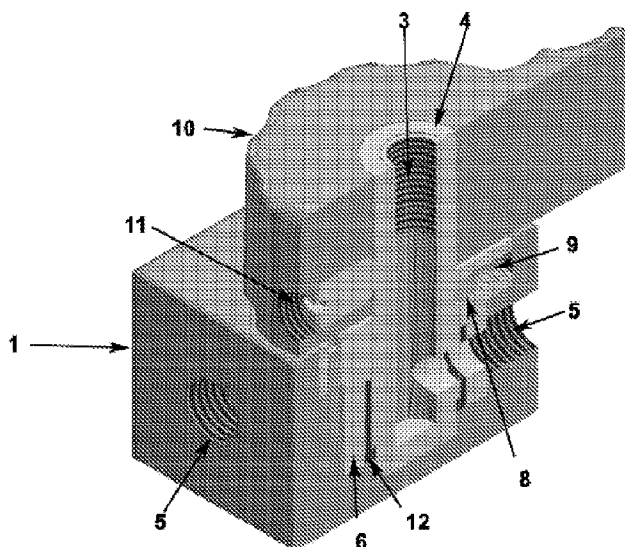




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(54) **Titre : COLLECTEUR DE DISTRIBUTION A MULTIPLES ORIFICES**
(54) **Title: MULTIPLE PORT DISTRIBUTION MANIFOLD**



(57) **Abrégé/Abstract:**

A mountable Multiple Port Distribution Manifold consisting of a knob, connected to a hollow, rotate-able Shaft that mounts within the Manifold. By rotating the Knob/Shaft, the side hole of the Knob/Shaft assembly may selectively intersect with multiple ports within the Manifold. Said assembly also provides of an "off" position, where no Shaft/Manifold intersection allows port to port connection. The invention may be constructed of any suitable material, natural or synthetic, that is sufficiently strong to withstand the internal pressures of a gas or liquid media routed within without leakage.

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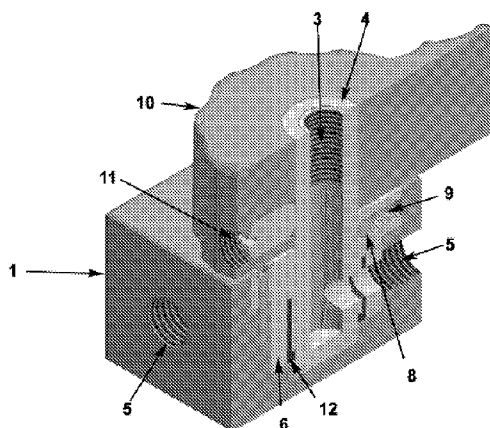
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(54) Title: MULTIPLE PORT DISTRIBUTION MANIFOLD

FIGURE 4



(57) Abstract: A mountable Multiple Port Distribution Manifold consisting of a knob, connected to a hollow, rotate-able Shaft that mounts within the Manifold. By rotating the Knob/Shaft, the side hole of the Knob/Shaft assembly may selectively intersect with multiple ports within the Manifold. Said assembly also provides of an "off" position, where no Shaft/Manifold intersection allows port to port connection. The invention may be constructed of any suitable material, natural or synthetic, that is sufficiently strong to withstand the internal pressures of a gas or liquid media routed within without leakage.

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"Multiple Port Distribution Manifold"

BACKGROUND- GENERAL

This invention relates to the attachment, interconnection, selection and distribution of multiple gas/fluid sources to destinations, within a single device. Depending upon the direction of flow the invention may either be used to a) route one [selected from a plurality] gas/liquid ["media"] "in" port to a single "out", or ; b) route a single gas/liquid ["media"] "in" port to one of a plurality of " out" ports.

A definitive feature of the invention is the passage of the media through the rotate-able Selector Knob/Shaft ["Knob/Shaft"] assembly to the single port. Said "Shaft" is hollow, with a opening at one end that is exterior to the manifold. A second opening appears on the side surface of the shaft, interior to the manifold. Selection of which single port, of the plurality available, will be selected and aligned with the interior opening to the shaft, is accomplished by rotating the Knob/Shaft assembly to the desired alignment. This rotational operation effectively selects the two ports (from/to) through with the media will be routed, within a unique, compact design configuration. It simultaneously routes said media internally through a predetermined change in direction without the use of additional externally connected "swivels." Lastly, the Shaft/Knob may also rotate to a position where no in/out port alignment exists, thereby creating an "off" position, through which no media may flow.

