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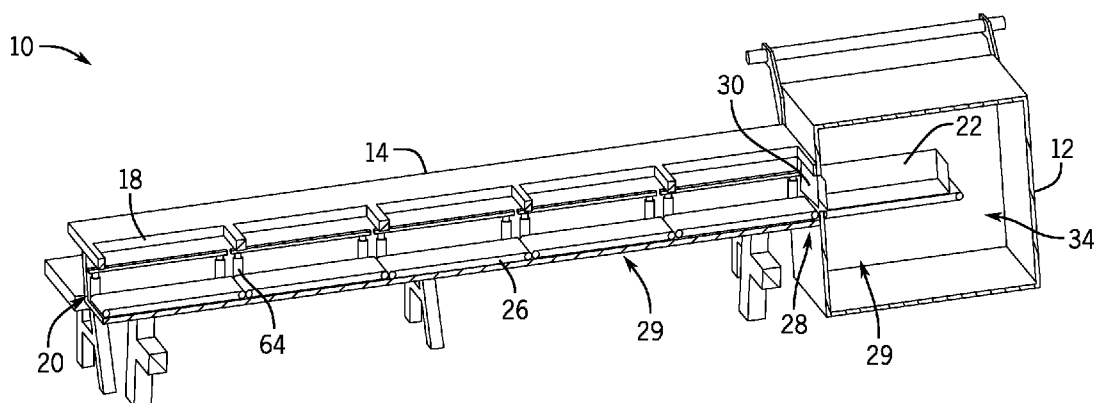


FIG. 2

(57) Abstract: In accordance with an embodiment, a serving presentation system includes: a mobile cart comprising a cart housing defining a cart cavity, a first port in the cart housing, and a cart conveyor system disposed within the cart cavity that may convey a serving from the cart cavity toward the first port. The serving presentation system also includes a table including a table housing defining a table cavity and a table surface with a table top port that may receive the serving therethrough, a second port in the table housing that may align and/or engage with the first port to define a passage between the cart cavity and the table cavity, a table conveyor system disposed within the table cavity that may convey the serving into the table cavity from the cart conveyor, and a lifter that may transition the serving from the table cavity through the table top port.

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SERVING PRESENTATION SYSTEM AND METHOD

BACKGROUND

[0001] The present disclosure relates generally to themed environments, and more specifically to using illusory effects to provide an immersive serving experience.

[0002] An entertainment venue may include attractions, such as arcade-style games, amusement rides, virtual reality (VR) experiences, vending or dining areas, and the like, and the attractions may align with a themed environment. For example, a dining area (or other area for service provision) may contribute to the themed environment using equipment, furniture, building layouts, props, decorations, displayed media, and so forth. It is now recognized that it may be desirable to incorporate certain special effects (e.g., illusions) into such a service provision area to further immerse guests into the themed environment.

[0003] This section is intended to introduce the reader to various aspects of art that may be related to various aspects of the present techniques, which are described and/or claimed below. This discussion is believed to be helpful in providing the reader with background information to facilitate a better understanding of the various aspects of the present disclosure. Accordingly, it should be understood that these statements are to be read in this light, and not as admissions of prior art.

BRIEF DESCRIPTION

[0004] Certain embodiments commensurate in scope with the originally claimed subject matter are summarized below. These embodiments are not intended to limit the scope of the disclosure, but rather these embodiments are intended only to provide a brief summary of certain disclosed embodiments. Indeed, the present disclosure may encompass a variety of forms that may be similar to or different from the embodiments set forth below

[0005] In accordance with an embodiment, a serving presentation system includes: a mobile cart comprising a cart housing defining a cart cavity, a first port in the cart housing, and a cart conveyor system disposed within the cart cavity that may convey a

serving from the cart cavity toward the first port. The serving presentation system also includes a table including a table housing defining a table cavity and a table surface with a table top port that may receive the serving therethrough, a second port in the table housing that may align and/or engage with the first port to define a passage between the cart cavity and the table cavity, a table conveyor system disposed within the table cavity that may convey the serving into the table cavity from the cart conveyor, and a lifter that may transition the serving from the table cavity through the table top port.

[0006] In accordance with another embodiment, a method, includes receiving, at a conveyor system within a cavity defined by a table housing of a table, one or more dishes sequentially via an ingress opening in the table housing, in which the table housing may conceal the cavity. The method also includes conveying, via the conveyor system, each of the one or more dishes to a corresponding target position along the conveyor system. The method also includes actuating one or more lifters to lift each dish from its corresponding target position through a respective table top port to a surface of the table.

[0007] In accordance with yet another embodiment, a serving presentation table includes a table housing defining a table cavity with an entry port on a side surface of the table housing and a table top port on a top surface of the table housing. The entry port and the table top port may allow a serving to enter and exit the table cavity therethrough. The serving presentation table also includes a table conveyor system disposed within the table cavity that may convey the serving into the table cavity through the entry port, a lifter that may transition the serving from the table cavity through the table top port, and a concealer to conceal the table top port during transition of the serving through the table to port and to open to reveal the serving when the serving is positioned in or above the table top port.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] These and other features, aspects, and advantages of the present disclosure will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein:

[0009] FIG. 1 is a perspective view of an embodiment of a serving concealment and delivery system, in accordance with an embodiment of the present disclosure;

[0010] FIG. 2 is a cross-sectional view of the serving concealment and delivery system of FIG. 1, in accordance with an embodiment of the present disclosure;

[0011] FIG. 3 is a block diagram of components of the serving concealment and delivery system of FIG. 1, in accordance with an embodiment of the present disclosure;

[0012] FIG. 4 is a schematic cross-sectional view of a delivery cart, in accordance with an embodiment of the present disclosure;

[0013] FIG. 5 is a schematic cross-sectional view of a delivery table in which dishes are conveyed in accordance with an embodiment of the present disclosure;

[0014] FIG. 6 is a schematic cross-sectional view of the delivery table of FIG. 5, in which dishes are lifted towards a surface of the delivery table, in accordance with an embodiment of the present disclosure;

[0015] FIG. 7 is a schematic cross-sectional view of the delivery table of FIG. 5, in which dishes are revealed, in accordance with an embodiment of the present disclosure;

[0016] FIG. 8 is a schematic cross-sectional overhead view of an embodiment of a serving concealment and delivery system, in which the delivery cart includes a loading conveyor and an unloading conveyor, in accordance with an embodiment of the present disclosure;

[0017] FIG. 9 is a schematic cross-sectional view of an embodiment of a dining delivery concealment system, in which dishes are conveyed from a preparation area, in accordance with an embodiment of the present disclosure;

[0018] FIG. 10 is a flow chart of a method for concealed delivery of dishes to guests of an entertainment venue, in accordance with present techniques; and

[0019] FIG. 11 is a block diagram of a control system for a serving concealment and delivery system, in accordance with an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0020] Embodiments of the present disclosure are directed to systems and methods for providing special effects to guests in a serving area (e.g., a dining area) of an entertainment venue. More specifically, a delivery cart may conceal items to be served to guests and may be used to transport the items to a dining table in a way that creates an illusion for an audience. The delivery cart may transfer the items to an interior portion of the dining table, and the dining table may convey the items to target locations within the dining table. The dining table may then lift the items to a surface (e.g., top surface), and may present the items to the guests by, for example, opening concealments (e.g., food covers) used to conceal, and subsequently expose, the items at the surface of the table. The delivery cart may be designed to look like an ordinary service cart and, likewise, the dining table may be designed to appear as an ordinary dining table. As such, the guests may remain unaware that items are being delivered to the surface of the dining table until the items are presented, creating the illusion that the items appeared spontaneously or by, thereby enhancing a themed environment. It should be noted that examples provided in the present disclosure focus on a dining experience and delivery of food servings. However, present embodiments may be employed in the delivery of other servings, such as a serving of cards (e.g., cards dealt for a card game), a serving of drinks, a serving of souvenirs, and so forth.

[0021] FIG. 1 is a perspective view of a system 10 that utilizes a mobile cart, represented as delivery cart 12, and a dining table 14, also described herein as a serving presentation table, that are designed in accordance with present embodiments to provide special effects to guests of an entertainment venue. Specifically, the delivery cart 12 may be used to conceal and transport one or more servings (e.g., dishes of food) from a preparation area (e.g., a kitchen) to the dining table 14. The delivery cart 12 may couple to the dining table 14 such that the one or more dishes may be conveyed from the delivery cart 12 to corresponding dining positions while remaining concealed from the view of the guests positioned alongside the dining table 14 (e.g., on the bench 16). In particular, each of the one or more dishes may be conveyed to a target position lifter within an inside portion 20 of the dining table 14 (e.g., table cavity) and may be lifted and/or transitioned through an opening (e.g., table top port, respective table top port) 18 in the surface of the dining table 14 (e.g., respective table top ports). As used herein,

the term “target position lifter” may be understood to mean a lifter (e.g., a vertical actuator, scissor lifter, hydraulic lifter) that may lift a dish towards the surface 90 (as illustrated in in FIG. 6) of the dining table 14 (e.g., table surface) once the dish is confirmed to have reached a target location inside the dining table 14. It should be noted that the delivery cart 12 is representative of any delivery and/or supply structure that can interface with and provide the servings to the dining table 14, which is representative of any presentation surface or area for receiving and presenting the servings. Further, the delivery cart 12 may be located away from the dining table 14 (e.g., hidden from the view of guests), and/or servings may be provided to the dining table 14 by other delivery and/or supply structures, as will be described with reference to FIG. 9, for instance. In the present disclosure, delivery and/or supply structures (e.g., the delivery cart 12) may be referred to as serving suppliers and presentation surfaces and/or areas (e.g., the dining table 14) may be referred to as serving presenters.

