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(54) Title: ABLUTIONARY SYSTEM

(57) Abstract: A customizable ablutionary system includes a modular mixer valve (1) having a main body part (2) housing a valve for connection to supplies of hot and cold water. A detachable accessory part (8) is connected to the main body part (2) via a transfer port to receive outlet water from the valve. The accessory part (8) has an outlet (4) separate from the transfer port for connection to a water delivery device such as a flexible hose for a shower handset. The system can be customized by connecting different accessory parts (8) having different functionality to the main body part (2). In other embodiments the outlet may be provided in the main body part. Several accessory parts may be connected in series and water may flow through none, some or all of the accessory parts.

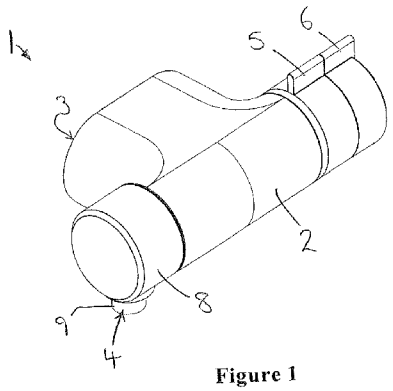

Figure 1

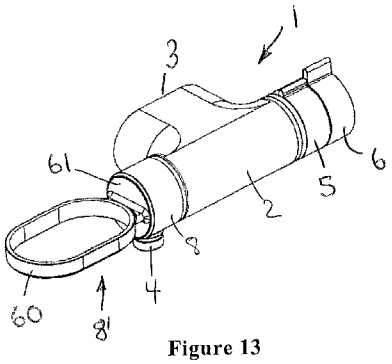

Figure 13

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ABLUTIONARY SYSTEM

[0001] This invention relates to an ablutionary system for washing and, in particular, it relates to an ablutionary system for showering. It also relates to a kit of parts for an ablutionary system and methods of assembly and installation. More especially, the invention relates to mixer valves employed in such installations and, in particular, but not exclusively, to a modular mixer valve that can be adapted for use in different systems and/or that can be provided with one or more accessories that may add to or change functionality of the mixer valve and/or the system in which the mixer valve is employed.

[0002] Ablutionary systems, such as showers, typically comprise a mixer valve that delivers water to an outlet and then on through a conduit to a shower head. The mixer valve controls the temperature and/or flow rate of the water delivered to the outlet. Shower mixer valves may be of exposed type or built in type. Exposed type mixer valves are mounted to a wall and project therefrom, usually into the enclosure that surrounds the shower. Built in type mixer valves are mounted behind the wall and are thus hidden from the view of the user. The outlets and controls project through the wall but the valve body is behind the wall. This invention relates to both types of shower valve.

[0003] A known exposed type shower system is shown in Figure 31 and comprises a moveable shower head attached to a flexible hose connected to an outlet on the underside of the mixer valve body. In another known exposed type shower system, a large fixed "rain" shower head is attached to a rigid pipe connected to an outlet on the topside of the mixer valve body. In another known exposed type shower system, a diverter valve is connected to an outlet on the topside of the valve body and is operable to deliver water to a moveable shower head or a fixed shower head.

[0004] In such known exposed type shower systems, the outlet is integral with the valve body and has a connection axis that is orientated vertically when the mixer valve is installed. In order to accommodate the different systems, two outlet positions are required – one having the outlet in the underside for use with

a moveable handset and another having the outlet in the topside for use with an overhead shower or diverter valve. The provision of two valves, one with the outlet in the topside and another with the outlet in the underside, adds to costs while the provision of two outlets in the same valve, one in the topside and another in the underside, requires a blanking plug to close the outlet that is not used which may detract from the aesthetics of the mixer valve.

[0005] A known built-in type shower systems is shown in Figure 32 and comprises a moveable shower head attached to a flexible hose connected to an outlet on the underside of an outlet connector mounted on the wall adjacent to a mixer valve. The mixer valve body is located in the wall behind a face plate and connected by a short conduit to the outlet connector. As with the exposed type shower systems, the connection axis is orientated vertically when the outlet connector is installed.

[0006] The present invention has been made from a consideration of the foregoing and seeks to overcome or mitigate the disadvantages of the known shower systems and mixer valves for use therein.

[0007] The present invention seeks to provide a customisable ablutionary system including a mixer valve that can be configured with a different outlet connection according to the type of system without changing the mixer valve body. The present invention further seeks to provide a modular mixer valve for use in such a customisable ablutionary system. The invention also seeks to provide modular mixer valves of both the exposed and built-in types. The invention further seeks to provide a method of assembling and/or configuring a mixer valve for customising an ablutionary system and a method of installing a mixer valve and/or ablutionary shower system employing such a modular mixer valve.