Application I: From Choice of Many to One

By way of example [and not limitation as to the variety of applications for which the invention may be suited], this invention may be used by persons in adverse environments where, in the event of a stoppage of the main media supply, the user may quickly rotate the Shaft/Knob assembly to select an alternative source from one of a plurality of alternative "in" sources. The media is internally redirected at a predetermined angle, from in to out, or may be shut off entirely.

Application II: From One to Choice of Many

Where the flow of media is opposite of Application I, the user may distribute media from a single "in" port to one of a plurality of "out" ports by rotating the Shaft/Knob assembly to selectively route the single "in" source to one of a plurality of alternative "out" destinations. The media is internally redirected at a predetermined angle, from in to out, or may to shut off entirely.

In conclusion, insofar as I am aware, no device formerly developed provides as simple, elegant and reliable design solution for the immediate selection from or distribution to alternative gas/fluid ["media"] sources / destinations.

BACKGROUND OF MULTIPOINT DISTRIBUTION MANIFOLD

In the following description, certain terms will be used for brevity, clarity, and understanding, but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such words are used for description purposes herein and are intended to be broadly construed. Furthermore, the embodiments of the system illustrated and described herein are by way of example, and the scope of the invention is not limited to the exact details of construction and use. They represent the general design characteristics of the invention and not the manufacturing details or applicable uses of the final production product. Shapes, sizes and fit will change in response to the requirements of various applications. Many other variations are possible with the teachings of the various embodiments.

Example Application of Use:

This invention may be used by persons both underwater (SCUBA) and terrestrial (SCBA), who require access to an alternative gas supply from a remote tank, surface supply or the main tank of a "buddy" partner, without disconnecting or disrupting the flow of gas. This type of transition is highly problematic and dangerous, especially when execution is required in toxic or zero visibility environments.

Furthermore, current designs do not allow for insertion of a tertiary gas supply (i.e. from an external tank, "buddy" or remote source). The design goal for the user whose gas supply has failed, is to have available a choice of multiple redundant gas supplies without need to first disconnect one source, before accessing an alternate. With the instant invention selection is simply made by rotating the Shaft/Knob into the right position, through which the supply will flow.

An example of this use is where a single source of air, is used to power a selection of pneumatic devices. By way of example only (and not limitation), said devices may be dental tools, mechanics tools, or even a multiple selection of air brushes such as those used by visual or makeup artists. Each tool is connected to a different "port". The single-port "in" source is directed through the Knob/Shaft, which is rotated by the user to direct the gas to exit and power the appropriate

device. Furthermore, the Shaft/Knob may be rotated to a position where no multi-port "out" exists, thereby creating an "off" position, through which no media may flow.

BACKGROUND – PRIOR ART

U.S. Pat. No. Des. 343,640 discloses a Multiple air brush tool station. FIG. 1 shows a manifold with one inlets, a pressure gauge and valve, connected to three outlets. Outlet selection is not rotational, nor through a selector knob.

U.S. Pat. No. 3,693,653 discloses a fluid (gas) mixing regulator for mixing two gases, using two regulator systems with a single control which can maintain a selected ratio of gases to the outlet at variable :flow rates. FIG. 1 shows a manifold with two inlets and one outlet. Outlet selection is not rotational, nor through a selector knob, nor allows simultaneous attachment/selection of tertiary source.

U.S. Pat. No. 4,328,798 discloses a fire-fighter's breathing apparatus which allows for connection with a second mask to provide emergency air to a second user. Source selection is not rotational, nor through a selector knob, nor allows simultaneous attachment/selection of tertiary source.

US Patent No. 4,392,490 Multiple Outlet Connection means for Self-Contained Positive Pressure or Demand Regulated Breathing Apparatus: shows a method by which to full face masked divers may share the air supply of a single diver. Air distribution is not selectable rotationally, nor through a selector knob, nor does it allows simultaneous attachment/selection of tertiary source.

U.S. Pat No. 4,449,524 discloses SCUBA including a demand valve for controlling gas flow, demand valve bypass means and allows providing emergency help to a second user by connecting his bypass valve to the first bypass orifice. Source selection is not rotational, nor through a selector knob, nor allows simultaneous attachment/selection of tertiary source.

U.S. Pat No. 4,838,256 discloses SCUBA with connections for underwater transfer of air from one user's tank to another's. In the figures, plug valve has four ports and two connection options. Source selection / distribution is not rotational through a selector knob. Does not allow simultaneous attachment/selection of tertiary source.

U.S. Pat No. 44,841,953 discloses SCUBA mask with connections for attachment of one alternate air source. Source selection is not rotational, nor through a selector knob, nor allows simultaneous attachment/selection of tertiary source.