[0022] FIG. 2 is an illustration of a cross-sectional view of the system 10, including a transfer conveyor 24 (e.g., cart conveyor) within the delivery cart 12 and one or more conveyor portions 26 disposed within the dining table 14 that may form table conveyor system. In the illustrated embodiment, items (or servings) to be served to the guests (e.g., dishes, utensils, beverages) may be placed inside a container 22 and loaded into the delivery cart 12. In other embodiments, the items may be loaded directly into the delivery cart 12, or may be placed on or into other storage devices. While one container 22 is illustrated, in some embodiments, multiple containers (e.g., 2, 5, 10, 20 containers) may be loaded onto the delivery cart. Additionally, in some embodiments, the order with which each serving and/or container is loaded into the delivery cart 12 may be based on a quantity and/or seating position of the guests seated at the dining table 14, as will be described below. It should be noted that while certain types of conveyors are shown for illustrative purposes, as used herein, “conveyor” may be understood to mean any suitable mechanism for moving items from one point to another, and may include belt conveyors, roller conveyors, chain conveyors, motorized conveyors, gravity-based conveyors, trolley conveyors, pneumatic conveyors, tilt conveyors, monorails, elevators, cable conveyors, and so on. In an embodiment, the transfer conveyor 24 includes a shelf that may tilt when actuated such that the shelf transitions to an angled position, which may cause the dish 50 to slide to the pass-through 28.

[0023] The delivery cart 12 may include a first port (e.g., hole, aperture, opening, passage) in a housing of the delivery cart 12 (e.g., cart housing), and the dining table 14 may include a second port in a housing of the dining table 14 (e.g., table housing) by which the inside portion 34 of the delivery cart 12, which may be described herein as a cart cavity, and the inside portion 20 of the dining table 14 may be accessed. The first port may be situated on a side surface of the delivery cart 12, and the second port may be situated in a side surface of the dining table 14, for example. The first port and second port, when the dining table 14 and the delivery cart 12 are coupled, may align with one another to together form a pass-through 28. As such, the first port and/or second port may define an entry port (e.g., entry point) to the delivery cart 12 and/or the dining table 14. Each of the first port and second port may be concealed by a concealer (e.g., a door, flap, scroll), which may be retracted or opened upon engagement of the delivery cart 12 with the dining table 14 to allow for cooperative establishment of the pass-through 28. As illustrated, the transfer conveyor 24 of the delivery cart 12 and the conveyor portions 26 of the dining table may connect via the pass-through 28 to form a collective conveyor 29, such that food, beverage, utensils, containers, or other items may be conveyed seamlessly between the inside portion 34 of the delivery cart 12 and the inside portion 20 of the dining table 14. As previously noted, the pass-through 28 may include one or more concealers coupled to the delivery cart 12 and/or the dining table 14, here illustrated as a swinging door 30, that may close to conceal the inside portion 20 of the dining table 14 and/or the inside portion 34 of the delivery cart 12 from the view of guests when the dining table 14 and the delivery cart 12 are not engaged with each other in an engaged system configuration (e.g., when the dining table 14 and the delivery cart 12 are in a detached system configuration). As may be appreciated, the swinging door 30 may open to allow items to be convey through the pass-through 28 when the dining table 14 and the delivery cart 12 are engaged with each other (e.g., when the dining table 14 and the delivery cart 12 are in an attached configuration). In some embodiments, the first port in the housing of the delivery cart 12 may include a first door (e.g., swinging door), and the second port in the housing of the dining table 14 may include a second door.

[0024] In some embodiments, the delivery cart 12 may couple to the dining table 14 via one or more couplers on the exterior of the delivery cart 12 and/or the dining table. For example, one or more magnets, clamps, locking mechanisms, or other suitable

coupler may be arranged near the pass-through 28 on the exterior of the delivery cart 12 and/or the dining table such that a connection is established when the delivery cart 12 nears or contacts the dining table 14. In some cases, the transfer conveyor 24 of the delivery cart 12 may extend within the inside portion 20 of the dining table 14 at a certain angle and position such that a corresponding angulation or positional relationship between the dining table 14 and the delivery cart 12 may be established. Additionally or alternatively, the transfer conveyor 24 of the delivery cart may couple to the conveyor portions 26 of the dining table 14 via suitable coupling mechanisms.

[0025] In the illustrated embodiment, the transfer conveyor 24 of the delivery cart 12 may convey the container 22 through the pass-through 28 such that the container 22 is transferred to the conveyor portions 26 of the dining table 14. Accordingly, the conveyor portions 26 may then convey the container 22 until it reaches a target position lifter (e.g., a first target position lifter 64) in the inside portion 20 of the dining table 14. In some embodiments, each of the conveyor portions 26 may operate independently. That is, each of the conveyor portions 26 may convey the container 22 at different speeds, directions, or time intervals. Additionally, one or more of the conveyor portions 26 may be liftable, such that the first target position lifter 64 or other suitable lifter may lift the one or more conveyor portions 26 towards a surface of the dining table 14. In any case, upon reaching the target position lifter 64, the container 22 may be lifted by the first target position lifter 64 through an opening 18 above the first target position lifter 64, such that the container 22 reaches the surface of the dining table 14. As may be appreciated, the target position lifter 64 may be positioned in an area directly below a position on the surface of the dining table 14 at which a dish may be presented to a guest. Additionally, while the target position lifter 64 is illustrated as a cylinder (e.g., a hydraulic cylinder or a pneumatic cylinder), other suitable lifters, such as scissor lifts, pulley lifters, boom lifts, platform lifts, magnet lifts, or hoists are envisioned.

[0026] With the foregoing in mind, FIG. 3 illustrates a block diagram of the system 10. As mentioned, the system 10 includes the dining table 14, including the conveyor portions (e.g., conveyor segments) 26 that collectively form a conveyor system) and lifters 32 (e.g., target position lifters), and the delivery cart including the transfer conveyor 24. Each of the conveyor portions 26 and the transfer conveyor 24 may include, for example, belt conveyors as illustrated in FIG. 2, roller conveyors, chain

conveyors, screw conveyors, pneumatic conveyors, magnetic conveyors, or other suitable conveyors. In addition, while illustrated as five conveyor portions in FIG. 2, the conveyor portions 26 of the dining table may include less conveyor portions (e.g., 1, 2, 3, or 4, conveyor portions) or more conveyor portions. Further, in some embodiments, the lifters 32 and the conveyor portions 26 may be implemented as part of or in conjunction with one another. For example, one or more of the conveyor portions 26 may be lifted by one of the lifters 32 when an item (e.g., the container 22) reaches a target location.

[0027] The dining table 14 may also include one or more sensors 38. In some embodiments, the one or more sensors 38 may be used to monitor an item to be served to a guest and/or detect when the item to be served to a guest has reached a target location corresponding to a target position lifter. For example, the one or more sensors 38 may include an optical distance sensor situated at either end of the inside portion 20 of the dining table to acquire positional information of the conveyed items. Additionally or alternatively, a particular sensor or sensors of the one or more sensors 38 may be placed on the conveyor portions 26 to acquire positional information of the items as the items are conveyed, may be placed on the swinging door 30 to track the items as they pass the pass-through 28, may be arranged on the surface of the dining table 14 to detect that an item has reached a position on the surface, and the like. The one or more sensors 38 may also acquire information used to determine whether an event (e.g., an error) has occurred in the system 10, such as a container 22 being blocked from movement within the dining table 14. The one or more sensors 38 may include laser sensors, optical sensors, capacitive sensors, pressure sensors, or other sensor types suitable for detecting positioning of the conveyed items or other status information for the system 10.

[0028] Likewise, the delivery cart 12 may include one or more sensors 40 to acquire sensor information of the items as they are loaded from a loader (e.g., cartridge) 36 to the transfer conveyor 24 and/or transferred to the dining table 14. The one or more sensors 40 may be positioned within the inside portion 34 of the delivery cart 12, around the pass-through 28, or elsewhere in, on, or around the delivery cart 12 to acquire sensor information of the items. Like the one or more sensors 38 of the dining table 14, the one or more sensors 40 of the delivery cart 12 may include laser sensors, optical sensors, capacitive sensors, or other sensor types suitable for detecting positioning of the

conveyed items or other status information for the system 10. In some embodiments the one or more sensors 40 differ in type from the one or more sensors 38.

[0029] The loader 36 may include a cartridge, and may store the items to be served to guests and may load them onto a transfer conveyor 24 of the delivery cart 12, such that they may then be transferred to the dining table 14. FIG. 4 illustrates a cross-sectional view of the delivery cart 12, including a loader 36. In the illustrated embodiment, the loader 36 includes a set of storage racks (e.g., shelves, holding racks) 52 separated vertically by a movably coupled loader rack 54. A loader lifter 56 may exert a force on the loader rack 54 and/or the storage racks 52 such that the storage racks 52 raise and descend along a path 58 within the delivery cart 12. In particular, the loader lifter 56 may cause one or more surfaces of the storage racks 52 to sequentially be positioned level with the transfer conveyor 24 to allow for an ordered transition of the dishes 50 from the loader rack 54 to the transfer conveyor 24 (which may represent multiple conveyors or a single conveyor).

