails **96**, **98** and **120** may be mounted to (or formed as part of) sidewalls **110** for supporting a first rack assembly **122** (also referred to as a lower rack assembly **122**), a middle rack assembly **124** (also referred to as a second rack assembly **124**), and a third rack assembly **126** (also referred to as an upper rack assembly **126**). As illustrated, upper rack assembly **126** is positioned at a top portion of wash chamber **106** above middle rack assembly **124**, which is positioned above lower rack assembly **122** along the vertical direction V. Additional details regarding the upper rack assembly **126** will be provided herein. For this example embodiment, upper rack assembly **126** is supported on opposing sidewalls **110** by rails **120** but rails **120** could be supported on and attached to middle rack assembly **124** as well.

Each rack assembly **122**, **124**, **126** is adapted for movement along transverse direction T between an extended loading position (not shown) in which the rack is substantially positioned outside the wash chamber **106**, and a retracted position (shown in FIGS. **1** and **2**) in which the rack is located inside the wash chamber **106**. This may be facilitated, for example, by rollers, or guide wheels **128** mounted onto rack assemblies **122**, **124**, **126**, respectively. Although guide rails **96**, **98**, **120** and guide wheels **128** are illustrated herein as facilitating movement of the respective rack assemblies **122**, **124**, **126**, it should be appreciated that any suitable sliding mechanism or member may be used according to alternative embodiments. In some embodiments, dishwasher appliance **100** may accommodate a different number of rack assemblies and supporting guide rails. For example, dishwasher appliance **100** may accommodate only first rack assembly **122** and upper rack assembly **126**, with accompanying guide rails.

Some or all of the rack assemblies **122**, **124**, **126** may be fabricated into lattice, or grid, structures including a plurality of wires or elongated members **130** (for clarity of illustration, not all elongated members making up rack assemblies **122**, **124**, **126** are shown in FIG. **2**). The plurality of wires or elongated members **130** may be either steel and stainless steel, and the wire may be coated with none, one, or more of nylon and polyvinyl chloride. Rack assemblies **122**, **124**, **126** are generally configured for supporting articles **94** within wash chamber **106** while allowing a flow of wash fluid to reach and impinge on those articles, e.g., during a cleaning or rinsing cycle. For some embodiments, a silverware basket (not shown) is removably attached to a rack assembly, e.g., lower rack assembly **122**, for placement of silverware, utensils, and the like, that are otherwise too small or delicate to be accommodated by rack **122**.

At least one spray assembly is located in wash chamber **106** and is configured to direct wash fluids onto at least on rack assembly for washing articles located therein. For the example embodiment of FIG. **2**, dishwasher appliance **100** further includes a plurality of spray assemblies for urging a flow of water or wash fluid onto the articles placed within wash chamber **106**. More specifically, as illustrated in FIG. **2**, dishwasher appliance **100** includes a first spray assembly **134** (also referred to as a lower spray arm assembly **134**) disposed in a lower region **136** of wash chamber **106** and above a sump **138** so as to rotate in relatively close proximity to lower rack assembly **122**. Similarly, a second spray assembly **140** (also referred to as a mid-level spray arm assembly **140**) is located in an upper region **137** of wash chamber **106** and may be located below and in close proximity to middle rack assembly **124**. In this regard, mid-level spray arm assembly **140** may generally be configured for urging a flow of wash fluid up through middle rack assembly **124** and third rack assembly **126**. Additionally, an upper or third spray assembly **142** (also referred to as an upper spray assembly **142**) may be located above upper or third rack assembly **126** along the vertical direction V. In this manner, third spray assembly **142** may be configured for urging and/or cascading a flow of wash fluid downward over rack assemblies **122**, **124**, and **126**.

The various spray assemblies and manifolds described herein may be part of a fluid distribution system or fluid circulation assembly **150** for circulating water and wash fluid in the tub **104**. More specifically, fluid circulation assembly **150** includes a pump **152** for circulating water and wash fluid (e.g., detergent, water, and/or rinse aid) in the tub **104**. Pump **152** may be located within sump **138** or within a machinery compartment located below sump **138** of tub **104**, as generally recognized in the art. Fluid circulation assembly **150** may include one or more fluid conduits or circulation piping for directing water and/or wash fluid from pump **152** to the various spray assemblies and manifolds. For example, as illustrated in FIG. **2**, a primary supply conduit **154** may extend from pump **152**, along rear side **112** of tub **104** along the vertical direction V to supply wash fluid throughout wash chamber **106**. In some examples, a secondary supply conduit (not shown) may supply additional wash fluid to one or more various spray assemblies and manifolds.