U.S. Pat. No. 5,273,030 discloses a chest-mounted pilot's terminal block assembly which couples breathing gas from a regulator to a breathing mask. A second outlet may couple to a chest vest. Emergency breathing gas (at high pressure) connects to the terminal block through a fixed orifice and a small diameter high pressure hose. Source selection is not rotational, nor through a selector knob, nor allows simultaneous attachment/selection of tertiary source.

US Patent No. 5,293,864 Emergency Breathing Apparatus shows a gas manifold designed delivery primary source air to one of only two destinations. Destination selection is not rotational, nor through a selector knob, nor does it allows simultaneous attachment/selection of tertiary destinations.

US Patent No 5,411,018 Underwater Oxygen Supply System shows a main air supply and attached emergency back up air supply that feeds a gas manifold. The choice of air source is selectable by the diver. Source selection is not rotational through a selector knob and does not allow simultaneous attachment/selection of tertiary source.

US Patent No 5,584,289 Breathing Apparatus Having a Flexible Manifold Connected Between a Plurality of Air Cylinders, shows two cylinders connected via High Pressure ("HP", 3,000 psi) hoses to a central HP manifold, that selects the air source for delivery to a first stage regulator. The system may also be used to connect an external LP air source post second stage, and not through the HP manifold. Source selection is not rotational through a selector knob and does not allow simultaneous attachment/selection of tertiary source, through the manifold.

US Patent No 5,678,542 Decompression Gas Switching Manifold shows the use of a two, dual source switching manifolds connected together by a third selector manifold to allow selectionh of three different air sources deliverable to a diver. Source selection is not rotational through a single selector knob within a single manifold. Does not allow simultaneous attachment/selection of tertiary source, through a single manifold to which primary and secondary sources are connected.

US Patent No 6,070,577 Reserve Air for Underwater Diving shows a method of connecting and switching from a main air source to an attached redundant air source for emergency back up purposes. Source selection is not rotational through a selector knob and does not allow simultaneous attachment/selection of tertiary source, through the manifold.

US Patent No 6,227,199 B1 Multiple Distributor for Low- Pressure Uses shows a method of distributing a single low pressure air source to a manifold, for delivery to alternate air using devices, including breathing air for the diver. Source selection is not rotational through a selector knob and does not allow simultaneous attachment/selection of tertiary source, through the manifold.

US Patent No 6,513,525 Triplicate Diving Gas Valve Device is a single device that distributes air to a siren alarming device, life coat inflation and for diver breathing . Source selection is not rotational through a selector knob and does not allow simultaneous attachment/selection of secondary or tertiary source.

US Patent No 7,168,428 B1 Apparatus for Connection Air Bottles shows a dual valve apparatus for transferring air from an external source to SCUBA or SCBA user to replenish air or provide an alternative source. Source selection is not rotational through a selector knob and does not allow simultaneous attachment/selection of tertiary source.

SUMMARY OF MULTIPLE PORT DISTRIBUTION MANIFOLD

Application I: From Choice of Many to One

The invention is a quantum improvement and simplification in the design of systems for selectively routing media sources to one of a selected plurality destinations.

Feature 1: The invention allows for the rotational selection of one of a plurality of "in" ports from which the media will be internally redirected at a predetermined angle to a single "out" port.

Feature 2: The rotational selection is by a knob that is attached to a hollow air shaft. Said shaft has two openings: one on the exterior end, the other on the side surface. The Knob Shaft assembly functions both as selector and router of the media from the selected "in" port to the single "out" port.

Feature 3: The direction of the knob indicates which "in" port is selected as source.

Feature 4: The invention allows for an "off" selection position by rotation of the knob to a position which offers no "in" port.

Feature 5: The rotational selection is made accurate by an internally located spring/bearing assembly, which partially presses the bearing into a semi-circular indentation on the airshaft, for selective stoppage at each port or the off position.

Feature 6: The invention allows for the attachment of a variety of couplers or other source devices.

Application II: From One to Choice of Many

Where the flow of media is opposite of Application I, the user has the option of distributing the media "in" from the single Knob/Shaft assembly port to one of a plurality of "out" ports.

Feature 1: The invention allows for the rotational selection and internal redirection at a predetermined angle, of one of a plurality of "out" ports to which the media is routed from a single "in" port.

Feature 2: The rotational selection is by a knob that is attached to a hollow air shaft. Said shaft has two openings: one on the exterior end, the other on the side surface. The Knob Shaft assembly functions both as selector and router of the media from the single "in" port to one of a plurality of "out" ports.