[0030] In some embodiments, the storage racks 52 each include/incorporate a respective loader conveyor 53, and each respective loader conveyor 53 may facilitate transfer of one or more dishes 50 between the storage racks 52 and the transfer conveyor 24. During a loading phase, the respective loader conveyors 53 may operate to receive the dishes from the transfer conveyor 24 and during a transfer phase, the respective loader conveyors 53 may operate to transition the plates to the transfer conveyor 24 (which then transfers the dishes to the dining table 14). For example, when the delivery cart 12 is being loaded with the one or more dishes 50, a dish may be placed on the transfer conveyor 24 (e.g., by a cook or server), and the transfer conveyor 24 may convey the dish to one of the storage racks 52. The loader lifter 56 may then exert forces to cause the storage rack 52, and thus the dish, to descend into storage. At a subsequent time, such as when the delivery cart 12 is coupled to a dining table, the loader lifter 56 may exert forces to cause the storage rack 52, and thus the dish, to raise with respect to the transfer conveyor 24 such that the storage rack is cycled into an active position level with the transfer conveyor 24. The storage rack 52 may, via the respective loader conveyor 53, transfer the dish to the transfer conveyor 24. The transfer conveyor 24 may then convey the dish towards the pass-through 28 such that it may be transferred to the dining table 14. In some embodiments, separators may be

included as part of the loader 36 (e.g., as part of the loader rack 54) that may separate the storage racks 52 as they ascend and descend within the delivery cart 12. Each separator may include a spring, a cylinder, or other compressible element such that, when the storage racks approach an interior edge (e.g., top) of the delivery cart 12, the separators may compress to allow the storage racks 52 to continue ascending or descending without exiting the delivery cart 12.

[0031] While the illustrated example shows a loader 36 including a set of vertically separated storage racks 52 coupled via a loader rack 54 and movable via a loader lifter 56, other implementations are envisioned. For example, the loader may include rotating mechanism (e.g., a lazy-Susan), a horizontal arrangement of conveyors or storage racks, or other suitable mechanism for loading the one or more dishes 50 onto the transfer conveyor 24. One or more such features may be represented by element 48. In addition, the loader 36 may include roller conveyors, chain conveyors, screw conveyors, pneumatic conveyors, magnetic conveyors to convey the one or more dishes, and may include hydraulic cylinders, pneumatic cylinders, scissor lifts, boom lifts, platform lifts, magnet lifts, or other lift types to cause the one or more dishes to raise and descend with respect to the transfer conveyor 24. As described herein, the loader 36 may be loaded with the one or more dishes 50 and/or items such as food, beverages, cups, plates, utensils, or other items that may be served to a guest of an entertainment venue. Further, in some embodiments, the one or more dishes 50 may include, or be placed in or on, a container, such as the container 22 of FIG. 2.

[0032] The transfer conveyor 24 may transfer the one or more dishes 50 to the dining table 14 via the pass-through 28. Turning now to FIG. 5, a first dish 62 (e.g., of the one or more dishes 50) may enter the inside portion 20 of the dining table 14 such that the first dish 62 contacts conveyor portions 26. The conveyor portions 26 may then convey the first dish 62 in a direction of travel 60 towards a first target position lifter 64. When it is determined that the first dish 62 has reached the first target position lifter 64 via, for example, monitoring from one or more pressure sensors 65 coupled to the conveyor portions 26, the conveyor portions 26 may cause the first dish 62 to remain at the first target position lifter 64. Likewise, a second dish 66 and a third dish 70 may enter the inside portion 20 of the dining table 14, and the conveyor portions 26 may convey the

second dish 66 until it reaches a second target position lifter 68 and convey the third dish 70 until it reaches a third target position lifter 72.

[0033] As mentioned, each of the conveyor portions 26 may operate independently. For example, a first portion of the conveyor portions 26 at the first target position lifter 64 may pause conveyance (e.g., to cause the first dish 62 to remain at the first target position lifter 64), while a second portion of the conveyor portions 26 may continue to convey the second dish 66 towards the second target position lifter 68. Alternatively, each of the first dish 62, the second dish 66, and the third dish 70 may be transferred to dining table with a pre-determined distance separation or time interval separation, and the conveyor portions 26 may convey the first dish 62, the second dish 66, and the third dish 70 a corresponding pre-determined distance such that each dish reaches a respective target position lifter.

[0034] The table 14 may include a first target position lifter 64, a second target position lifter 68, and a third target position lifter 72 that may cause the first dish 62, the second dish 66, and the third dish 70, respectively, to ascend towards and/or transition to the surface of the dining table 14. Each of the aforementioned target position lifters may be coupled to, part of, or positioned near the conveyor portions 26 at respective target positions (e.g., corresponding target positions). In the illustrated embodiment, the first target position lifter 64, for instance, includes a scissor lift positioned below a respective conveyor portion 27 of one or more of the conveyor portions 26 and a lifter rack positioned on each side of the respective conveyor portion 27. While the first target position lifter 64, a second target position lifter 68, and a third target position lifter 72, which may each be described herein as respective lifters, are illustrated as including respective scissor lifts, in other embodiments, target position lifters may include hydraulic cylinders, pneumatic cylinders, boom lifts, platform lifts, magnet lifts, or other suitable lifts.

[0035] FIG. 6 illustrates a cross-sectional view of the dining table 14, in which the first target position lifter 64 the second target position lifter 68, and the third target position lifter 72 cause the first dish 62, the second dish 66, and the third dish 70, respectively, to ascend towards a surface 90 of the dining table 14. In the illustrated embodiment, the first dish 62 may reach the first target position lifter 64 prior to the second dish 66 reaching the second target position lifter 68. As such, the first target

position lifter 64 may cause the first dish 62 to ascend towards the surface 90 of the dining table 14 prior to the second target position lifter 68 causing the second dish 66 to ascend towards the surface 90 of the dining table 14. In other embodiments, each target position lifter may cause a respective dish to ascend in response to the dishes each reaching a respective target position lifter. As such, each dish may be lifted simultaneously.

[0036] In any case, the first dish 62, the second dish 66, and/or the third dish 70 may reach the surface 90 of the dining table 14 and may remain concealed from the view of guests by one or more concealments 74. The one or more concealments (e.g., respective concealments) 74 may also conceal respective table top ports (e.g., respective openings) via which each of the first dish 62, the second dish 66, and/or the third dish 70 reach the surface 90 of the dining table 14. The one or more concealments 74 may have an appearance of, for example, an ordinary food cover (e.g., stainless steel dome cover).

[0037] Turning now to FIG. 7, the concealments 74 may open to reveal the first dish 62, the second dish 66, and/or the third dish subsequent to the dishes reaching the surface 90. As illustrated, the concealments 74 may be coupled to the surface 90 via a hinge or other suitable movable coupling, and may open manually (e.g., via force exerted by a server) or may automatically open upon instruction from a controller to an automated actuator. Each concealment 74 may open simultaneously, may open according to a pre-defined order, or may open according to an order in which each of the first dish 62, the second dish 66, and/or the third dish 70 reaches the surface 90, as examples.

[0038] FIG. 8 is an overhead cross-sectional view of the system 88, in which the delivery cart 12 is coupled to a dining table 92. In particular, the dining table 92 includes a circular (e.g., roundtable) shape and a conveyor 94 that is accordingly circular. In addition, the delivery cart 12 includes a loading conveyor 96 for transferring items to the dining table 14 and an unloading conveyor 98 for receiving items (e.g., used dishes) from the dining table 92. In other embodiments, the loading conveyor 96 and/or the unloading conveyor 98 may be components of the table 92 that may extend toward the delivery cart 12 (e.g., via actuation about a hinge) during engagement and remain otherwise concealed. As illustrated, the loading conveyor 96 and the unloading conveyor 98 may be positioned adjacent to and laterally separated from each other. In

other embodiments, the loading conveyor 96 and the unloading conveyor 98 may be separated vertically, positioned on different sides of the delivery cart 12, or in another arrangement. As such, the dining table 92 may include separated entry and exit openings that may form ingress and egress pass-throughs for the loading conveyor 96 and the unloading conveyor 98, respectively. In yet another embodiment, the same conveyor may operate as both the loading conveyor 96 and the unloading conveyor 98. As discussed herein, the conveyor 94 may convey dishes in a counter-clockwise direction from the loading conveyor 96 to corresponding target location lifters. For example, as illustrated, the conveyor 94 may convey a first dish 100 to a first target position lifter 102, and may convey a second dish 104 to a second target position lifter 106.

[0039] In addition, the conveyor 94 may convey items from a target location lifter to the unloading conveyor 98. For example, after guests have finished dining, items, such as used dishes and/or food waste, here represented as used dish 107 and used dish 108, may be placed on the first target position lifter 102 and the second target position lifter 106. The target position lifter 102 and the target position lifter 106 may then cause the used dish 107 and the used dish 108, respectively, to descend such that they contact the conveyor 94. Subsequently, the conveyor 94 may convey the used dish 107 and the used dish 108 towards the unloading conveyor 98 of the delivery cart 12. The unloading conveyor 98 may receive the used dish 107 and the used dish 108, and may, for example, store each used dish in a dish receptacle included as part of the delivery cart 12. The receptacle may include, for example, a removable container, which may facilitate a process for dish removal and washing.

[0040] While the loading conveyor 96 and the unloading conveyor 98 are illustrated as separate conveyors, in some embodiments, loading and unloading functions may be performed by a single conveyor. For example, a bi-directional load-unload conveyor may both transfer dishes from the delivery cart 12 to the dining table 92 and transfer used dishes from the dining table 92 to the delivery cart 12. In addition, the conveyor 94 may change direction based on a type of item being conveyed or other status of the system 88. For instance, the conveyor 94 may rotate in counter-clockwise direction to convey dishes from the delivery cart 12 to corresponding target position lifters, and

may rotate in a clockwise direction to convey items from target position lifters to the delivery cart 12.