As illustrated, primary supply conduit **154** is used to supply wash fluid to mid-level spray arm assembly **140** while a secondary supply conduit **92** supplies wash fluid to upper spray assembly **142**. Diverter assembly **156** can allow selection between spray assemblies **134** and **140**, **142** being supplied with wash fluid. However, it should be appreciated that according to alternative embodiments, any other suitable plumbing configuration may be used to supply wash fluid throughout the various spray manifolds and assemblies described herein.

Each spray assembly **134**, **140**, **142** or other spray device may include an arrangement of discharge ports or orifices for directing wash fluid received from pump **152** onto dishes or other articles located in wash chamber **106**. The arrangement of the discharge ports, also referred to as jets, apertures, or orifices, may provide a rotational force by virtue of wash fluid flowing through the discharge ports. Alternatively, spray assemblies **134**, **140**, **142** may be motor-driven, or may operate using any other suitable drive mechanism. Spray manifolds and assemblies may also be stationary. Movement of the spray arm assemblies **134** and **140** and the spray from fixed manifolds like spray assembly **142** provides coverage of dishes, silverware, and other dishwasher contents and articles **94** to be cleaned with a washing spray. Other configurations of spray assemblies may be used as well. For example, dishwasher appliance **100** may have additional spray assemblies for cleaning silverware, for scouring casserole dishes, for spraying pots and pans, for cleaning bottles, etc. One skilled in the art will appreciate that the embodiments discussed herein are used for the purpose of explanation only and are not limitations of the present subject matter.

In operation, pump **152** draws wash fluid in from sump **138** and pumps it to a diverter assembly **156**, e.g., which is positioned within sump **138** of dishwasher appliance. Diverter assembly **156** may include a diverter disk (not shown) disposed within a diverter chamber (not shown) for

selectively distributing the wash fluid to the spray assemblies **134**, **140**, **142** and/or other spray manifolds or devices. For example, the diverter disk may have a plurality of apertures that are configured to align with one or more outlet ports (not shown) at the top of diverter chamber (not shown). In this manner, the diverter disk may be selectively rotated to provide wash fluid to the desired spray device.

According to an example embodiment, diverter assembly **156** is configured for selectively distributing the flow of wash fluid from pump **152** to various fluid supply conduits, only some of which (e.g., **154**) are illustrated in FIG. **2** for clarity. More specifically, diverter assembly **156** may include four outlet ports (not shown) for supplying wash fluid to a first conduit for rotating lower spray arm assembly **134** in the clockwise direction, a second conduit for rotating lower spray arm assembly **134** in the counterclockwise direction, a third conduit for spraying rack assembly **126** (shown in FIG. **2**) as a silverware rack, and a fourth conduit for supplying only mid-level and/or upper spray assemblies **140**, **142**. Other configurations of diverter assembly **156** and/or other components (e.g., valves) may be used to allow various choices in the operation of the spray assemblies **134**, **140**, and **142** during a cleaning cycle.

The dishwasher appliance **100** is further equipped with a controller **160** (FIG. **2**) to regulate operation of the dishwasher appliance **100**. Controller **160** may include one or more memory devices and one or more microprocessors, such as general or special purpose microprocessors 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 **160** 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.

The controller **160** may be positioned in a variety of locations throughout dishwasher appliance **100**. In the illustrated embodiment, the controller **160** may be located within a control panel area **162** of door **116**. In such an embodiment, input/output ("I/O") signals may be routed between the control system and various operational components of dishwasher appliance **100** along wiring harnesses that may be routed through the bottom of door **116**. Typically, the controller **160** includes a user interface panel/controls **164** (FIG. **1**) through which a user may select various operational features and modes and monitor progress of the dishwasher appliance **100**. In one embodiment, the user interface **164** may represent a general purpose I/O ("GPIO") device or functional block. In one embodiment, the user interface **164** may include input components, such as one or more of a variety of electrical, mechanical, or electro-mechanical input devices including rotary dials, push buttons, and touch pads. The user interface **164** may include a display component, such as a digital or analog display device designed to provide operational feedback to a user. The user interface **164** may be in communication with the controller **160** via one or more signal lines or shared communication busses.

It should be appreciated that the invention is not limited to any particular style, model, or configuration of dishwasher appliance **100**. The example embodiment depicted in FIGS. **1** and **2** is for illustrative purposes only. For example, different locations may be provided for user interface **164**, different configurations, including providing one or more rack assemblies **122**, **124**, **126** and one or more spray assemblies **134**, **140**, **142**, to dishwasher appliance **100** may be used, different configurations may be provided for rack assemblies **122**, **124**, **126**, different spray assemblies **134**, **140**, **142** and spray manifold configurations may be used, and other differences may be applied while remaining within the scope of the present subject matter.