Feature 3: The direction of the knob indicates which "out" port is selected

Feature 4: The invention allows for an "off" selection position by rotation of the knob to a position which offers no "out" port.

Feature 5: The rotational selection is made accurate by an internally located spring/bearing assembly, which partially presses the bearing into a semi-circular indentation on the airshaft, for selective stoppage at each port or the off position.

Feature 6: The invention allows for the attachment of a variety of couplers or other destination devices.

BRIEF DESCRIPTION OF THE DRAWINGS- FIGURES

Figure 1: Side - Two (In/Out) Port Assembled

Figure 4: Sagittal View Assembled

Figure 2: Side - One (In/Out) Port Assembled

Figure 5: Sagittal View Assembled

Figure 3: Exploded View

DRAWINGS – Reference Numerals

Part 1: Manifold

Part 7: Bushing Mounting Screws

Part 2: Manifold Mounting Screws

Part 8: Shaft Selector Bearing

Part 3: Hollow Shaft

Part 9: Shaft Selector Bearing Spring

Part 4: Port 1 (in/out)

Part 10: Selector Knob

Part 5: Port 2-4 (in/out)

Part 11: Selector Knob Set Screw

Part 6: Bushing

Part 12: Sealant Surface

DETAILED DESCRIPTION OF MULTIPLE PORT DISTRIBUTION MANIFOLD

General Description:

The Multiple Port Distribution Manifold (#1) consists of a Selector Knob (#10), connected to a rotate-able Hollow Shaft (#3) that fits within a Manifold (#1). The Manifold has multiple selectable ports (#5) that intersect with the vertical Knob/Shaft assembly (#'s 4, 10, 12). Four ports are shown in the current embodiment. More are possible. By rotating the Knob/Shaft assembly port (#4) said assembly may associate the single port (#4) with any one of the plurality ports (#5) at a predetermined angle relative to each other. The Manifold (#1) is mountable by retaining screws (#2) on its underside. The Shaft (#3) is retained within the Manifold (#1) by a Bushing (#6), secured by multiple Mounting Screws (#7) into the Manifold (#1). The Shaft (#4) is sealed against the Bushing (#6) by a Sealant Surface (#12). The Sealant Surface (#12) prevents media leakage, yet allows the Shaft (#3) to rotate as required by the use of a Knob / Set Screw arrangement (#'s 10,11). The Knob / Shaft / Sealant (#'s 10, 3, 12) assembly has multiple selectable positions to properly associate each in/out port, through the Knob / Hollow Shaft (#3). The selection is facilitated by a bearing/spring assembly (#'s 8, 9) that is housed horizontally within the Bushing (#6). The Spring (#9) assembly exerts Bearing (#8) pressure against the shaft within the Bushing (#6). Appropriately placed indents within the Shaft (#3) allow the bearing (#8) to insert within and allow proper port-to-port alignment. The invention may be constructed of any suitable material, natural or synthetic, that is sufficiently strong to withstand both the internal pressures of the media as well as external environments and temperatures without rupture or leakage.

Description of Figures:

Figure 1: *Two Port Side View*: Two (In/Out) Ports (#5) shown on one side of the Manifold. Said ports extend within the Manifold to intersect with the Shaft assembly.

Figure 2: *One Port Side View*: One (In/Out) Port (#5) shown on one side of the Manifold. Said port extends within the Manifold to intersect with the Shaft assembly.

Figure 3: *Exploded View*: shows the Sealant Surface (#12) upon the Shaft, (#3) that is inserted into the Bushing (#6) and held in location by the Bearing Spring assembly (#8,9) located internally within the Bushing (#6). The entire Shaft/Bushing (#'s 12, 3, 6) assembly is mounted

within the Manifold (#1) with Mounting Screws (#7). The Knob (#10) inserts onto the rotate-able Shaft (#3) and visually camouflages the internal assembly.

Figure 4: *Sagittal View Assembled*: shows Figure 3 as assembled for operation.

Figure 5: *Sagittal View Assembled*: shows Figure 3 as assembled for operation.

SUMMARY OF ADVANTAGES

From the description and illustration of each embodiment of each component hereinabove, numerous advantages become evident:

The Multiple Port Distribution Manifold:

- 1) is simple in design, efficient in use and easy to manufacture with low level technology.
- 2) uniquely routes the media through the Selector Knob port, at a predetermined angle relative to the Multiple Ports, without use of external connectors or swivels.
- 3) is mountable to surfaces and other host.
- 4) is attachable to a variety of supply and destination hoses/devices.
- 5) is scalable to accommodate different media and flow rates.
- 6) is adaptable in structure and the materials from which it is manufactured as dictated by the requirements of its application.
- 7) may be fabricated from a vast array of materials including but not limited to: metals, plastics, synthetics, rubbers, carbons, composites as well as an array of natural and synthetic fabrics.

