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Hawken

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(54) **MODULAR VALVE ARRAY HAVING A SINGLE DISPENSE POINT**

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B67D 1/08 (2006.01)
B67D 1/12 (2006.01)

(52) **U.S. Cl.**
CPC ***B67D 1/0085*** (2013.01); *B67D 1/0021* (2013.01); *B67D 1/0024* (2013.01); *B67D 1/0044* (2013.01); *B67D 1/0888* (2013.01); *B67D 1/1202* (2013.01); *B67D 2001/0094* (2013.01); *B67D 2210/0006* (2013.01)

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USPC 222/129.1, 132, 135, 145.2, 460–462, 222/478–489, 566–571, 330, 145.1, 222/144.5; 137/884
See application file for complete search history.

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(57) **ABSTRACT**

The invention relates to a valve dispensing system that can be used in a beverage dispenser. In particular, the valve dispensing system has individual valve module components that control the flow of a beverage or beverage component, and a plurality of valve module components may be combined to form a system capable of dispensing a plurality of beverages and/or beverage components.

15 Claims, 5 Drawing Sheets

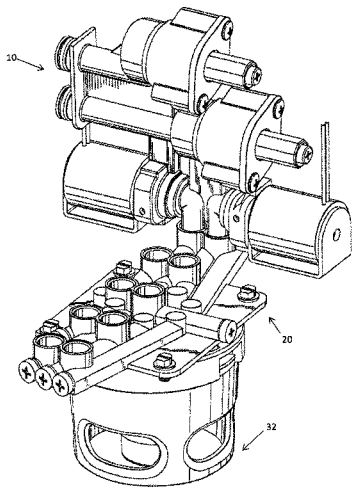

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Fig. 1

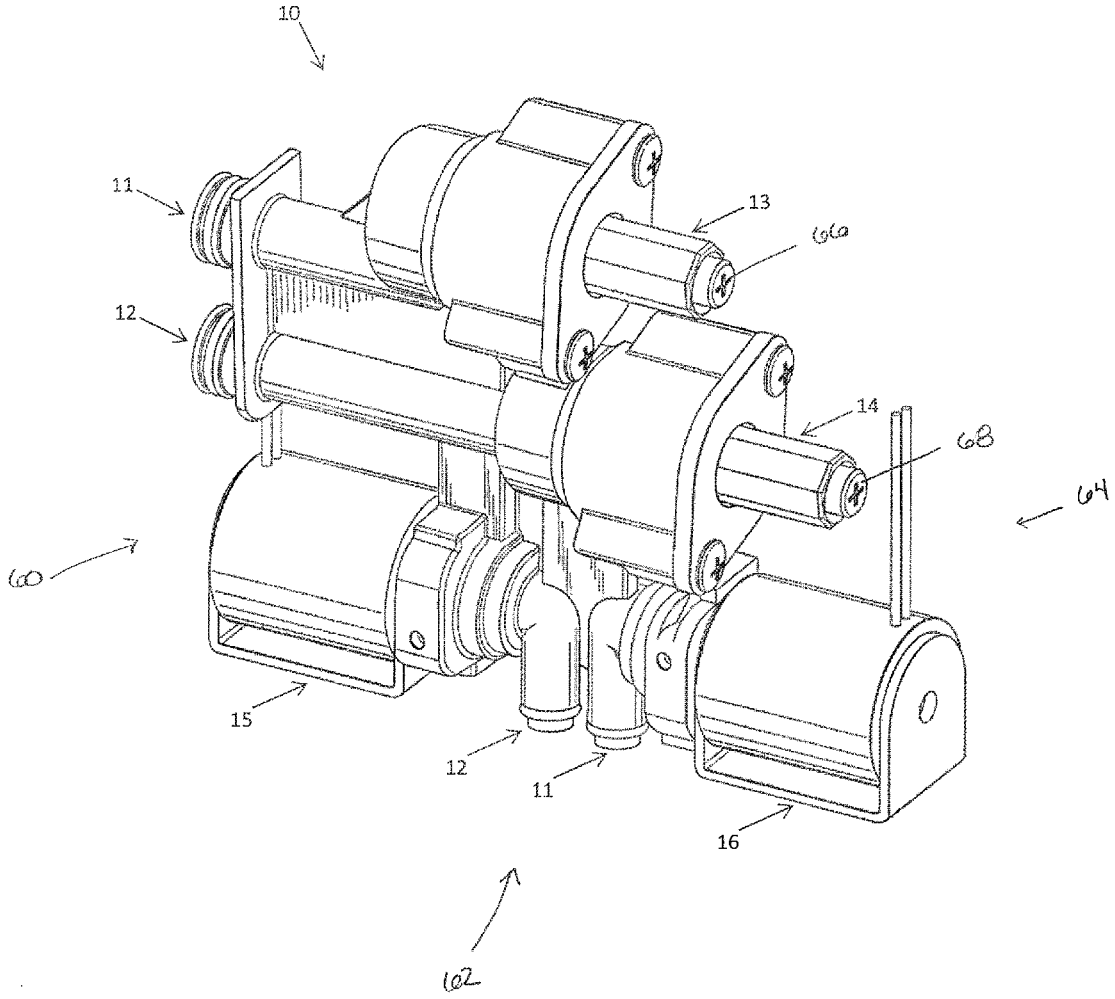

Fig. 2

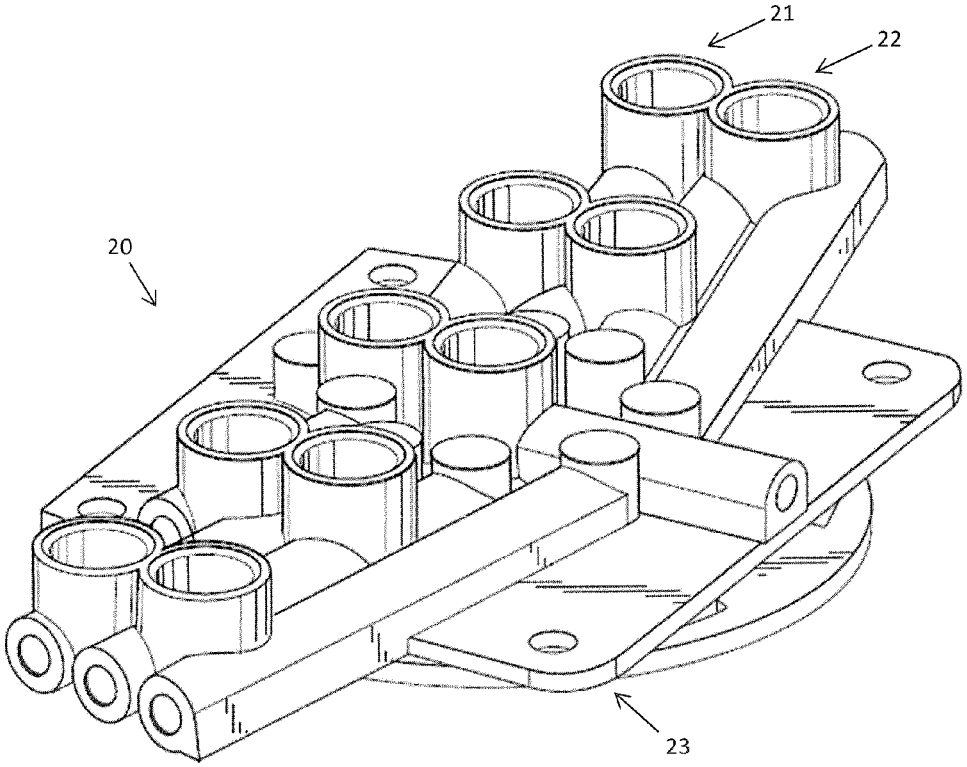

Fig. 3

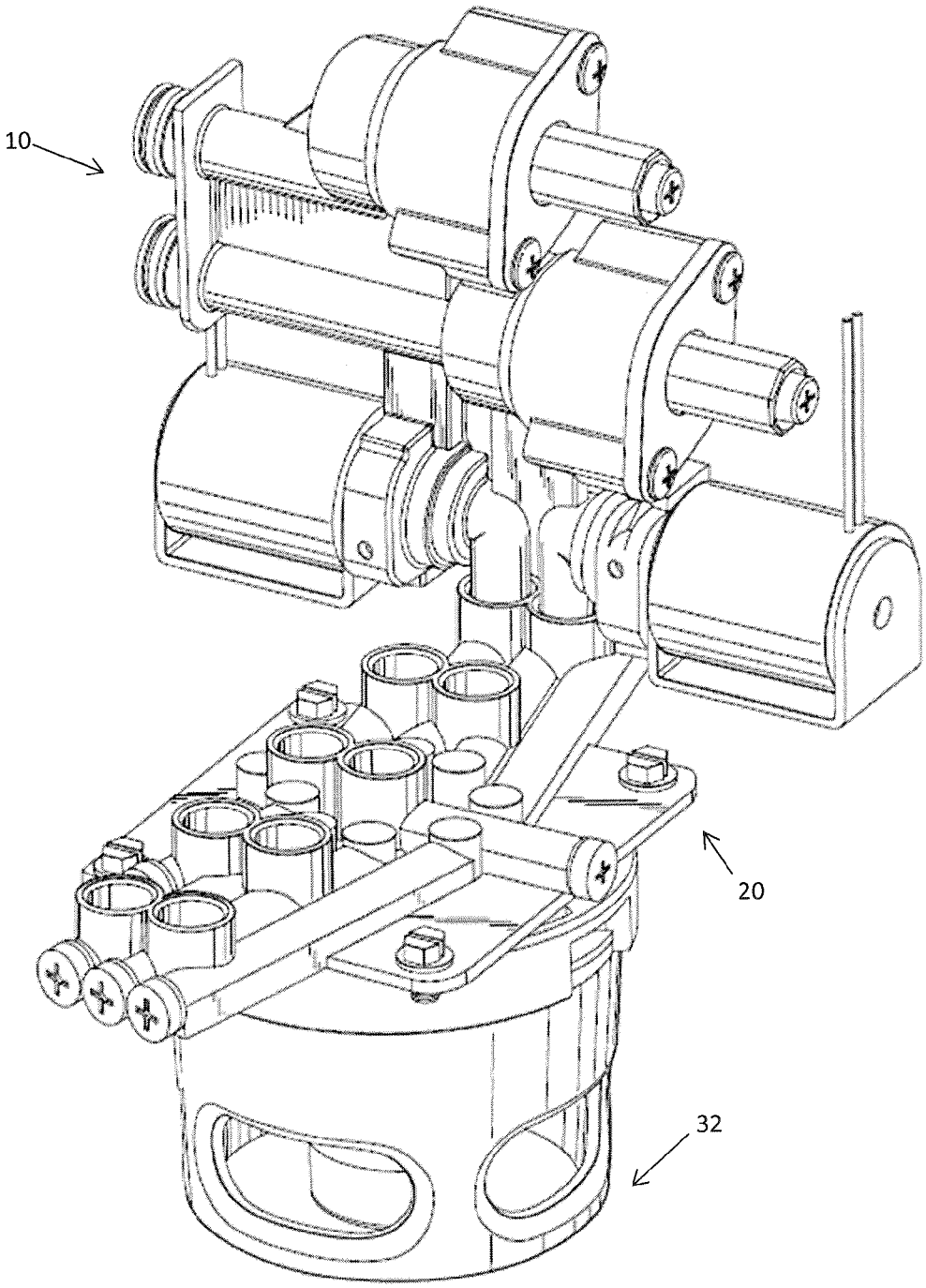

Fig. 4

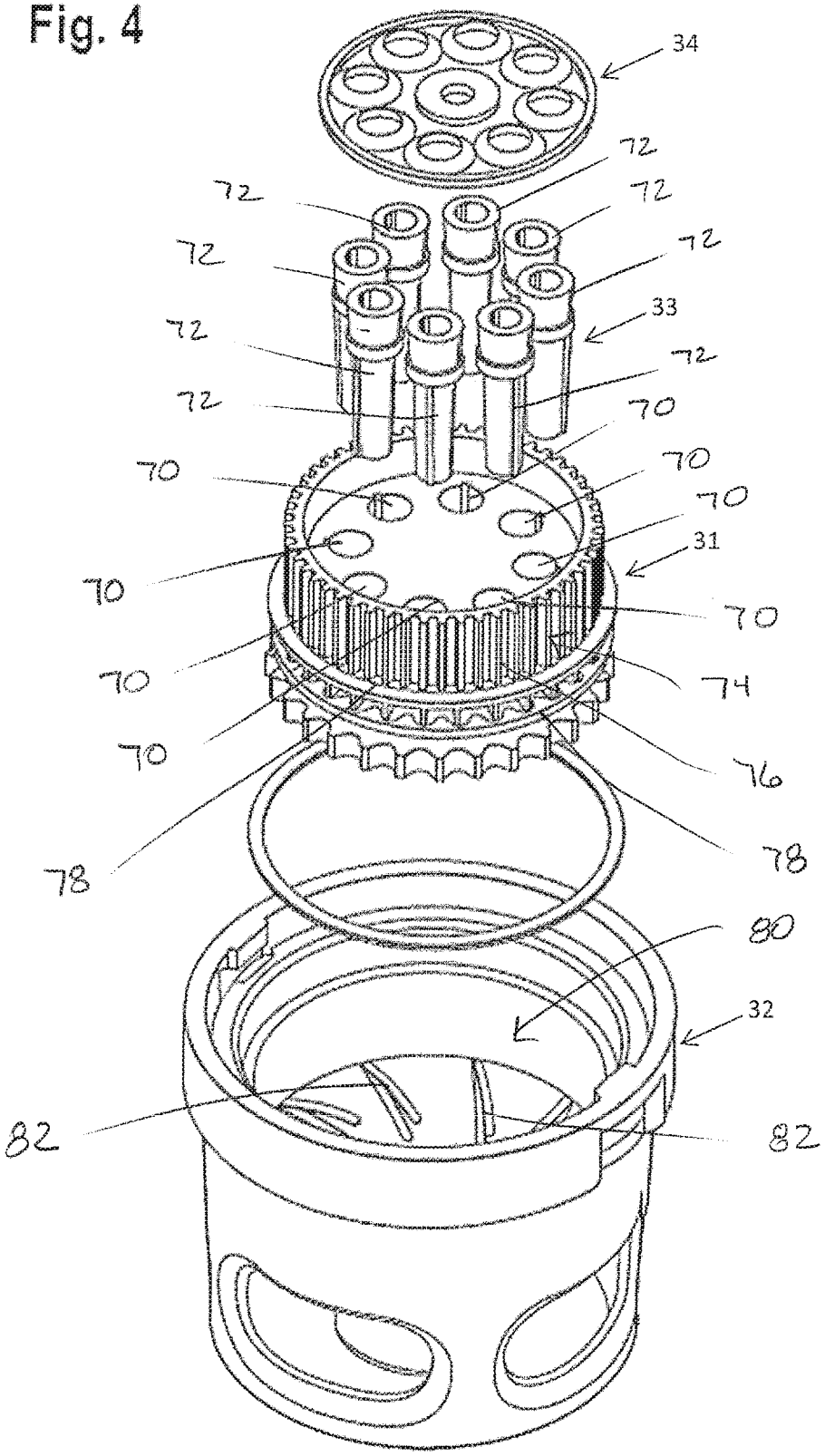
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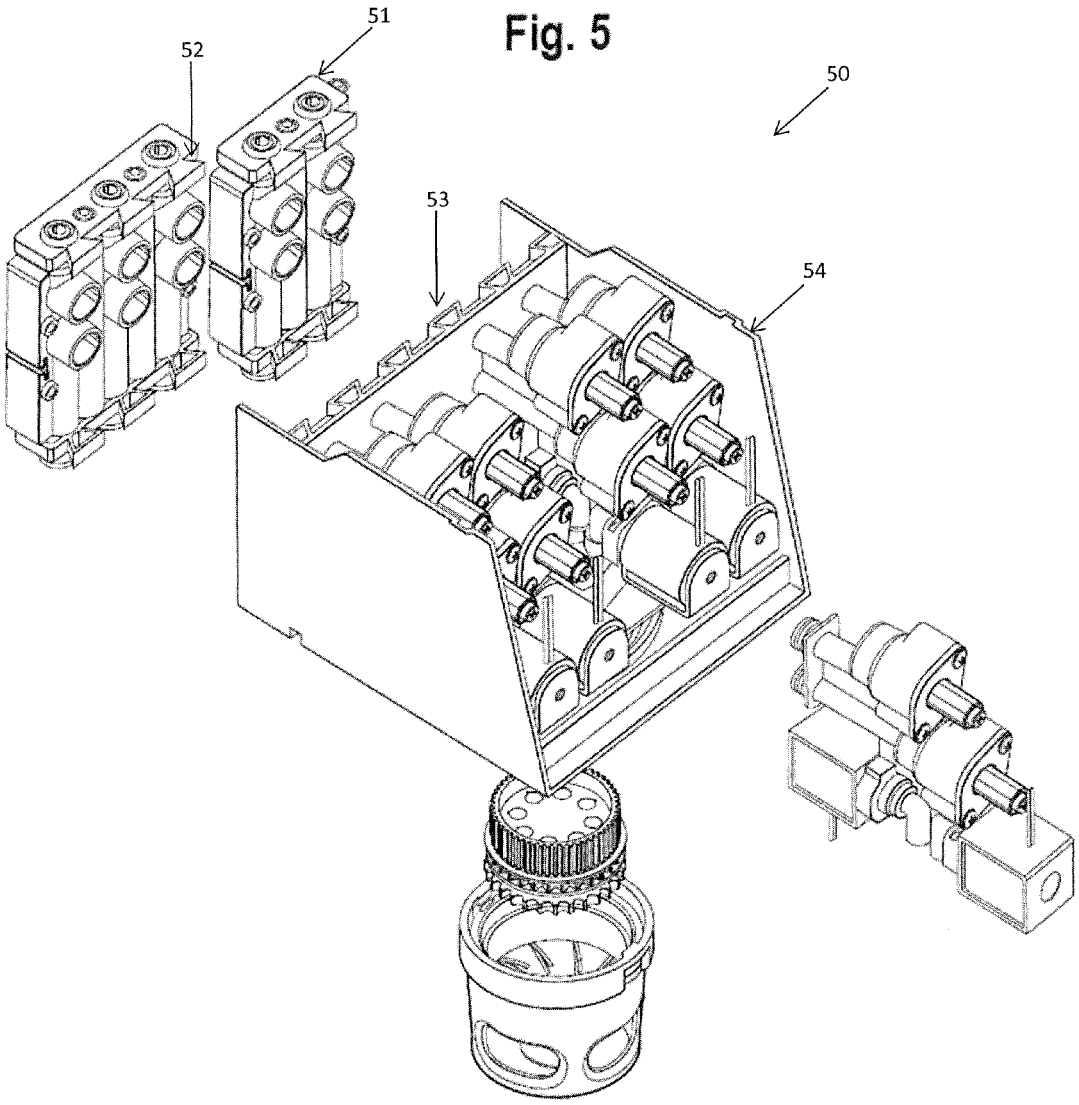
Fig. 5