Shown in FIGS. **3** and **4**, the perimeter of third rack assembly **126** may be defined by a wire framework **300**. Wire framework **300** may include a floor **308** formed in combination with the floor portion of wire insert **302**. Wire insert **302** may include at least two (2) of a hook **306**, or the like, for removably coupling wire insert **302** to wire framework **300**. The present example embodiment includes four (4) hooks **306**. Wire insert **302** may be defined in the transverse direction T, between a first boundary wall **310** and a second boundary wall **312**, whereupon hooks **306** may be positioned. In FIG. **3**, wire insert **302** is shown coupled to wire framework **300** via hooks **306**. In FIG. **4**, wire insert **302** is shown removed from wire framework **300** with respect to the vertical direction V. Wire insert **302** may include an upper floor portion **314** and a lower floor portion **316**. The upper floor portion **314** and the lower floor portion **316** may be positioned at different heights with respect to the vertical direction V such that different size articles for washing may be placed upon wire insert **302**. Lower floor portion **316** may be configured to interface, e.g., minimal gap, with floor **308** when wire insert **302** is inserted in wire framework **300**. Thus, e.g., floor **308** may be nested against wire insert **302** when wire insert **302** is inserted in wire framework **300**. Moreover, lower floor portion **316** may be positioned generally coplanar with floor **308** such that lower floor portion **316** and floor **308** may collectively form a portion of the floor of third rack assembly **126**.

Referring still to FIGS. **3** and **4**, wire framework **300** may further include a third boundary wall **311** at a first side portion **313** and a fourth boundary wall **315** at a second side portion **317**. Third boundary wall **311** at first side portion **313** and fourth boundary wall **315** at second side portion **317** may be configured for enclosing third rack assembly **126** with respect to the lateral direction L. First boundary wall **310** and second boundary wall **312** of wire insert **302** may enclose third rack assembly **126** with respect to the transverse direction T.

Shown in FIGS. **5-7**, another example embodiment of third rack assembly **126** may be defined by a wire framework **300**. Wire framework **300** may include a floor **308** and a wire insert **302** forming a first floor portion and a second floor portion, respectively, of a floor of third rack assembly **126**. Wire insert **302** may include at least two (2) of a hook **306**, or the like, for coupling wire insert **302** to wire framework **300**. The present example embodiment includes four (4) hooks **306**. Wire insert **302** may be defined in the transverse direction T, between a first boundary wall **310** and a second boundary wall **312**, whereupon hooks **306** may be positioned. Wire insert **302** may include an upper floor portion **314** and a lower floor portion **316**. The upper floor portion **314** and the lower floor portion **316** may be positioned at different heights with respect to the vertical direction, V, such that different size articles for washing may be placed upon wire insert **302**.

As discussed in greater detail below, wire insert **302** may be translatable relative to wire framework **300**, e.g., along the lateral direction L. For example, hooks **306** may slide on wires of wire framework **300** as wire insert **302** translates

relative to wire framework **300**, e.g., along the lateral direction L. As an example, wire insert **302** may be translatable relative to wire framework **300** between the positions shown in FIGS. **5** and **7**. A user may adjust the position of wire insert **302** on wire framework **300** in order to allow taller items to be placed on a rack (not shown) below third rack assembly **126** with interfering with wire insert **302**.

Lower floor portion **316** may include a handle **320** welded to the wires of lower floor portion **316** at weld spots **322**. Handle **320** may extend in the transverse direction T. FIG. **6** provides an alternative embodiment of handle **320**, where handle **320** is a continuation of the existing wire of lower floor portion **316**, rather than an additional, welded handle piece. As illustrated in FIG. **7**, a user may grasp handle **320** and translate wire insert **302** along the lateral direction L. Additional or alternative embodiments may exist where a user may grasp handle **320** and translate wire insert **302** along the transverse direction T. Handle **320** may show a user the intended translation of third rack assembly **126**, e.g., perpendicular or parallel to tub **104**. Third rack assembly **126** may be perceived as shallow and hidden at the top of dishwasher appliance **100**, so handle **320** may aid in communicating to a user the location of third rack assembly **126** when viewing dishwasher appliance **100** from above. Additionally or alternatively, wire insert **302** may include both handles **320** that extend in the transverse direction T and vertical direction V.