CONCLUSION, RAMIFICATIONS, AND SCOPE:

Accordingly the reader will see that a variety of applications are possible, depending upon the direction of flow, with the teachings of the various embodiments. Each offers an alternative set of advantages and anticipated uses.

OPERATION

The Multiple Port Distribution Manifold may be used in the following manner:

Application I: From Plurality to One

1. A single destination Port (#4) is associated with one of a plurality of source ports (#5) by rotation of the Knob/Shaft/Sealant assembly (#'s 10, 3, 12) within the Bushing (#6)
2. Both destination Port (#4) and source ports (#5) are connectable to any device, hose or coupling.
3. Alternatively the user rotates the Knob/Shaft/Sealant assembly (#'s 10,3,12) to a non-associated "off" position to stop the flow of media through the manifold.

Application II: From One to Plurality

1. A single source Port (#4) is associated with one of a plurality of destination ports (#5) by rotation of the Knob/Shaft/Sealant assembly (#'s 10, 3, 12) within the Bushing (#6)
2. Both destination Port (#4) and source ports (#5) are connectable to any device, hose or coupling.
3. Alternatively the user rotates the Knob/Shaft/Sealant assembly (#'s 10,3,12) to a non-associated "off" position to stop the flow of media through the manifold.

SUMMARY OF THE INVENTION.

In a first aspect, the present invention provides a distribution manifold of predetermined height, length and width that retains within a hollow, rotate-able shaft through which a gas or liquid media may flow between an end opening port and a side opening that is select-ably aligned with one of a plurality of ports within a manifold in a predetermined angle and direction. Said rotate-able shaft is retained within the manifold by a bushing, whereby said shaft may rotate to align said side opening with any one of a plurality of predetermined ports located around the circumference of said bushing. Said shaft may also rotate to a position where no orifice exists, and thereby stop the flow of media. Said bushing and shaft are mounted within said manifold by a predetermined number of mounting screws. Said shaft has circular indents of predetermined size, depth and location around its circumference that communicate with a bearing that is pressurized against said shaft by a spring within said bushing. A selector knob is affixed to around the end opening by a set screw, at a predetermined position, whereby the said shaft may be rotated to positions select-ably determined by a spring that exerts pressure upon a bearing into indents spaced in predetermined locations around the circumference of the shaft. A sealant material of predetermined density is affixed to the outer

circumference of said shaft and rotate-ably communicates with the inner circumference of said bushing, whereby said media is retained within said shaft and said selected orifice. The manifold is attachable to a user defined host surface or device by a predetermined number of mounting screws.

The invention provides a method of select-ably routing a gas or liquid media between one orifice and a plurality of orifices within a manifold, whereby selection of one orifice is made from a plurality of choices by rotation of a knob, connected to a hollow shaft through which said media may pass between said selected plurality orifice and one orifice located at the hollow open end of said shaft.

CLAIM

What I claim is:

5 1. A multiport distribution manifold for use both a self-contained underwater breathing apparatus (SCUBA) and terrestrial a self-contained breathing apparatus (SCBA), the manifold comprising:

 a planar face and a plurality of manifold ports each configured to receive a gas media from a source, wherein the plurality of manifold ports extend through the planar face to
10 communicate with a central bore of the manifold to create a slot;

 wherein the plurality of manifold ports having a planar face with two bores extending thereto, where one of the plurality of manifold ports in the manifold houses a rotatable hollow shaft with an end opening port and a single side opening port, the hollow shaft communicates with a selector knob by which the hollow shaft is rotatable to align the side opening port with
15 one of the plurality of manifold ports, through which the gas media is capable of flowing internally through the manifold, into the side opening port of the hollow shaft, which communicates with the selector knob, through which the gas media within the hollow shaft passes through the selector knob, and through the end opening port of the hollow shaft;

 wherein the end opening port of the hollow shaft is connectable to a device, hose or
20 coupling.

 2. The multiport distribution manifold of claim 1, wherein at least a portion of the hollow shaft is housed within the central bore of the manifold by a bushing including multiple pass through ports that align with the manifold ports.
25

 3. The multiport distribution manifold of claim 2, wherein each of the pass through ports aligns with the slot, through which the gas media is capable of flowing through the bushing to the single side port within the hollow shaft, when aligned with the pass through hole within the bushing.
30

 4. The multiport distribution manifold of claim 1, wherein the hollow shaft is configured to rotate to a position where none of the manifold ports are in communication with the side opening port of the hollow shaft to prevent the media to flow therethrough.