[0008] In an exemplary embodiment, a customizable ablutionary system for washing comprises a main body part, a water outlet for delivering water for washing and an accessory connector, the main body part having a water inlet arranged to receive a supply of water, wherein the accessory connector includes a water transfer port and the main body part is adapted to provide a supply of water

to the water transfer port of the accessory connector, wherein the system includes at least two, different accessory parts each having different functionality, and wherein the accessory connector is adapted to removably receive one of the at least two, different accessory parts such that the functionality of the ablutionary system can be customized by connecting the accessory part that has the desired functionality to the accessory connector.

[0009] This is advantageous as the ablutionary system is modular and can easily be added to and modified by connecting one or more different accessory parts to the accessory connector. The accessory part is advantageous as it may enhance the functionality of the ablutionary system, as will be described in more detail below. The ablutionary system allows the customization of an ablutionary apparatus, such as a shower, so that it can receive a variety of accessory parts to suit a user's needs. Also, the ablutionary system can be installed with one type of accessory part and can be later modified without needing to replace the whole ablutionary system.

[0010] It may be that the accessory connector is integral with the main body part, in that it forms part of the main body part, or is connected to the main body part by a conduit. Thus, depending on whether the ablutionary shower system is an exposed type or built in type, the accessory connector can be conveniently located to attach the accessory part.

[0011] It may be that the accessory part is removably connectable to the accessory connector. This is advantageous as it allows the ablutionary system to be customized with accessory parts that may or may not require or need to interact with the water moving through the ablutionary system when it is in use.

[0012] The accessory part may be arranged to receive or utilise a flow of water in use from the water transfer port of the accessory connector. In this case, the accessory part is a "wet" accessory part. Alternatively, the accessory part may be arranged not to receive or utilise a flow of water in use from the water transfer port of the accessory connector. In this case, the accessory part is a "dry" accessory part.

[0013] It may be that the accessory part includes the water outlet or provides a flow path to the water outlet. This is advantageous as the accessory part forms a manifold for directing water to the water outlet allowing the method of delivery of the water to be customised. Accordingly, the water outlet may be arranged to connect to a variety of water delivery devices that deliver water for washing. Thus, the delivery device may be a flexible shower hose for a handset or a rigid pipe for a fixed shower head or a body jet bar or a wash down hose for cleaning the shower or a bath filling spout module or combinations thereof. Thus, the water outlet provides means for water to leave the ablutionary system, possibly via a delivery device removably connected thereto, for use by a user of the system. The water outlet may include a connection means, such as a screw thread, to attach the delivery device conduit for delivering water to a shower head.

[0014] It may be that the main body part includes the water outlet and the accessory part may receive or utilise a flow of water in use from the water transfer port of the accessory connector. For example, the accessory connector may provide a second, separate water outlet or a flow path to a second, separate outlet. This is advantageous as the number and arrangement of water outlets for delivery of the water to be customised. Accordingly, one or more water outlets may be arranged to connect to a variety of water delivery devices that deliver water for washing. Thus, the delivery device may be a flexible shower hose for a handset or a rigid pipe for a fixed shower head or a body jet bar or a wash down hose for cleaning the shower or a bath filling spout module or combinations thereof.

[0015] It may be that the main body part includes the water outlet and the accessory part does not receive or utilise a flow of water in use from the water transfer port of the accessory connector. This is advantageous as the accessory part can provide functionality that does not rely on water flow and different accessory parts can be fitted to suit the required functionality.

[0016] "Dry" accessory parts may include means to provide any of the following; parking socket for shower handset, a soap dish, a storage shelf, a soap/lotion dispenser, a cup holder, a clamp for shampoo/soap/lotion etc, a hook for attaching articles, a clock, a radio or other music player, a USB slot to connect a MP3 or other music player, a Wi-Fi or other wireless receiver such as a Bluetooth speaker for receiving information to relay to a user of the shower such as streaming news, music, weather updates or a schedule, mood lighting, a note pad, a picture display frame that may be a digital photograph frame or a shaving mirror. It will be appreciated that the invention is not limited to these specific examples of "dry" accessory parts.