Shown in FIG. **8** is another example embodiment of third rack assembly **126** combining elements from other example embodiments. Particularly, wire insert **302** may include at least two (2) of a hook **306**, or the like, for removably coupling wire insert **302** to wire framework **300**. The present example embodiment includes four (4) hooks **306**. Wire insert **302** is shown removed from wire framework **300** with respect to the vertical direction V in FIG. **8**. A handle **320** may be welded or bent from lower floor portion **316** and extend in the vertical direction, V, such that a user may grasp handle **320** and lift wire insert **302** in the vertical direction V out from wire framework **300**.

Shown in FIG. **9**, another example embodiment of third rack assembly **126** may be defined by a wire framework **300**. In the present example embodiment, wire framework **300** may include a guide bar **328** across which wire insert **302** translates via hook **306**. Wire insert **302** may change position relative to the wire framework **300**. As shown in FIG. **9**, a first detent **330** may be positioned at an end of guide bar **328** and a second detent **332** may be positioned at an opposite end of guide bar **328**. First detent **330** may provide tactile feedback to a user translating wire insert **302** when a gap **324** has been fully opened, e.g., wire insert **302** may be in an open position. First detent **330** may indicate the full justification of wire insert **302** in the open position. Second detent **332** may provide tactile feedback to a user translating wire insert **302** when gap **324** has been fully closed, e.g., wire insert **302** may be in a normal position. Second detent **332** may indicate the full justification of wire insert **302** in the normal position. As shown in FIG. **9**, gap **324** is open while wire insert **302** is in the open position. When wire insert **302** is in the normal position, third rack assembly **126** may be closed off from second rack assembly **124**, and while wire insert **302** is in the open position, gap **324** of third rack assembly **126** maybe open above second rack assembly **124** in order to fit larger articles for washing.

FIG. **10** provides an example embodiment of the guide bar **328** of FIG. **9**, further including a plurality of detents **400** including first detent **330**, detent **334**, detent **336**, and detent **338** and second detent **332** (not shown in FIG. **10**). The plurality of detents **400** may indicate different positions of wire insert **302** and the size of gap **324**. Wire rack **302** may be positioned between the plurality of detents **400** in order to clear common items in second rack assembly **124** without unnecessarily sacrificing space of third rack assembly **126**. For example, a narrow bottle may not need wire insert **302** translated over as much as a wider bottle such as a tumbler. Thus, guide bar **328** of wire framework **300** may have several set points via the plurality of detents **400**, such as set points for wide tumblers, stemware, narrow water bottles, etc.

The example embodiments represented in FIGS. **3-10** may be used in any suitable combination thereof. The present example embodiments are provided by way of example only and are not intended to be limiting to the illustrated example embodiments appearance or structure. 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.

What is claimed is:

1. A dishwasher appliance, comprising:

a tub defining a wash chamber;

a first rack assembly slidably positioned within the wash chamber;

a first spray assembly positioned in the wash chamber and configured to direct wash fluids at the first rack assembly;

a second rack assembly slidably positioned in the wash chamber above the first rack assembly;

a second spray assembly positioned in the wash chamber and configured to direct wash fluids at the second rack assembly; and

a third rack assembly slidably positioned in the wash chamber above the second rack assembly; and

a third spray assembly positioned over the third rack assembly and configured to direct wash fluid at articles located in the third rack assembly, the third rack assembly comprising

a wire framework defining a perimeter of the third rack assembly, the wire framework comprises a boundary wall at a first side portion and a boundary wall at a second side portion, and

a wire insert comprising a wire floor portion, the wire insert configured to translate along one of the lateral direction and the transverse direction,

wherein the wire framework comprises one or more detents configured to provide positional feedback when the wire insert passes over the one or more detents,

wherein the one or more detents of the wire framework comprises a first detent proximate the boundary wall at the first side portion and a second detent proximate the boundary wall at the second side portion, the first detent and the second detent configured to provide feedback indicative of the wire insert in a normal position and an open position, respectively.

2. The dishwashing appliance of claim **1**, wherein the third rack assembly is closed off from the second rack

assembly while the wire insert is in the normal position, and the third rack assembly comprises a gap above the second rack assembly while in the open position.

3. The dishwashing appliance of claim **1**, wherein the one or more detents of the wire framework comprises a plurality of additional detents spaced between the first detent and the second detent, the plurality of additional detents indicative of different positions of the wire insert on the wire framework.