[0041] In some cases, it may be practicable to omit a delivery cart and instead transfer dishes directly from a food preparation area to a dining table in a separate dining area. As illustrated in FIG. 9, for instance, an edge of the dining table 14 and a food preparation area 122 may include a common wall 124 or other divider, and dishes 126 may be conveyed from the food preparation area 122 through a pass-through 128 to the inside portion 20 of the dining table 14. In particular, dishes 126 may be placed on a preparation conveyor 130 by, for example, a chef. The preparation conveyor 130 may be accessible from the food preparation area 122, and may be positioned near food preparation devices used to prepare the dishes 126, such as an oven 132. The preparation conveyor may convey the dishes 126 through the pass-through 128, such that the dishes 126 contact the conveyor portions 26 of the dining table 14, and the conveyor portions 26 may then convey the dishes 126 to a target position lifter (e.g., the target position lifters 64, 78, 72). Subsequently, corresponding target position lifters may cause the dishes 126 to ascend to the surface 90 of the dining table 14. In some embodiments, the preparation conveyor 130 and the conveyor portions 26 of the dining table 14 may be combined or included as part of a single conveyor that conveys dishes 126 from the food preparation area 122 to the target position lifters.

[0042] As with the system 88 of FIG. 8, the system 120 may be implemented such that items such as used dishes may be transported from the dining area 123 to a dishwashing area. For example, the conveyor portions 26 of the dining table 14 may convey dishes 126 in a first direction (e.g., towards the target position lifters), and may convey used dishes in a second direction (e.g., towards a dishwashing area). The dining table 14 may be coupled to both the preparation conveyor 130 and a separate unloading conveyor, such that dishes 126 may be loaded onto the conveyor portions 26 in the food preparation area 122 and used dishes may be unloaded in a separate dishwashing area.

[0043] While the wall 124 divides the food preparation area 122 and the dining area 123 in the illustrated embodiment, in other embodiments, such as those that are part of a multi-level entertainment venue, a floor or ceiling may divide the food preparation area 122 and the dining area 123. That is, the food preparation area 122 may be beneath or above the dining table 14, and the dishes 126 may be conveyed (e.g., lifted) below

or above the food preparation area 122 such that the dishes 126 contact the conveyor portions 26. For example, the preparation conveyor 130 may include a lift including a loader, such as the loader 36 of FIG. 4. In such cases, the dining table may extend to a floor or ceiling of the entertainment venue, and openings in the dining table and floor or ceiling may create a pass-through by which dishes may be transferred to the conveyor portions 26.

[0044] FIG. 10 illustrates a flow chart of a method 200 for concealed delivery of dishes to guests of an entertainment venue using a dining table and a delivery cart. In block 202, the dining table may couple to the delivery cart. The delivery cart may, via forces exerted by a server of the entertainment venue, move to contact the dining table, and coupling mechanisms on the dining table and/or delivery cart may maintain a position of the delivery cart with respect to the dining table. In particular, a conveyor portion of the dining table may contact or be positioned sufficiently near a cart conveyor (e.g., cart conveyor system) of the delivery cart such that items may be received at an inside portion of the dining table from the delivery cart. This may include extending a conveyor belt (e.g., via actuation about hinge) from one of the delivery cart or the dining table to the other of the delivery cart or dining table.

[0045] In block 204, dishes may be received at the dining table from the delivery cart. As described herein, the conveyor portion of the delivery cart may iteratively convey dishes towards the inside portion of the dining table such that the dishes contact a conveyor portion of the dining table. As such, dishes may be transferred from the delivery cart to the dining table.

[0046] In block 206, conveyor portions of the dining table may convey dishes towards target position lifts in the inside portion of the dining table. While the dishes are being conveyed towards the target position lifts, respective positions of each dish may be monitored via, for example, one or more sensors included as part of the dining table and/or cart. As discussed herein, the one or more sensors may include distance sensors, optical sensors, and the like to monitor respective positions of each dish as each dish is conveyed towards respective target position lifts. Additionally or alternatively, a pressure sensor positioned near a target position lift may acquire sensor information (e.g., monitor pressures) indicative of a dish reaching the target position lift to determine that a dish has reached a corresponding target position lift.

[0047] In block 210, target position lifts may lift dishes towards a surface (e.g., top surface) of the dining table. A target position lift may trigger to exert a force on a respective dish in response to, for example, a pressure sensor determining that the receptive dish has reached the target position lift, which may cause the respective dish to ascend towards the surface of the dining table. The target position lift may be included as part of a conveyor portion of the dining table or may be positioned proximate to the conveyor portions, and may include scissor lifts, pneumatic cylinder lifts, and the like.

[0048] In block 212, an indication is sent to unveil the dishes. The indication may include instructions to open a concealment via an automated actuator, or instructions to present a visual indication (e.g., LED status indicator) to a server of the entertainment venue to remove the concealment. The indication may be sent in response to, for example, the one or more sensors of the dining table acquiring information indicative of the dishes reaching the surface of the dining table. For example, an optical sensor within the concealment may determine that a dish has entered the concealment and, in response, instructions may be sent to cause the concealment to open.

[0049] FIG. 11 illustrates a block diagram of a control system 300 for a serving delivery concealment system (e.g., the system 10 of FIGS. 1-2). In particular, the control system 300 may include a table controller 302 and a cart controller 304. Each of the table controller 302 and the cart controller 304 may be included as part of a dining table, a delivery cart, a wayside location of an entertainment venue, or a combination thereof. For example, the table controller 302 may be included as part of the dining table or the delivery cart, or may be located in a food preparation area, a server station, or the like. The table controller 302 and the cart controller 304 may communicate with the dining table and the delivery cart, respectively, via wired connection (e.g., Ethernet, USB, Serial), wireless connection (e.g., Wi-Fi, Bluetooth connection, RFID), or a combination thereof and suitable communication circuitry. Likewise, the table controller 302 and the cart controller may be communicatively coupled via wired and/or wireless connection and the suitable communication circuitry.

[0050] The table controller 302 may facilitate, for example, control functions of components of the dining table, such as conveyor portions, target position lifts, and concealments. The table controller 302 may include, for instance, processing circuitry

306, a memory 308, and at least one storage 312 (e.g., non-transitory computer readable media, such as, but not limited to, a hard disk device, a solid-state disk device, a flash memory device). The processing circuitry 82 may include one or more suitable processors that can execute instructions loaded onto the memory 308 from the storage 312 for carrying out the presently disclosed techniques, such as a general-purpose processor, system-on-chip (SoC) device, an application-specific integrated circuit (ASIC), a processor of a programmable logic controller (PLC), a processor of an industrial PC (IPC), or some other similar processor configuration. These instructions are encoded in programs or processor-executable code stored in a tangible, non-transitory, computer-readable medium. The storage 312 may store machine-readable and/or processor-executable instructions (e.g., firmware or software) to load onto the memory 308 for the processing circuitry 306 to execute. The instructions may include, for example, conveyor routines 314 relating to controlling conveyor portions. The conveyor routines 314 may facilitate, for example, determining a speed or duration of conveyance to convey a dish to a target position lift. The instructions may also include lift routines 315 for controlling target position lifts, instructions relating detecting that dishes have reached a target position lift, instructions for determining that dishes have reached a surface of the dining table, instructions for detecting an error in dish conveyance or lifting, or instructions for instructing one or more visual indicators 310 to display an indication that dishes have reached the surface of the dining table. In addition, the instructions stored in the storage 312 may execute control functions based on sensor data (e.g., positional data, pressure data) acquired by one or more sensors 318. The memory 308 may store, for example, control software, look up tables, configuration data, and so forth. The memory 308 may include a tangible, non-transitory, machine-readable-medium, such as a volatile memory (e.g., a random access memory (RAM)) and/or a nonvolatile memory (e.g., a read-only memory (ROM), flash memory, hard drive, and/or any other suitable optical, magnetic, or solid-state storage medium). The memory 308 may store guest information (e.g., menu orders), calibration data of the dining table, and so on.

[0051] The one or more visual indicators 310 may present status information related to the dining table and may include light-emitting diodes (LEDs), displays, or the like. For example, the processing circuitry 306 may send a signal to the one or more visual indicators 310 indicative of instructions to display an indication of a dish reaching the

surface of the dining table. Further, the processing circuitry 306 may send a signal to the one or more visual indicators 310 indicative of instructions to display an indication of an error in conveying a dish in response to, for example, sensor data from the one or more sensors 318 indicating that a dish has been obstructed along the conveyor portions of the dining table. In some embodiments, the one or more visual indicators 310 may display status indicators based on instructions from the processing circuitry 320 of the cart controller 304. Additionally, in some embodiments, the one or more visual indicators 310 may be positioned remote from the table and/or delivery cart in, for example, a food preparation area, a server station, or the like, such that servers may observe statuses of the control system 300.

[0052] The cart controller 304 may facilitate, for example, control functions of components of the delivery cart, such as a transfer conveyor and a loader. The cart controller 304 may include, for instance, processing circuitry 320, a memory 322, and at least one storage 326 (e.g., non-transitory computer readable media, such as, but not limited to, a hard disk device, a solid-state disk device, a flash memory device). The processing circuitry 320 may include one or more suitable processors that can execute instructions loaded onto the memory 322 from the storage 326 for carrying out the presently disclosed techniques, such as a general-purpose processor, system-on-chip (SoC) device, an application-specific integrated circuit (ASIC), a processor of a programmable logic controller (PLC), a processor of an industrial PC (IPC), or some other similar processor configuration. These instructions are encoded in programs or processor-executable code stored in a tangible, non-transitory, computer-readable medium. The storage 326 may store machine-readable and/or processor-executable instructions (e.g., firmware or software) to load onto the memory 308 for the processing circuitry 306 to execute. The instructions may include, for example, loader routines 328 that may determine an order with which dishes are placed on the transfer conveyor based on, for example, a mapping of guests and dish orders. The instructions may also include instructions relating to controlling the transfer conveyor, instructions for detecting an error in dish conveyance or loading, or instructions for instructing one or more visual indicators 310 to display an indication that dishes have been transferred to the dining table. In addition, the instructions stored in the storage 326 may execute control functions based on sensor data (e.g., positional data, pressure data) acquired by one or more sensors 330. The memory 322 may store, for example, control software,

look up tables, configuration data, and so forth. The memory 322 may include a tangible, non-transitory, machine-readable-medium, such as a volatile memory (e.g., a random access memory (RAM)) and/or a nonvolatile memory (e.g., a read-only memory (ROM), flash memory, hard drive, and/or any other suitable optical, magnetic, or solid-state storage medium). The memory 322 may store a mapping between guest order and dishes stored in the loader, calibration data of the loader, and so on.