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5. The multiport distribution manifold of claim 1, wherein the hollow shaft has circular indent cavities located around a circumference of the hollow shaft that communicate with a bearing that is biased against the hollow shaft by a spring, wherein the indent cavities inhibit rotational movement of the hollow shaft when the bearing is positioned within at least one of the indent cavities in the hollow shaft.

6. The multiport distribution manifold of claim 1, wherein one or more mounting screws communicate with the manifold for attachment to a host surface or device.

7. A multiport distribution manifold for use both underwater SCUBA and terrestrial SCBA, the manifold comprising:

a planar face and a plurality of manifold ports each configured to receive a gas media from a source, wherein the plurality of manifold ports extend through the planar face to communicate with a central bore of the manifold to create a slot;

wherein the plurality of manifold ports having a planar face with two bores extending thereto, where one of the plurality of manifold ports in the manifold houses a rotatable hollow shaft with an end opening port and a single side opening port, the hollow shaft communicates with a selector knob by which the hollow shaft is rotatable to align the side opening port with one of the plurality of manifold ports, through which the gas media is capable of flowing internally through the manifold, into the side opening port of the hollow shaft, which communicates with the selector knob, through which the gas media within the hollow shaft passes through the selector knob, and through the end opening port of the hollow shaft; and

wherein the central bore houses a bushing with one or more pass through holes, each of which aligns with the slot, through which the gas media is capable of flowing through the bushing to the single side port within the hollow shaft, when aligned with the pass through hole within the bushing.

8. The multiport distribution manifold of claim 7, wherein the end opening port of the hollow shaft is connectable to a device, hose or coupling.

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9. A multiport distribution manifold comprising:

a manifold having an exterior with a planar face, a central bore with a cylindrical shape, and a plurality of manifold ports each configured to receive a gas media from a source, at least one of the plurality of manifold ports extend from the manifold exterior planar face to the manifold central bore, and the at least one of the plurality of manifold ports has an elongated slotted shape at an intersecting surface of the manifold central bore and the at least one of the plurality of manifold ports, another of the plurality of manifold ports extend from the manifold exterior planar face to the manifold central bore;

a hollow shaft rotatably including a portion thereof housed in the central bore, the hollow shaft including an end opening port, a single side opening port, and an outer circumference with circular indent cavities;

a selector knob fittable with the hollow shaft to rotate the hollow shaft to align the single side opening port with one of the plurality of manifold ports;

a detent assembly including a spring that presses a bearing against the hollow shaft, wherein the detent assembly inhibits rotational movement of the hollow shaft when the bearing is positioned within one of the circular indent cavities of the hollow shaft; and

a bushing including multiple pass through ports that are alignable with the plurality of manifold ports, the bushing is receivable in the central bore of the manifold, and is configured to house at least a portion of the hollow shaft;

wherein a gas or liquid media is capable of flowing from one of the plurality of manifold ports into the side opening port of the hollow shaft, through the selector knob, and through the end opening port of the hollow shaft;

wherein the rotatable hollow shaft rotates to a position in which the side opening port of the rotatable hollow shaft faces a portion of the manifold where none of the manifold ports are in communication with the side opening port of the hollow shaft in a manner to prevent the gas media to flow therethrough.

10. The multiport distribution manifold of claim 9, wherein the end opening of the hollow shaft is aligned with a longitudinal axis of the hollow shaft, and is a defined through a free end of the hollow shaft, wherein the free end is received through the selector knob.

11. The multiport distribution manifold of claim 9, wherein one or more mounting screws communicate with the manifold for attachment to a host surface or device.

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12. The multiport distribution manifold of claim 9 further comprising a sealant surface configured to seal the hollow shaft against the bushing, and configured to allow rotation of the hollow shaft.

5

13. A method of using a multiport distribution manifold for selectably routing a flow of a gas or liquid media, the method includes the steps of:

a) providing a manifold including a planar face and a plurality of manifold ports, wherein at least one of the plurality of manifold ports extend through the planar face to communicate with a central bore of the manifold to create a slot, wherein the plurality of manifold ports having a planar face with two bores extending thereto, where one of the plurality of manifold ports in the manifold houses a rotatable hollow shaft with an end opening port and a single side opening port, the hollow shaft communicates with a selector knob by which the hollow shaft is rotatable;

b) communicating each of the plurality of manifold ports with the gas or liquid media source different from each other;

c) rotating the selector knob to select one of the manifold ports so that to align the side opening port with one of the plurality of manifold ports;

d) flowing the gas or liquid media internally through the manifold, into the side opening port of the hollow shaft, which communicates with the selector knob, through which the gas or liquid media within the hollow shaft passes through the selector knob, and through the end opening port of the hollow shaft;

e) rotating the hollow shaft to a position where none of the manifold ports are in communication with the side opening port of the hollow shaft in a manner to prevent the gas or liquid media to flow therethrough.