MODULAR VALVE ARRAY HAVING A SINGLE DISPENSE POINT

This Application claims the benefit of the filing date under 35 U.S.C. §119(e) of U.S. Provisional Application No. 61/832,599, filed on Jun. 7, 2013, which is hereby incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to the field of beverage dispensers, and more particularly to a modular valve assembly in which an array of valve modules are connected to a manifold for dispensing multiple different beverages through a single nozzle dispense point.

SUMMARY OF THE INVENTION

The present invention relates to a valve assembly for dispensing multiple beverages through a single nozzle dispense point. One aspect of the invention recognizes the need for a modular valve assembly that can easily be expanded to allow more types of beverages to be dispensed. A valve module has multiple fluid pathways and a flow control and shut-off component for controlling the flow of fluid through each pathway. A manifold is configured to receive at least one valve module, but may also be configured to receive multiple valve modules. Valve modules can easily be added to the manifold to expand the dispensing capacity of the valve assembly. The manifold also contains pathways for directing the fluid to a diffuser, which releases the fluid into a single nozzle dispense point.

DESCRIPTION OF THE FIGURES

FIG. **1** is a side perspective view of a valve module having two fluid pathways.

FIG. **2** is a top perspective view of a manifold.

FIG. **3** is a side perspective of a valve module, manifold, and nozzle connected to each other.

FIG. **4** shows a seal, syrup tips, diffuser and nozzle.

FIG. **5** shows an array of valve modules positioned within a housing.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, FIGS. **1-5** show an embodiment of the valve assembly. The valve assembly **50**, as in FIG. **5**, uses one or more valve modules **10**, as seen for example in FIG. **1**, to create an expandable array of valves capable of dispensing different beverages. Valve module **10** contains fluid pathways **11**, **12**, that may be interfaced to a manifold **20**. When a valve module **10** is connected to the manifold **20**, the fluid pathway(s) **11**, **12** of the valve module **10** interface with a corresponding pathway in the manifold **21**, **22**. The manifold **20** and manifold pathways **21** and **22** are show in greater detail in FIG. **2**. In this way, a fluid may travel through a fluid pathway **11**, **12** in the valve module **10** and into the corresponding pathway of the manifold **21**, **22**, which routes the fluid to a common dispense point **23**. At the common dispense point **23**, a diffuser **31** (as seen for example in FIG. **4**) diffuses the fluid into a nozzle **32**, where the fluid may mix with other fluids to create a beverage. Flow control **13**, **14** and shut-off components **15**, **16** in the valve module control the amount of fluid that flows through the pathways. Although valve module **10** in FIG. **1** is shown having two sets of fluid pathways **11**, **12**, it is understood that each valve module **10** may have any number of pathways.

Referring specifically to FIG. **1**, the valve module **10** is shown as having two separate fluid pathways **11**, **12**. The fluid pathways **11**, **12** are not in communication with each other. Each fluid pathway **11**, **12** is controlled by a shut-off component **15**, **16** and a flow control component **13**, **14**. Together, the shut-off component **15**, **16** and the flow control component **13**, **14** control the rate (or completely stop the flow) of a fluid flowing through the fluid pathways **11**, **12**. Although the shut-off component **15**, **16** and the flow control components **11**, **12** are shown separately in the embodiment of FIG. **1**, it is also possible for a single component to control both the flow and the shut-off of a pathway.

In one embodiment, the shut-off component **15**, **16** may be a solenoid designed to be ¼ turn twist on, which requires no tools to remove, install, or service. The solenoid may use a 24v DC direct pull and plunger assembly, but alternatively a "hit and hold" solenoid using electronic controls could also be used. For the flow-control component, a differential pressure ceramic flow control may be used. In an alternate embodiment, the flow-control component may include stepper motor rotary controls that function on flow feedback.

The fluid pathways **11**, **12** are configured to interface with a manifold **20** (see FIG. **2**) on one end, and with a backblock **51** (see FIG. **5**) on the other end. The backblock **51** provides fluid which may flow through the fluid pathways **11**, **12** when the shut-off component **15**, **16** and flow control component **13**, **14** are in the open position. The backblock **51** may contain an interface to a fluid source. The backblock **51** may further include a heat exchanger for controlling the temperature of a fluid. An example thereof is disclosed in Applicant's U.S. Pat. App. 61/831,517, which is hereby incorporated in its entirety. The backblock **51** may be fastened to the housing using mating "dove-tail" fasteners **52**, **53** as see in FIG. **5**. More specifically, FIG. **5** shows a dovetail **52** on the backblock, and a mating receptacle **53** on the housing. Using mating dove-tail features to connect the housing to the backblock provides the added benefit being easily detachable for cleaning.