[0053] While only certain features of the invention have been illustrated and described herein, many modifications and changes will occur to those skilled in the art. It is, therefore, to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit of the invention.

[0054] The techniques presented and claimed herein are referenced and applied to material objects and concrete examples of a practical nature that demonstrably improve the present technical field and, as such, are not abstract, intangible or purely theoretical. Further, if any claims appended to the end of this specification contain one or more elements designated as “means for (perform)ing (a function)...” or “step for (perform)ing (a function)...”, it is intended that such elements are to be interpreted under 35 U.S.C. 112(f). However, for any claims containing elements designated in any other manner, it is intended that such elements are not to be interpreted under 35 U.S.C. 112(f).

CLAIMS

1. A serving presentation system, comprising:
 - a mobile cart comprising a cart housing defining a cart cavity;
 - a first port in the cart housing;
 - a cart conveyor system disposed within the cart cavity and configured to convey a serving from the cart cavity toward the first port;
 - a table comprising a table housing defining a table cavity and a table surface with a table top port configured to receive the serving therethrough;
 - a second port in the table housing that is configured to align and/or engage with the first port to define a passage between the cart cavity and the table cavity;
 - a table conveyor system disposed within the table cavity and configured to convey the serving into the table cavity from the cart conveyor; and
 - a lifter configured to transition the serving from the table cavity through the table top port.
2. The serving presentation system of claim 1, wherein the cart conveyor system comprises a cartridge comprising a plurality of shelves configured to hold a plurality of servings.
3. The serving presentation system of claim 2, wherein each shelf of the plurality of shelves comprises a respective conveyor portion configured to be cycled into an active position by the cartridge such that the respective conveyor portion can transition a respective serving toward the first port.
4. The serving presentation system of claim 1, wherein the cart conveyor system is configured with a shelf which tilts when actuated to cause a serving placed thereon to slide toward the first port.
5. The serving presentation system of claim 1, wherein the cart conveyor system comprises a first conveyor belt and the table conveyor system comprises a second conveyor belt.

6. The serving presentation system of claim 1, wherein the cart conveyor system comprises a loader configured to convey the serving into the cart cavity.

7. The serving presentation system of claim 1, a first door of the first port and a second door of the second port, wherein the first door and the second door are configured to:

close to block the passage in a detached system configuration and

open to provide access to the passage in an engaged system configuration.

8. The serving presentation system of claim 1, wherein, in an engaged system configuration, the table conveyor system is configured to extend into the table cavity and/or the cart conveyor system is configured to extend into the table cavity.

9. The serving presentation system of claim 1, wherein the table conveyor system comprises a plurality of conveyor segments and each segment of the plurality of conveyor segments comprises a respective lifter configured to be actuated to lift a respective serving into a respective table top port of a plurality of table top ports.

10. The serving presentation system of claim 1, wherein the table top port is one of a plurality of table top ports and each respective table top port of the plurality of table top ports comprises a respective concealment configured to be actuated to cover or expose the respective table top port.

11. The serving presentation system of claim 1, comprising one or more sensors configured to monitor positioning of the serving relative to the table top port and actuate the lifter based on the positioning.

12. A serving presentation method, comprising:

receiving, at a conveyor system within a cavity defined by a table housing of a table, one or more dishes sequentially via an ingress opening in the table housing, wherein the table housing is configured to conceal the cavity;

conveying, via the conveyor system, each of the one or more dishes to a corresponding target position along the conveyor system; and

actuating one or more lifters to lift each dish from its corresponding target position through a respective table top port to a surface of the table.

13. The method of claim 12, comprising:

monitoring, via one or more sensors, respective positions of each of the one or more dishes as each of the one or more dishes is conveyed via the conveyor system; and

determining, via the one or more sensors, that the one or more dishes are in position for lifting to trigger actuating the one or more lifters.

14. The method of claim 13, wherein the one or more sensors comprise one

or more pressure sensors configured to monitor pressures along the conveyor system at each of the corresponding target positions.

15. The method of claim 12, comprising:

actuating the one or more respective lifters to cause the one or more dishes to descend from the surface of the table through the respective table top ports to the conveyor system; and

conveying, via the conveyor system, each of the one or more dishes to an egress opening in the table housing.

16. The method of claim 15, comprising:

conveying, via the conveyor system, each of the one or more dishes to a dish receptacle via the egress opening.

17. A serving presentation table, comprising:

a table housing defining a table cavity with an entry port on a side surface of the table housing and a table top port on a top surface of the table housing, the entry port and the table top port configured to allow a serving to enter and exit the table cavity therethrough;

a table conveyor system disposed within the table cavity and configured to convey the serving into the table cavity through the entry port;

a lifter configured to transition the serving from the table cavity through the table top port; and

a concealer configured to conceal the table top port during transition of the serving through the table to port and to open to reveal the serving when the serving is positioned in or above the table top port.

18. The serving presentation table of claim 17, wherein the table conveyor system comprises a plurality of conveyor segments and each segment of the plurality of conveyor segments comprises a respective lifter configured to be actuated to lift a respective serving into a respective table top port of a plurality of table top ports.

19. The serving presentation table of claim 18, wherein the plurality of conveyor segments comprises one or more belt conveyors, roller conveyors, chain conveyors, motorized conveyors, or a combination thereof.

20. The serving presentation table of claim 17, wherein each respective lifter comprises a scissor lifter, a pulley lifter, or a hydraulic lifter.