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FIGURE 1

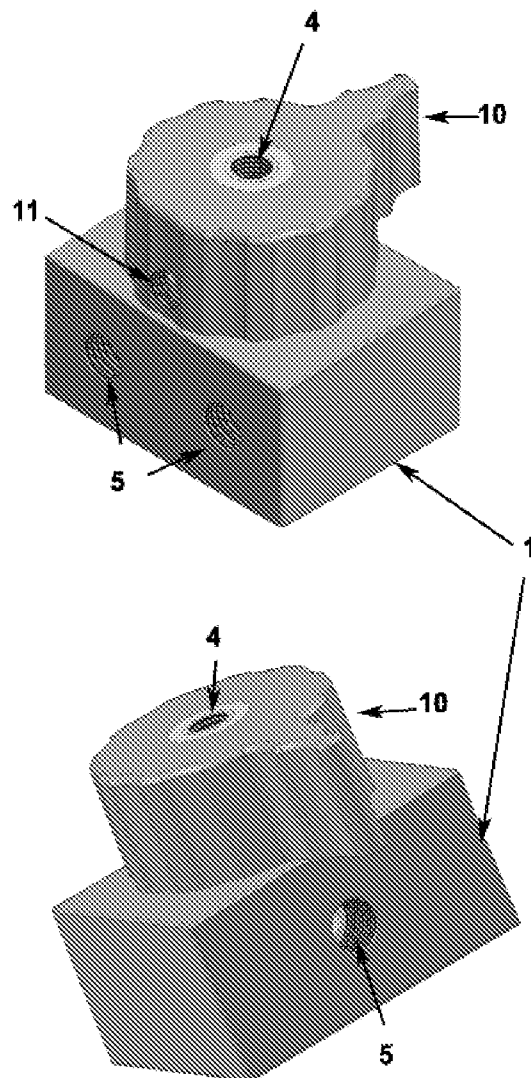


FIGURE 2

FIGURE 3