The fluid flowing from the backblock **51** into the valve module(s) **10** may be a branded beverage, or the fluid may be a beverage component, such as a syrup, concentrate, water, or carbonated water. The embodiment of FIG. **1** shows a valve module **10** having two fluid pathways **11**, **12**. But, a valve module **10** may have any number of fluid pathways. An advantage of using two fluid pathways per valve module is the ability to closely match the number of valves required by adding or removing valve modules.

Optionally, one or more of the valve modules may be in electronic communication with a CPU. Via the electronic communication, the CPU may be able to control either the valve module's shut off component and/or its flow control, thereby allowing the CPU to effectively control the volume and/or rate at which each of the valve modules dispenses a beverage. The valve modules may be controlled by a CPU, which receives a beverage recipe and drink size through an input, such as a touch screen or a conventional button, and operates the relevant valve modules **10** to dispense the required amount of each fluid. In other words, each valve module **10** contains a component of a beverage, and the CPU may operate the valve module(s) **10** to dispense the correct amount of each beverage component required to construct a beverage. The CPU may be in communication with a computer readable memory that uses non-transitory memory to store data representative of a beverage recipe. Thus, the

CPU knows the correct amount of each beverage component that must be dispensed to construct a beverage. The CPU controls the opening and closing of the flow-control components **13**, **14** of each valve module **10**. Thus, the CPU may open any desired combination of valves for a predetermined time period to dispense the required quantity of each fluid.

FIG. **2** shows a manifold **20** which interfaces with the valve module **10**. In FIG. **3**, a manifold **20** and a valve module **10** are shown in the interfaced configuration. The manifold **20** used in this embodiment has five sets of two fluid pathways. Each set of these manifold pathways interfaces with the valve module fluid pathways when a valve module **10** is connected to the manifold. Thus, the manifold of FIG. **2** is capable of interfacing with five valve modules, where each valve module has two fluid pathways. It is understood that the manifold may be configured to receive any number of valve modules. Likewise, the housing **54** shown in FIG. **5** is configured to hold five valve modules, but may also be expanded according to a user's needs.

The manifold pathways **21**, **22** direct fluid to a common dispense point **23**. In the embodiment of FIG. **2**, the common dispense point **23** is positioned near the center of the manifold, but alternate configurations are also possible. Moreover, it is preferable, but not necessary, that each manifold pathway **21**, **22** have a slight downward slope from valve module interface to the common dispense point. A downward-sloping manifold pathway takes advantage of gravity to help move fluid to the common dispense point.

The manifold pathways **21**, **22** of FIG. **2** are not in fluid communication with each other. It is envisioned that the fluid pathways **11**, **12** of the valve module **10**, and by extension the manifold pathways **21**, **22**, can carry different flavored beverages or beverage components. Separating the manifold pathways **21**, **22** ensures that cross-contamination does not occur. Although there may be instances in which it is desirable to mix multiple beverages or beverages components (i.e. mixing a cherry concentrate with a cola beverage, or mixing a cola concentrate with carbonated water), the embodiment of FIG. **2** contemplates that such mixing should preferably occur in the nozzle.

In alternative embodiments, a subset of the manifold pathways **21**, **22** may be in fluid communication with each other. For example, it may be desirable to create a common manifold pathway that mixes uncarbonated water and carbonated water to create a mid-carbonated water.

At the common dispense point **23**, the manifold pathways **21**, **22** open into a diffuser **31**. The diffuser **31** is shown in FIG. **4**. The diffuser **31** is designed to cause fluids to disperse into the nozzle **32**. The various ridges and edges shown in the diffuser **31** of FIG. **4** have the effect of causing fluid to disperse evenly in the nozzle. The diffuser **31** provides the advantage of causing an even distribution of the fluid into the nozzle, which is beneficial because it enhances the mixing of multiple fluids. For example, where a cola and a cherry flavor are mixed in the nozzle **32**, the diffuser **31** enhances the mixing of the fluids. Similarly, the diffuser **31** enhances the mixing of beverage syrup or concentrate with water or carbonated water. In the embodiment of FIG. **3**, the diffuser **31** is designed to flow up to **4** ounces of water per second.

Moreover, syrup tips **33** (shown in FIG. **4**) may be used to guide fluid from the manifold pathways **21**, **22** into the diffuser **31**. The use of syrup tips **33** provides the added benefit of reducing backsplash, and thus reducing the possibility of cross-contamination. Similarly, a seal **34** may be used to reduce potential leakage. In one embodiment, the seal **34** is a face-sealing silicon seal, which is easier to clean than typical **0**-ring and bore type assemblies.