[0017] "Wet" accessory parts may include means to provide any of the following; a water outlet, a temperature display of the water, a flow rate meter to measure the flow rate of the water, a soap injector to introduce soap into the water flow, an aromatherapy oil injector to introduce aromatherapy oils into the water flow, an air injector to introduce air into the water flow, an on/off valve actuated by a push button, a shower energy usage calculator that measures properties of the water flow to calculate the energy usage, a shower cost meter that measures properties of the water flow to calculate the cost of showering, or an anti-mist shaving mirror which flows the water past the mirror to maintain the mirror mist free. It will be appreciated that the invention is not limited to these specific examples of "wet" accessory parts.

[0018] It may be that the accessory connector is arranged to engage with a complimentary connecting part on the accessory part to secure the accessory part to the accessory connector, the arrangement forming a connector system. Further, the connector system may also include a release element arranged to allow separation of the accessory part from the accessory connector when the release element is actuated. This is advantageous as the accessory part will be securely retained on the accessory connector until actuation of the release element.

[0019] It may be that the accessory connector comprises (a) a bayonet connector; or (b) a snap fit connector; or (c) a screw thread connector; or (d) a grub screw arranged to engage in a complimentary recess type connector. It will be

appreciated that the connector system is not limited to these particular options and may comprise any appropriate connector system that provides a reliable connection between the parts with suitable seal integrity and releasability as may be necessary.

[0020] The accessory part may include a further accessory connector to receive a further accessory part. The further accessory connector may include a further water transfer port. Several accessory parts may be connected together in series. Where more than one accessory part is provided, these may be "dry" accessory parts or "wet" accessory parts or a combination of "wet" and "dry" accessory parts. This is advantageous as the accessory parts can be connected to add additional functionality to the ablutionary system. Thus, several accessory parts can be added to provide a variety of functions or water outlet arrangements.

[0021] It may be that the ablutionary system includes a removable water transfer port cap to sealingly close the water transfer port or further water transfer port, if present, when the port is not in use. The cap can be removed at a later time if further functionality is required with the addition of further accessory parts.

[0022] It may be that the water inlet comprises a supply of relatively hot water and a supply of relatively cold water, the main body part including a valve to control the temperature of the water at the water outlet by mixing the hot and cold water supplies. The valve may be controlled by mixing controls which are provided on the main body part. The valve may be a thermostatic valve.

[0023] It may be that the ablutionary system includes flow rate controls for controlling the rate of flow of water to the water outlet when in use. The flow rate controls may be provided on the main body part.

[0024] It may be that the connector system that connects two parts to be coupled, i.e. the accessory part and main valve body part or the accessory part and further accessory part where more than one accessory part is provided, is a snap fit connector system. This provides an easy and secure connection. The snap fit connector system may comprise a first locking element adapted to be secured to

one of the parts and a second locking element, complimentary to the first locking element, adapted to be secured to the other part to be coupled, the second locking element arranged to engage behind at least a portion of the first locking element to secure the two elements together. The second locking element may include engagement lugs adapted to engage with the part that the first locking element is secured to prior to engaging with the first locking element. The first locking element may be arranged to flex or rotate within the part it is secured in order to allow the second locking element to engage behind at least a portion of it. The first locking element may comprise a locking ring having resilient flanges that engage with one of the parts, the resilient flanges arranged such that the locking ring can rotate relative to the part in which it is secured, and the second locking element comprises an activator ring having axially extending engagement lugs adapted to engage with the part that the locking ring is secured to prior to engaging with the locking ring, the activator ring adapted such that engagement of the locking ring and activator ring in an axial direction urges the locking ring to rotate against the force of the resilient flanges and then resile back to its original position locking the activator ring behind the locking ring.

[0025] In an exemplary embodiment, a kit of parts may be provided for forming the ablutionary system of the type described herein.

[0026] This is advantageous as the kit can comprise one or more accessory parts so that a user can customize their ablutionary shower system. The system can be customised to receive a variety of accessory parts to suit a user's needs. Also, the ablutionary system can be installed with one type of accessory part and can be later modified without needing to replace the whole system. For example, the accessory part may comprise a manifold to direct water to a delivery device for use that is adapted to connect to the accessory part. For example, the accessory part may connect to a delivery device comprising a hose and movable shower head. Alternatively, the accessory part may connect to a delivery device comprising a fixed pipe and rigid shower head. Alternatively, the accessory part may connect to both a delivery device comprising a hose and movable shower head and a delivery device comprising a fixed pipe and rigid shower head with a diverter for directing water flow to either one or both of the delivery devices.

These alternative configurations can be interchanged easily. Other configurations of single or multiple delivery devices may be employed.