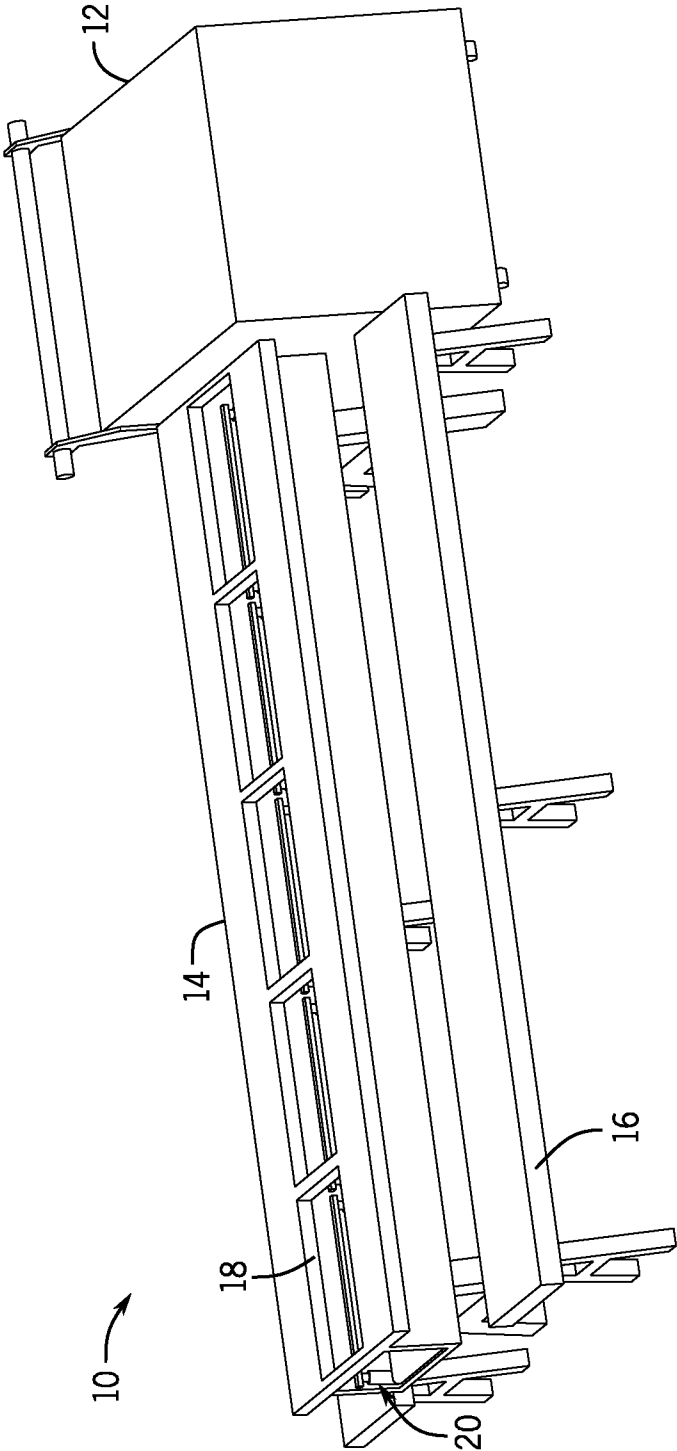


FIG. 1

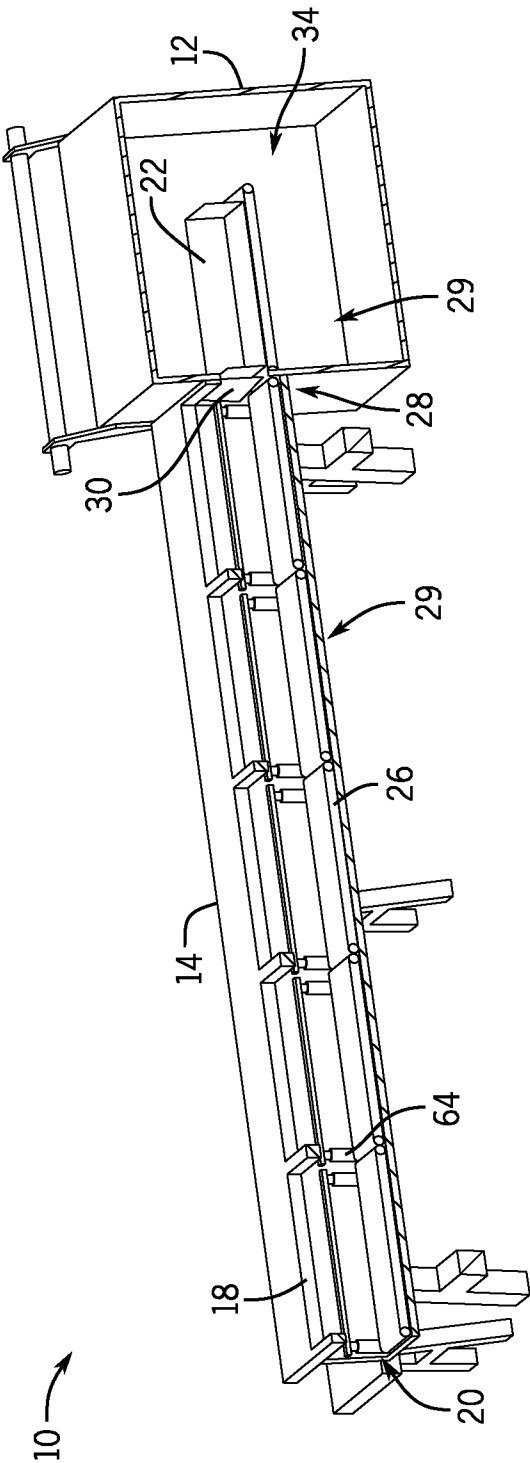


FIG. 2

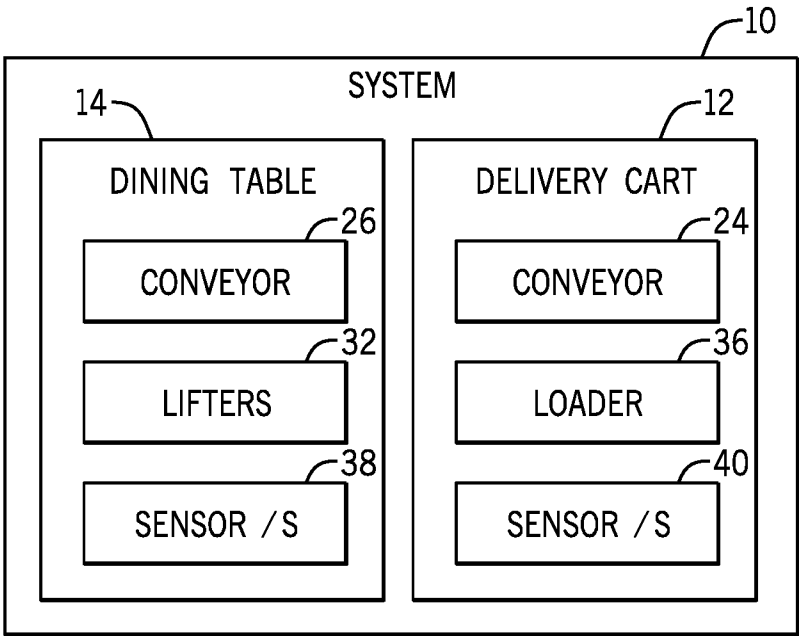


FIG. 3

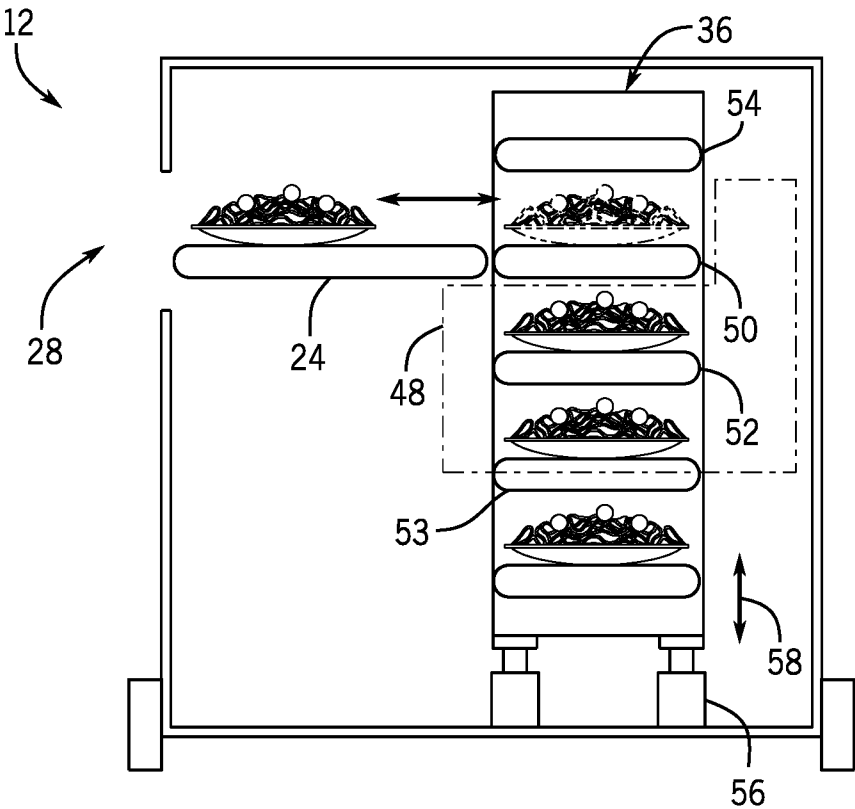
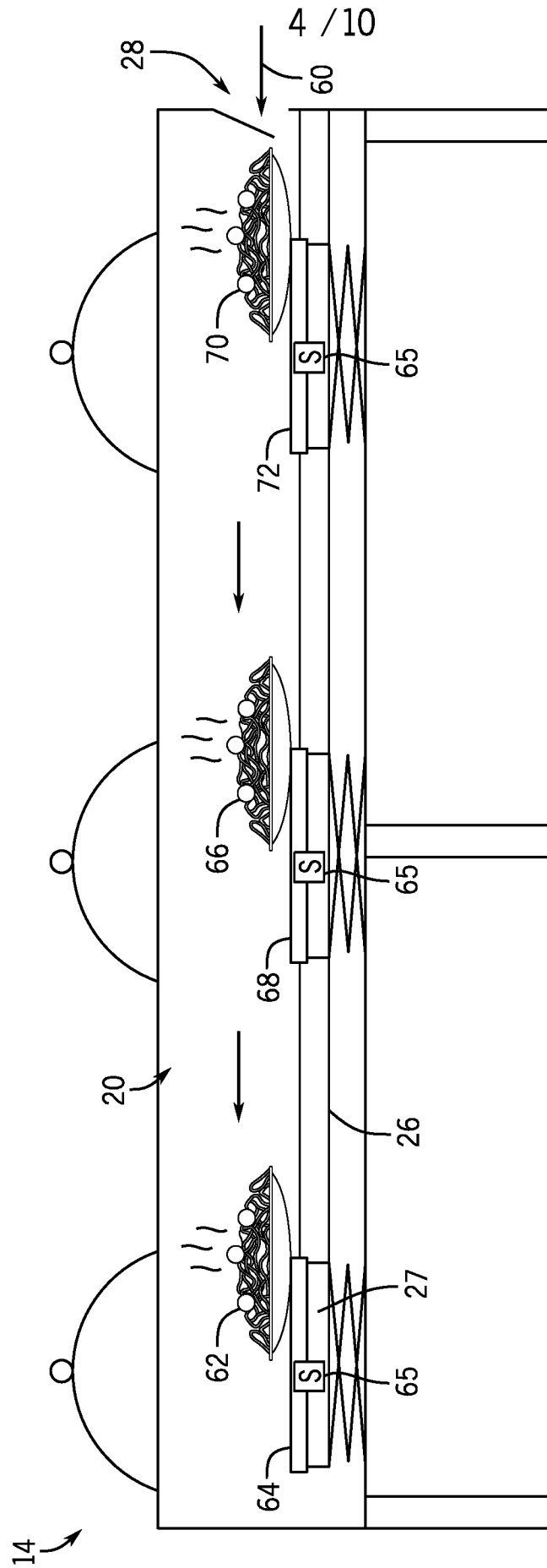