FIG. **3** shows a valve module **10** and a nozzle **32** mounted to the manifold **20**. In operation, the valve module **10** and manifold **32** may be placed in a housing (not shown). Additional valve modules may be attached to the manifold in order to expand the dispense capability of the valve assembly.

It will thus be seen that the present disclosure teaches a valve assembly **50** for dispensing multiple beverages via a common nozzle **32** dispense point. The valve assembly **50** includes a plurality of valve modules **10**, each valve module **10** having a plurality of separate fluid pathways **11**, **12**. A plurality of flow control components **13**, **14** are configured to control flow of fluid in the separate fluid pathways **11**, **12**. A backblock **51**, **52** couples the valve modules **10** to a fluid source for providing a flow of fluid to the separate fluid pathways **11**, **12**. A dispenser nozzle **32** forms the common nozzle **32** dispense point for the valve modules **10**. A diffuser **31** receives the flow of fluid from the valve modules **10** and diffuses the flow of fluid into the dispenser nozzle **32**.

Each of the valve modules **10** has a back side **60** that interfaces with the backblock **51**, **52** and a bottom side **62** that interfaces with the diffuser **31**. Each of the valve modules **10** also has a front side **64** that is opposite the back side **60**. As show in FIG. **1**, the bottom side **62** is perpendicular to the back side **60** and perpendicular to the front side **64**. Each of the flow control components **13**, **14** has a flow control device **66**, **68** for controlling flow of fluid therethrough. Each flow control device **66**, **68** faces the front side **64** so that the flow control device **66**, **68** is easily accessed without removing the flow control component **10** from the valve assembly **50**.

As further shown in FIG. **1**, each separate fluid pathway **11**, **12** extends horizontally from the back side **60** towards the front side **64** and then vertically downwardly to the bottom side **62**. The separate fluid pathways **11**, **12** extend parallel to each other from the back side **60** towards the front side **64** and then vertically downwardly to the bottom side **62**. As shown in FIG. **1**, the flow control components **13**, **14** are vertically aligned on top of each other and are horizontally offset from each other so that the flow control devices **66**, **68** are offset from each other. In the illustrated example, the flow control devices **66**, **68** include a screw having a screwhead that faces the front side **64**.

As also shown in FIG. **1**, the shut off valves **15**, **16** are located at the bottom side **62** and on opposite sides of the separate fluid pathways **11**, **12**.

Referring to FIG. **4**, the diffuser **31** has a plurality of apertures **70** there through and a plurality of syrup tips **72** that are received in the plurality of apertures **70**. The seal **34** forms a seal on the diffuser **31** and with the plurality of syrup tips **72**.

As shown in FIG. **4**, the diffuser **31** has a radially outer perimeteral surface **74** having axially extending ridges **76** that are configured to evenly distribute water to the dispenser nozzle **32**. The diffuser **31** also has circumferentially extending channels **78** located below the ridges **76** and further configured to evenly distribute water to the dispenser nozzle **32**.

As shown in FIG. **4**, the dispenser nozzle **32** has an inner cavity **80** with a plurality of helical ribs **82** for inducing helical flow through the dispenser nozzle **32**.

What is claimed is:

1. A valve assembly for dispensing multiple beverages via a common nozzle dispense point, the valve assembly comprising:

a plurality of valve modules, wherein each valve module in the plurality of valve modules has a plurality of separate fluid pathways;

a plurality of flow control components that control flow of fluid in the plurality of separate fluid pathways, wherein a flow control component from the plurality of flow control components is provided for each separate fluid pathway in the plurality of separate fluid pathways;

a backblock that couples the plurality of valve modules to a fluid source for providing a flow of fluid to the plurality of separate fluid pathways;

a dispenser nozzle that forms the common nozzle dispense point for the plurality of valve modules; and

a diffuser that receives the flow of fluid from the plurality of valve modules and diffuses the flow of fluid into the dispenser nozzle; wherein

each of the plurality of valve modules have a back side that interfaces with the backblock,

each of the plurality of valve modules have a bottom side that interfaces with the diffuser, wherein the bottom side is perpendicular to the back side,

each of the plurality of valve modules have a front side that is opposite the back side and perpendicular to the bottom side, and

each of the flow control components has a flow control device for controlling flow of fluid there through, each flow control device facing the front side so that the flow control device can be accessed without removing the flow control component from the valve assembly;

wherein the each separate fluid pathway extends horizontally from the back side towards the front side and then vertically downwardly to the bottom side;

wherein the plurality of separate fluid pathways extend parallel to each other from the back side towards the front side and wherein the plurality of separate fluid pathways extend parallel to each other towards the bottom side;

wherein the plurality of flow control components in each valve module are vertically aligned on top of each other;

wherein the plurality of flow control components in each valve module are horizontally offset from each other from the back side towards the front side;

a plurality of shut off components that are configured to shut off flow of fluid in the plurality of separate fluid pathways, wherein one shut off component from the plurality of shut off components is provided for each separate fluid pathway in the plurality of separate fluid pathways;

wherein the plurality of shut off components comprises first and second shut off components that are located at the bottom side and face each other on opposite sides of the plurality of separate fluid pathways.