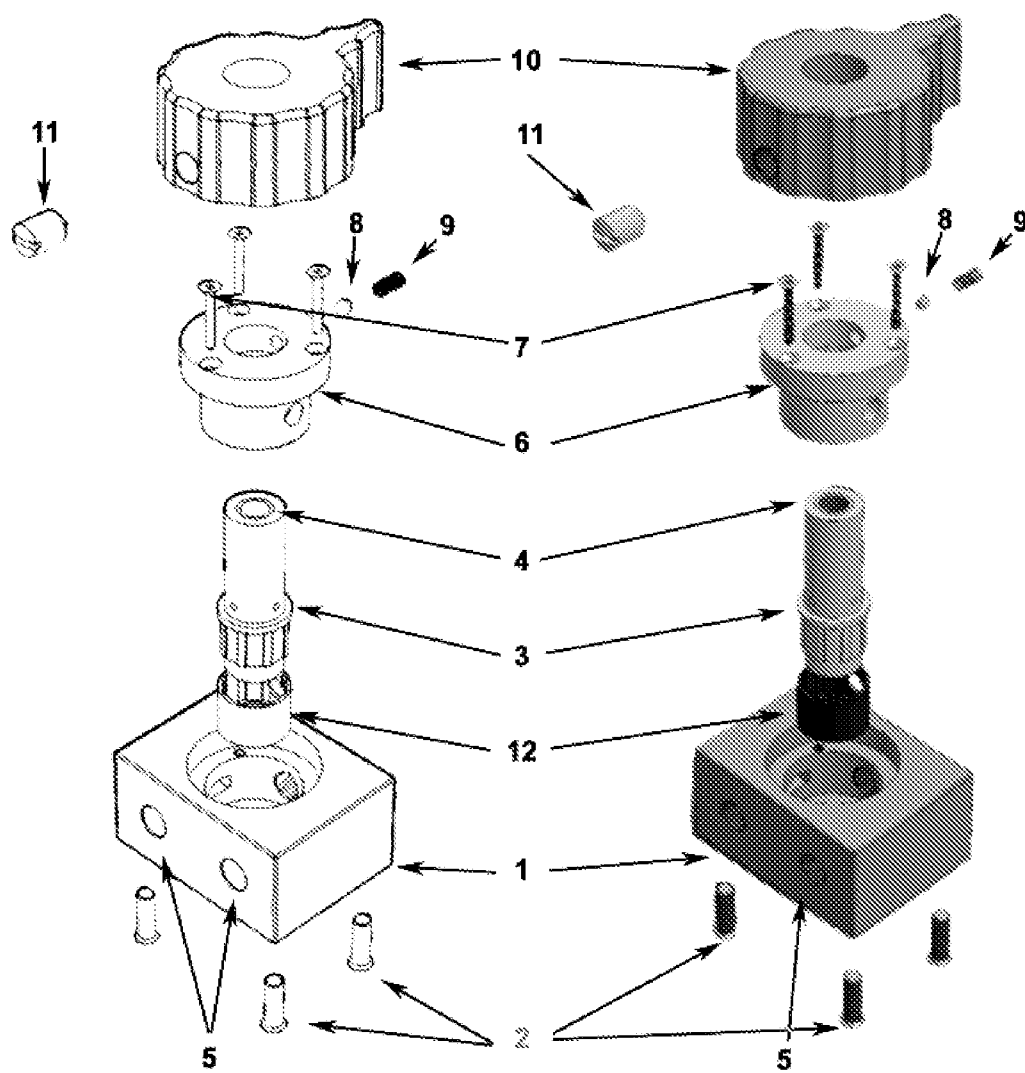


FIGURE 4

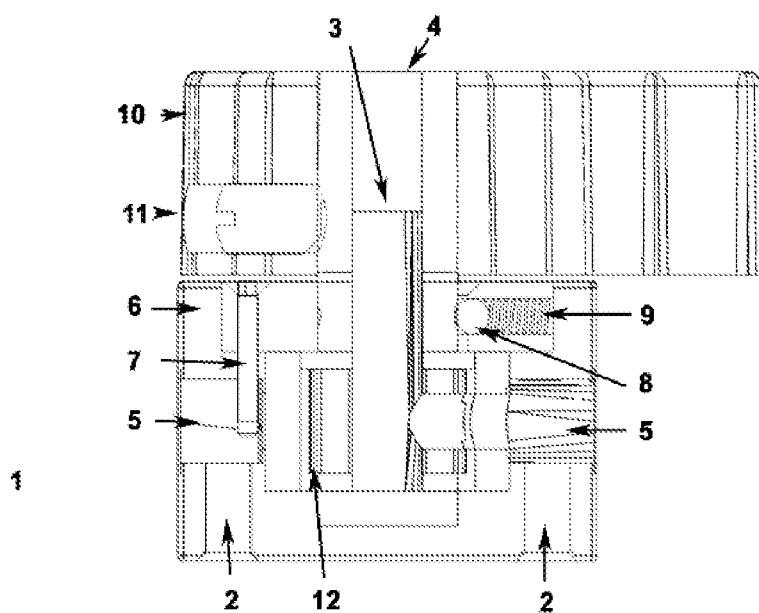
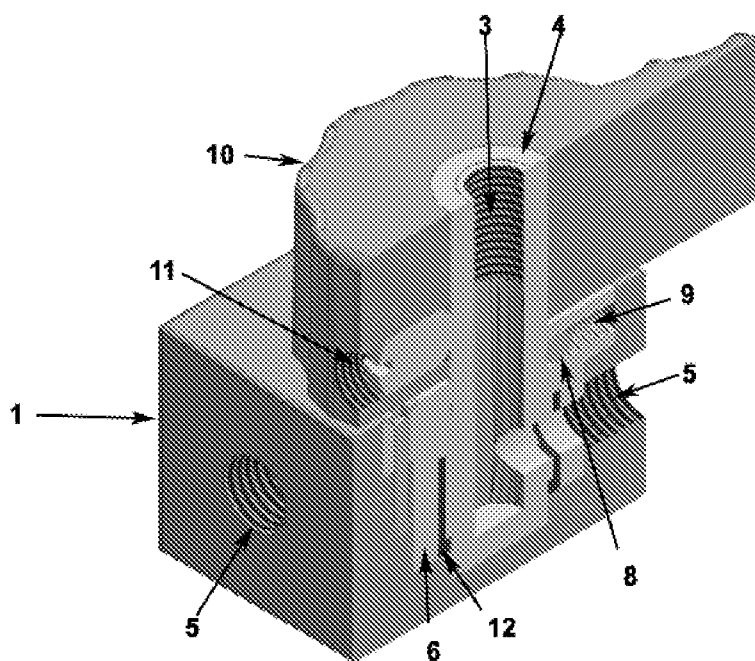


FIGURE 5