4. The dishwashing appliance of claim **1**, wherein the wire framework comprises a grid pattern of wire, the grid pattern comprises wires extending transversely along a transverse direction and wires extending longitudinally along a lateral direction, the wires in the grid pattern comprising one or both of coated steel wires and stainless steel wires.

5. The dishwashing appliance of claim **1**, further comprising a plurality of guide wheels disposed on the wire framework, the plurality of guide wheels configured for sliding the third rack assembly in the transverse direction into and out of the tub of the dishwashing appliance.

6. A dishwasher appliance, comprising:

a tub defining a wash chamber;

a first rack assembly slidably positioned within the wash chamber;

a first spray assembly positioned in the wash chamber and configured to direct wash fluids at the first rack assembly;

a second rack assembly slidably positioned in the wash chamber above the first rack assembly;

a second spray assembly positioned in the wash chamber and configured to direct wash fluids at the second rack assembly; and

a third rack assembly slidably positioned in the wash chamber above the second rack assembly; and

a third spray assembly positioned over the third rack assembly and configured to direct wash fluid at articles located in the third rack assembly, the third rack assembly comprising

a wire framework defining a perimeter of the third rack assembly, the wire framework comprises a boundary wall at a first side portion and a boundary wall at a second side portion, and

a wire insert configured to removably couple to the wire framework, the wire insert comprises a wire floor portion, the wire insert configured to translate along one of the lateral direction and the transverse direction,

wherein the wire framework comprises a first detent proximate the boundary wall at the first side portion and a second detent proximate the boundary wall at the second side portion, the first detent and the second detent configured to provide feedback indicative of the wire insert in a normal position and an open position, respectively.

7. The dishwashing appliance of claim **6**, wherein the third rack assembly is closed off from the second rack assembly while the wire insert is in the normal position, and the third rack assembly comprises a gap above the second rack assembly while in the open position.

8. The dishwashing appliance of claim **6**, wherein the wire framework comprises a plurality of additional detents spaced between the first detent and the second detent, the plurality of additional detents indicative of different positions of the wire insert on the wire framework.

9. The dishwashing appliance of claim **6**, wherein the wire framework comprises a grid pattern of wire, the grid pattern comprises wires extending transversely along a transverse direction and wires extending longitudinally along a lateral direction, the wires in the grid pattern comprising one or both of coated steel wires and stainless steel wires.

10. The dishwashing appliance of claim **6**, further comprising a plurality of guide wheels disposed on the wire framework, the plurality of guide wheels configured for sliding the third rack assembly in the transverse direction into and out of the tub of the dishwashing appliance.

11. A dishwasher appliance, comprising:

a tub defining a wash chamber;

a first rack assembly slidably positioned within the wash chamber;

a first spray assembly positioned in the wash chamber and configured to direct wash fluids at the first rack assembly;

a second rack assembly slidably positioned in the wash chamber above the first rack assembly;

a second spray assembly positioned in the wash chamber and configured to direct wash fluids at the second rack assembly; and

a third rack assembly slidably positioned in the wash chamber above the second rack assembly; and

a third spray assembly positioned over the third rack assembly and configured to direct wash fluid at articles located in the third rack assembly, the third rack assembly comprising,

a wire framework defining a perimeter of the third rack assembly, the wire framework comprises a boundary wall at a first side portion and a boundary wall at a second side portion, and

a wire insert comprising a plurality of hooks configured to removably couple to the wire framework, the wire insert comprises a wire floor portion, the wire insert a second portion of the floor of the third rack assembly, the wire insert configured to translate along one of the lateral direction and the transverse direction,

wherein the wire framework comprises a plurality of detents spaced between a first detent and a second detent, the first detent proximate the boundary wall at the first side portion and the second detent proximate the boundary wall at the second side portion, the first detent and the second detent configured to provide feedback indicative of the wire insert in a normal position and an open position, respectively, and the plurality of detents indicative of different positions of the wire insert on the wire framework.

12. The dishwashing appliance of claim **11**, wherein the third rack assembly is closed off from the second rack assembly while the wire insert is in the normal position, and the third rack assembly comprises a gap above the second rack assembly while in the open position.

13. The dishwashing appliance of claim **11**, wherein the wire framework comprises a grid pattern of wire, the grid pattern comprises wires extending transversely along a transverse direction and wires extending longitudinally along a lateral direction, the wires in the grid pattern comprising one or both of coated steel wires and stainless steel wires.

14. The dishwashing appliance of claim **11**, further comprising a plurality of guide wheels disposed on the wire framework, the plurality of guide wheels configured for sliding the third rack assembly in the transverse direction into and out of the tub of the dishwashing appliance.

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