2. The valve assembly according to claim **1**, wherein the flow control device comprises a screw having a screw head that faces the front side.

3. The valve assembly according to claim **1**, wherein the bottom side is configured to be manually coupled to and uncoupled from the diffuser.

4. The valve assembly according to claim **1**, wherein the first and second shut off components each comprises a solenoid.

5. The valve assembly according to claim **1**, wherein the diffuser comprises a plurality of apertures there through and further comprising a plurality of syrup tips that are received in the plurality of apertures, each syrup tip configured to separately guide the flow of fluid to the dispenser nozzle.

6. The valve assembly according to claim **5**, further comprising a seal that forms a seal on the diffuser and with the plurality of syrup tips.

7. The valve assembly according to claim **6**, wherein the seal forms a face seal with the diffuser and wherein the plurality of syrup tips extend through the seal and are sealed there with.

8. The valve assembly according to claim **5**, wherein the diffuser comprises a radially outer perimeteral surface that comprises a plurality of axially extending ridges configured to evenly distributing water to the dispenser nozzle.

9. The valve assembly according to claim **8**, wherein the diffuser further comprises a plurality of circumferentially extending channels located below the plurality of axially extending ridges and configured to evenly distribute water to the dispenser nozzle.

10. The valve assembly according to claim **8**, wherein the dispenser nozzle comprises an inner cavity having a plurality of helical ribs for inducing helical flow through the dispenser nozzle.

11. The valve assembly according to claim **1**, further comprising a manifold configured to releasably couple with the plurality of valve modules such that the plurality of valve modules form an expandable and contractible array of valve modules.

12. The valve assembly according to claim **11**, wherein the manifold comprises a downwardly sloping pathway extending from the plurality of valve modules to the common nozzle dispense point.

13. The valve assembly according to claim **12**, further comprising a housing that houses the manifold and the plurality of valve modules, wherein the flow control device of each of the plurality of valve modules is accessible on the front side.

14. A valve module for dispensing multiple beverages, the valve module comprising:

a plurality of separate fluid pathways;

a plurality of flow control components that control flow of fluid in the plurality of separate fluid pathways, wherein a flow control component from the plurality of flow control components is provided for each separate fluid pathway in the plurality of separate fluid pathways;

a backblock that couples the plurality of valve modules to a fluid source for providing a flow of fluid to the plurality of separate fluid pathways;

wherein the valve module has a back side that interfaces with the backblock, a bottom side that interfaces with a diffuser, wherein the bottom side is perpendicular to the back side, and a front side that is opposite the back side and perpendicular to the bottom side, and

wherein each of the flow control components has a flow control device for controlling flow of fluid there through, wherein each flow control device faces towards the front side so that the flow control device can be accessed;

wherein the plurality of separate fluid pathways each extend horizontally from the back side towards the front side and then vertically downwardly to the bottom side;

wherein the plurality of separate fluid pathways each extend parallel to each other from the back side towards the front side and wherein the plurality of separate fluid pathways each extend parallel to each other towards the bottom side;

wherein the plurality of flow control components in each valve module are vertically aligned on top of each other;

wherein the plurality of flow control components in each valve module are horizontally offset from each other from the back side to the front side so that the plurality of flow control devices in each valve module are horizontally offset from each other;

wherein the bottom side is configured to be manually coupled to and uncoupled from a diffuser; and

a plurality of shut off components that are configured to shut off flow of fluid in the plurality of separate fluid pathways, wherein one shut off component from the plurality of shut off components is provided for each separate fluid pathway in the plurality of separate fluid pathways;

wherein the plurality of shut off components comprises first and second shut off components that are located in first and second separate fluid pathways in the plurality of fluid pathways, the first and second shut off components located at the bottom side and face each other on opposite sides of the plurality of fluid pathways.

15. A valve module for dispensing multiple beverages, the valve module comprising:

first and second fluid pathways that are separate from each other;

first and second flow control devices that are configured to control flow of fluid through the first and second fluid pathways, respectively; and

first and second shut off components that are configured to shut off the flow of fluid in the first and second fluid pathways, respectively;

wherein the valve module has a back side that is configured to receive the flow of fluid, a bottom side that is transverse to the back side and configured to discharge the flow of fluid, and a front side that is opposite the back side;

wherein the first and second fluid pathways extend from the back side towards the front side and then downwardly to the bottom side;

wherein the first and second flow control device are accessible via the front side;

wherein the first and second flow control devices are vertically aligned and are horizontally offset with respect to each other; and

wherein the first and second shut off components are located at the bottom side and face each other on opposite sides of the first and second fluid pathways.

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