FIG. 4



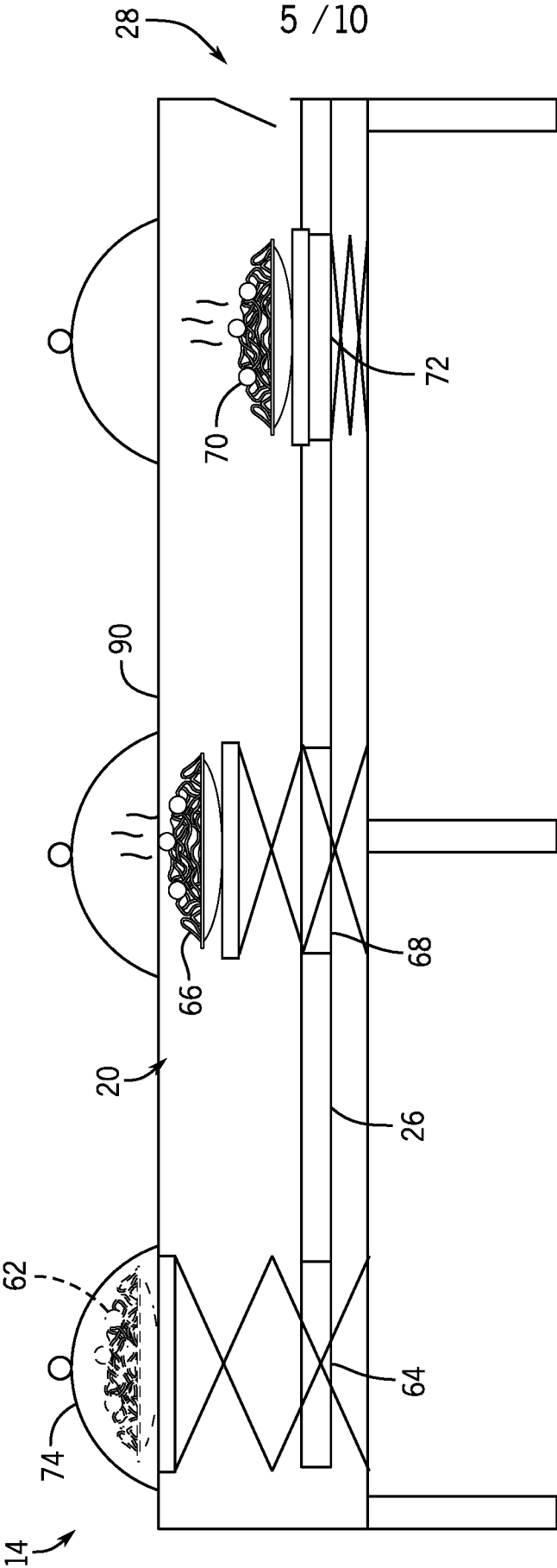
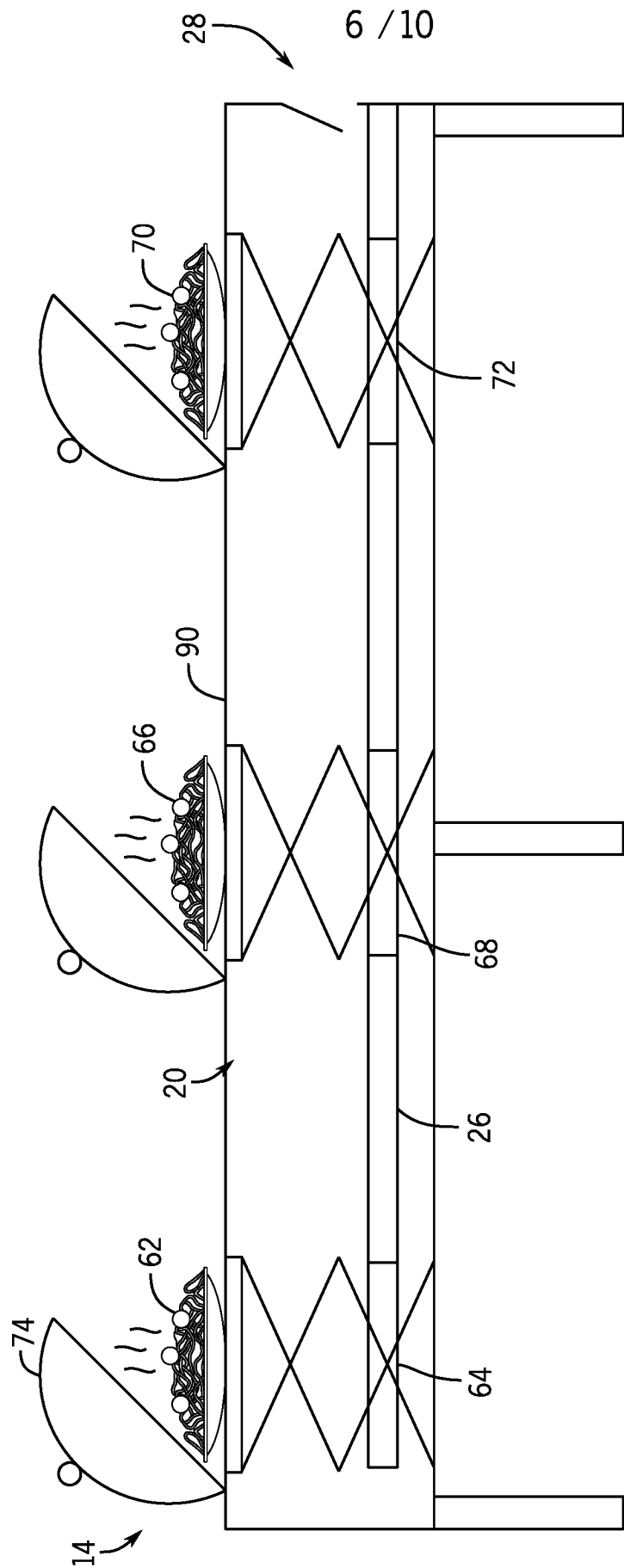