[0027] It may be that the kit includes at least one further accessory part arranged to connect to the connector of the main body part or a further connector on the accessory part.

[0028] In an exemplary embodiment, an accessory part may be provided for enhancing the functionality of a customizable ablutionary system, such as a shower, the accessory part including part of a connector system to removably connect the accessory part to an accessory connector of a customizable ablutionary system, the accessory part including a water receiving aperture as part of the connector system to receive a supply of water from the ablutionary system when in use.

[0029] This is advantageous as the shower accessory part can have a multitude of configurations and can be used to configure the ablutionary shower system.

[0030] It may be that the accessory part includes a water receiving aperture which is arranged to receive a flow of water from the ablutionary system when in use.

[0031] It may be that the accessory part includes a water outlet for delivering water for showering. The water outlet, separate from the water receiving port, provides means to connect a delivery device such as a shower hose or a fixed pipe with fixed shower head or a body jet bar or a wash down hose for cleaning the shower or a bath filling spout module or combinations thereof. Thus, the water outlet provides means for water to leave the ablutionary system, possibly via a delivery device removably connected thereto, for use by a user of the system. Preferably the water outlet includes a connection means, such as a screw thread, to attach the delivery device conduit for delivering water to a shower head.

[0032] It may be that the accessory part includes a water transfer port arranged to receive a supply of water from the ablutionary system through the water receiving

port for supplying a further accessory part connected to the water transfer port. This is advantageous because the accessory part can be connected in series with a further accessory part. Preferably, the accessory part includes a removable transfer port cap, to sealingly close the water transfer port when not in use.

[0033] In another embodiment, an ablutionary system for washing may include a main body part having a water inlet arranged to receive a supply of water, the ablutionary system further comprising a water outlet for delivering water for washing and an accessory connector adapted to receive an accessory part.

[0034] This is advantageous as the accessory part can enhance the functionality of the ablutionary system. The accessory part may include any of the accessory parts described herein.

[0035] In another embodiment, an accessory part for enhancing the functionality of an ablutionary system, such as a shower, may include part of a connector system to removably connect the accessory part to a connector of an ablutionary system.

[0036] In another embodiment, a modular mixer valve may include a detachable accessory part. The accessory part can enhance the functionality of the mixer valve. The accessory part may include any of the accessory parts described herein. The modular mixer valve may provide outlet water for a water supply system for hand washing, bathing, showering. Thus the outlet may be connected to a delivery device such as a shower hose or a fixed pipe with fixed shower head or a body jet bar or a wash down hose for cleaning the shower or a bath filling spout module or combinations thereof.

[0037] In another embodiment, a modular mixer valve may include hot and cold water inlets for connection to supplies of hot and cold water, valve means for controlling mixing of hot and cold water according to user selection of outlet water temperature, an accessory part connectable to a water transfer port, and a water outlet separate from the water transfer port, wherein the accessory part is detachable from the water transfer port. This is advantageous as the functionality

of the mixer valve may be enhanced by selection and fitment of different accessory parts according to requirements. The accessory part may include any of the accessory parts described herein.

[0038] The outlet may be provided by the accessory part connected to the water transfer port. Alternatively, the outlet may be provided by a part of the valve provided with the water transfer port. Alternatively, both the accessory part and the part of the valve provided with the water transfer port may be provided with outlets.

[0039] At least one further accessory part may be connected to the accessory part connected to the water transfer port. Such further accessory part may add to functionality of the mixer valve. In some embodiments, such further accessory part may be in fluid communication with the accessory part connected to the water transfer port. In this way, both accessory parts may receive or utilise a flow of water from the main body part. The outlet may be provided by the main body part, the accessory part connected to the main body part or by the further accessory part or combinations thereof. In other embodiments, such further accessory part may not be in fluid communication with the accessory part connected to the valve body. In this way, the accessory part connected to the main body part may receive or utilise a flow of water from the main body part. The outlet may be provided by the main body part or the accessory part connected to the main body part or combinations thereof. The selection and assembly of different combinations of accessory parts may further add to functionality of the mixer valve. In general the number of accessory parts that can be connected in series may be limited by practical and/or the aesthetic considerations.

[0040] The mixer valve may be of the exposed type having a valve body that is exposed (visible) in use, for example mounted on a wall or similar support surface, with the transfer port in the valve body. The outlet may be provided in the valve body or in the accessory part connected to the transfer port. Alternatively, two outlets may be provided. A diverter may be employed to select either one or both outlets. One outlet may be provided in the valve body and

another outlet in the accessory part. Alternatively both outlets may be provided in the accessory part.