FIG. 6



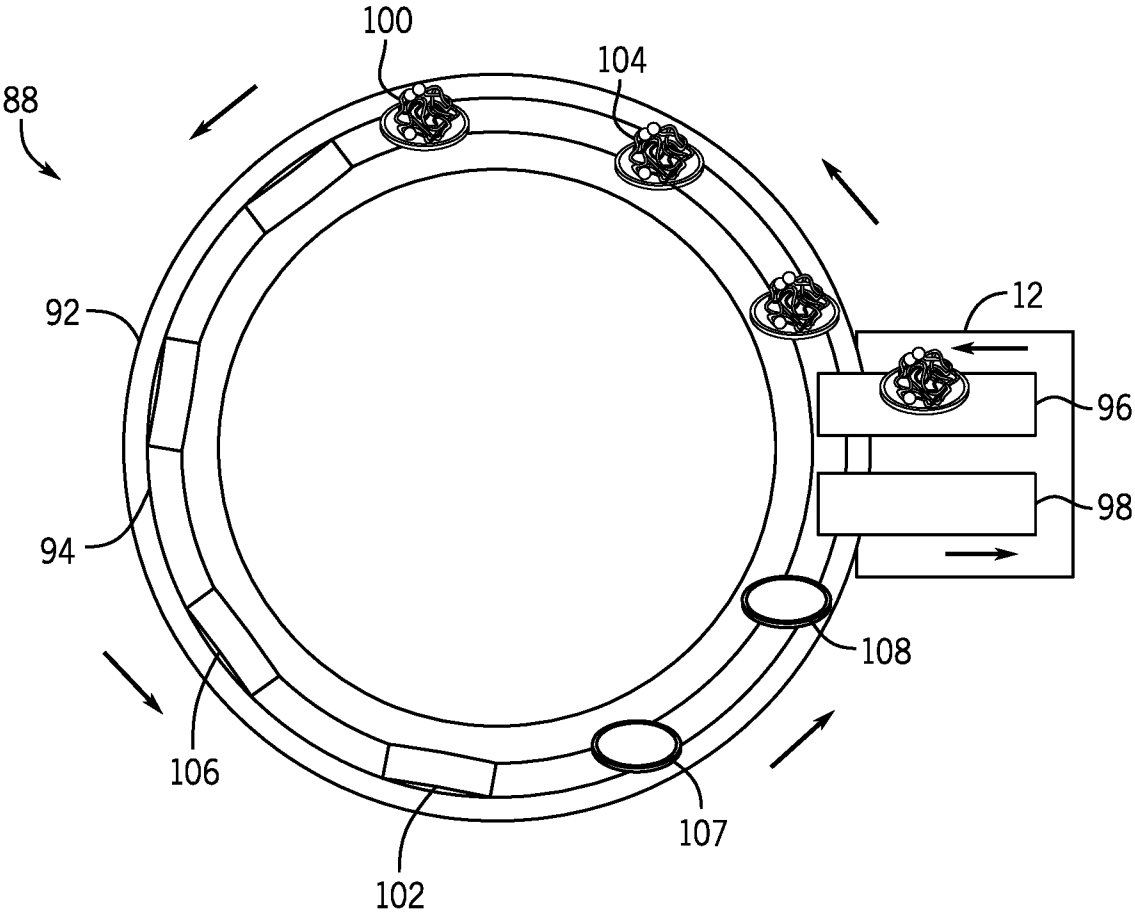


FIG. 8

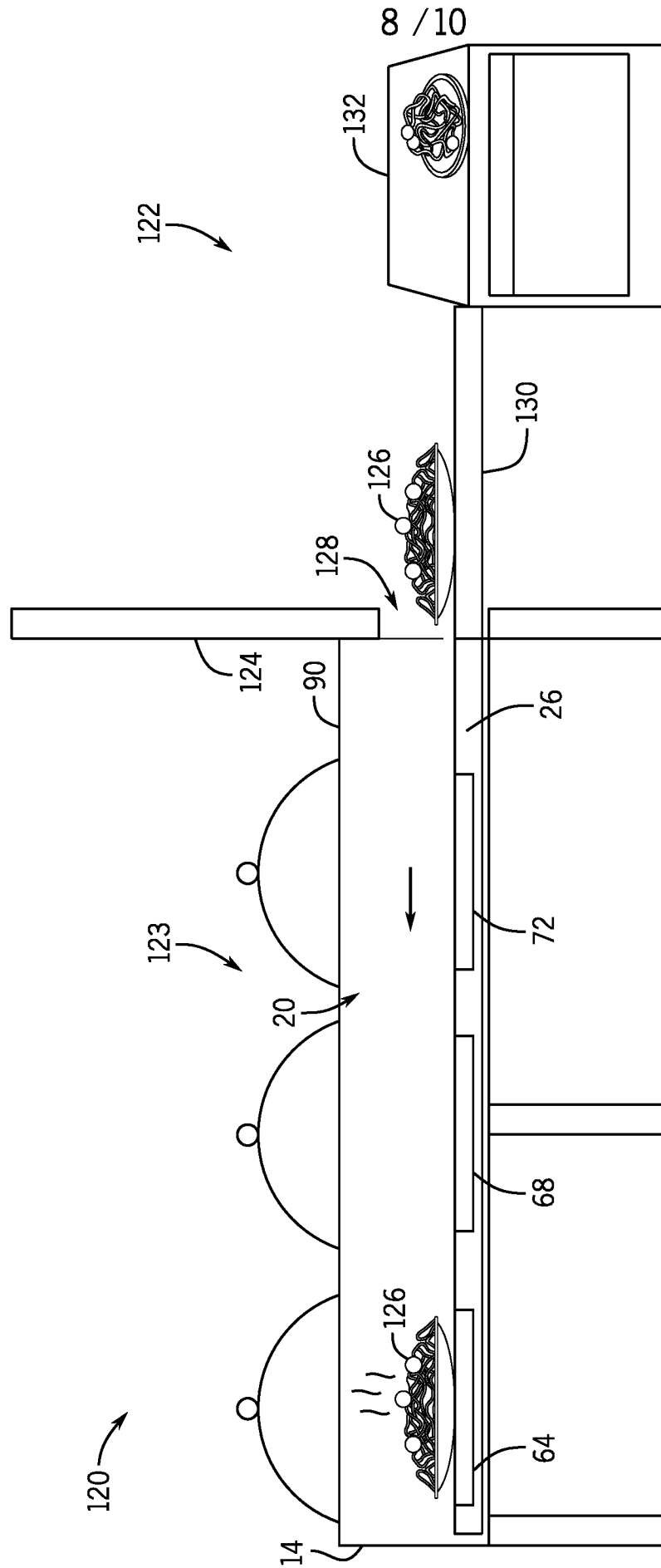


FIG. 9

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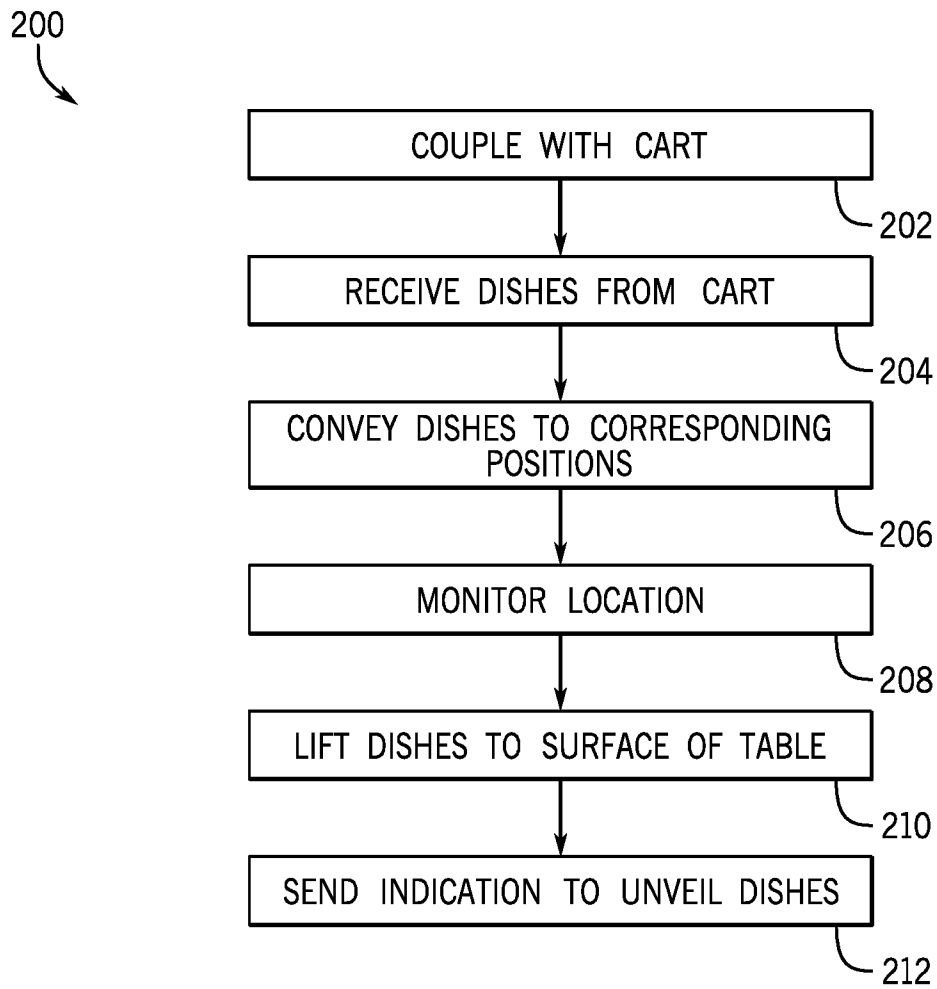


FIG. 10

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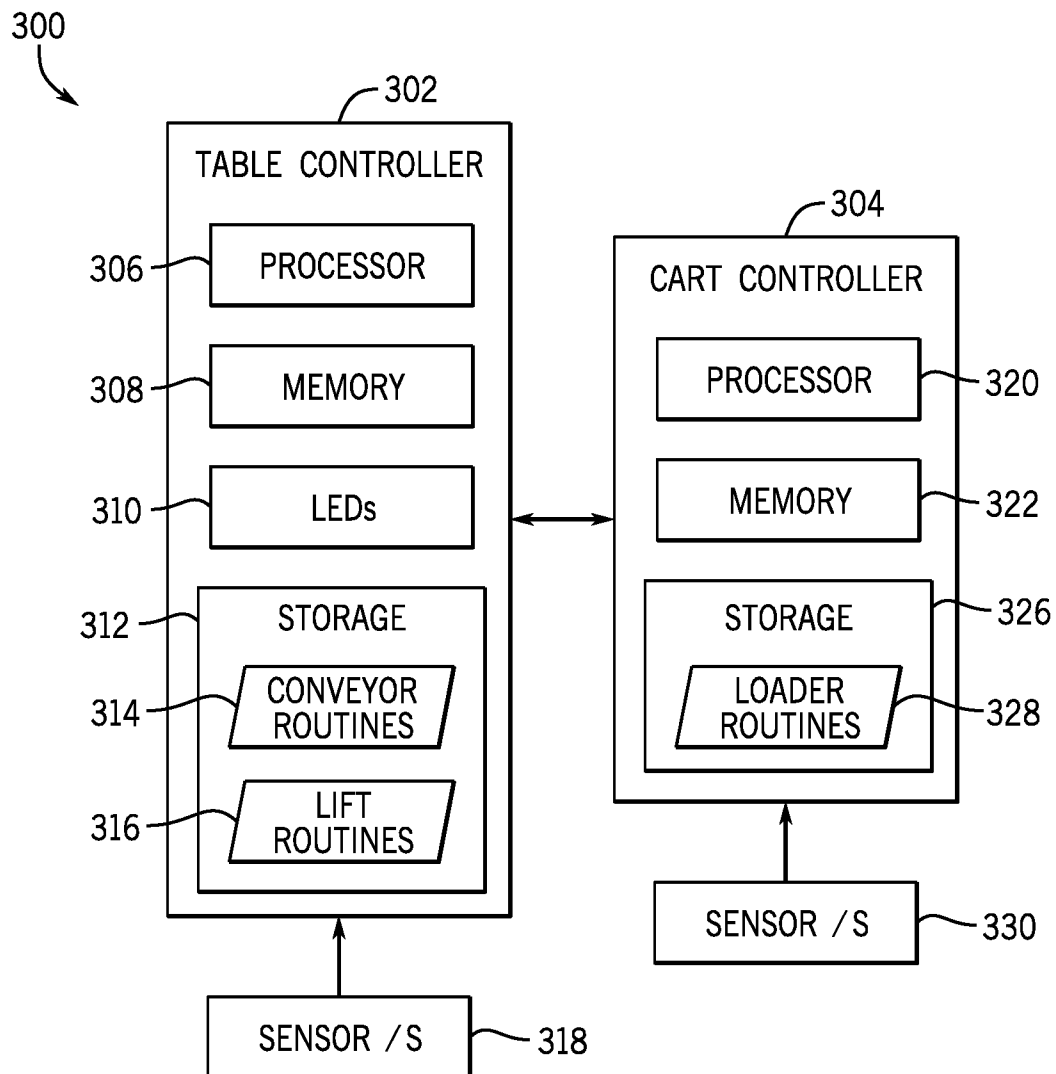


FIG. 11

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2024/060590

A. CLASSIFICATION OF SUBJECT MATTER

INV. A47F10/06

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47F A47B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 36 02 342 C1 (LUKESCH ROBERT) 25 June 1987 (1987-06-25) figures 1-4 -----	12-17, 20
A	US 2002/088671 A1 (TANAKA KUNIHICO [JP]) 11 July 2002 (2002-07-11) the whole document -----	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"E" earlier application or patent but published on or after the international filing date

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

10 February 2025

Date of mailing of the international search report

24/02/2025

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Authorized officer

Linden, Stefan

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2024/060590

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
DE 3602342	C1	25-06-1987	NONE			

US 2002088671	A1	11-07-2002	JP	2002204742 A		23-07-2002
			US	2002088671 A1		11-07-2002