[0041] The mixer valve may be of the built-in type having a valve body that is concealed (not visible) in use, for example by a cover plate, with the transfer port in a connector part mounted on a wall or similar support surface. The outlet may be provided in the connector part or in the accessory part connected to the transfer port. Alternatively, two outlets may be provided. A diverter may be employed to select either one or both outlets. One outlet may be provided in the connector part and another outlet in the accessory part. Alternatively both outlets may be provided in the accessory part.

[0042] In both types of the valve, the outlet(s) may be configured to connect to a variety of water delivery devices that deliver water for washing. Thus, the delivery device may be a flexible shower hose for a handset or a rigid pipe for a fixed shower head or a body jet bar or a wash down hose for cleaning the shower or a bath filling spout module or combinations thereof. Thus, the water outlet(s) provides means for water to leave the mixer valve, possibly via a delivery device removably connected thereto, for use by a user of the valve. Preferably the water outlet includes a connection means, such as a screw thread, to attach the delivery device conduit for delivering water to a shower head.

[0043] In an exemplary embodiment, a modular mixer valve may include a valve body having a main body part provided with inlets for connection to supplies of hot and cold water, valve means for controlling mixing of hot and cold water according to user selection of outlet water temperature, and a water transfer port having a connection axis that, in use, is orientated in a first direction, and the main body part being connectable to an accessory part providing a flow path from the water transfer port through the accessory part to an outlet having a connection axis that, in use, is orientated in a second direction substantially normal to the first direction.

[0044] The first direction may be horizontal or substantially horizontal and the second direction may be vertical or substantially vertical. In some embodiments,

the accessory part may provide a flow path to an outlet that opens in an upwards direction. In some embodiments, the accessory part may provide a flow path to an outlet that opens in a downwards direction. In some embodiments, the accessory part may provide a flow path to outlets that open in an upwards and a downwards direction and the accessory part may include a diverter valve for selecting one or both outlets.

[0045] It may be that the outlet is provided by the accessory part connected to the main body part. The accessory part may be detachable. In this way, the outlet may be configured by selection and assembly of the main body part with the appropriate accessory part according to the required orientation of the outlet.

[0046] At least one further accessory part may be connected to the accessory part connected to the main body part. Such further accessory part may add to functionality of the mixer valve. In some embodiments, such further accessory part may be in fluid communication with the accessory part connected to the main body part. In this way, both accessory parts receive water from the main body part and the outlet may be provided by the accessory part connected to the main body part or by the further accessory part. In other embodiments, such further accessory part may not be in fluid communication with the accessory part connected to the valve body. In this way, only the accessory part connected to the main body part receives water from the main body part and the outlet is provided by that accessory part. The selection and assembly of different combinations of accessory parts may further add to functionality of the mixer valve. In general the number of accessory parts that can be connected in series may be limited by practical and/or the aesthetic considerations.

[0047] The mixer valve may be of the exposed type in which the main body part is exposed in use, for example mounted on a wall or similar support surface. Alternatively, the mixer valve may be of the built-in type where the main body part is concealed in use, for example by a cover plate and may be at least partially recessed in a wall or similar support surface. In both types of the valve, the outlet may be configured for connection to a delivery device selected from a flexible hose, a rigid pipe or a combination of a flexible hose and a rigid pipe by

selection of an accessory part having an appropriate outlet or combination of outlets and assembling a main body part of the valve with the accessory part connected to the main body part directly or indirectly via a further accessory part.

[0048] In an exemplary embodiment, a modular shower system may employ a mixer valve having a control module and an accessory module selected from a plurality of accessory modules. The control module may include a valve body with inlets for connection to supplies of hot and cold water and a mixing valve for controlling mixing of the hot and cold water according to user selection of outlet water temperature. The control module may have an outlet for connection to a water delivery device that delivers water to a shower as previously described. Alternatively or additionally, the accessory module may include an outlet for connection to a water delivery device that delivers water to a shower as previously described. A required shower system can be configured by selecting and assembling the appropriate control module and accessory module so that the delivery device receives water from the control module directly and/or via the accessory module. At least one further accessory module may be provided in addition to the selected control module and accessory module for further adapting and customising the shower system to the user's requirements. Some accessory modules may connect to the water path from the control module. Other accessory modules may be isolated from the water path. The control module may be selected from a plurality of control modules. Different combinations of control modules and accessory modules may be employed allowing shower systems to be configured with different functionality.

[0049] In an exemplary embodiment, a method of assembling a mixer valve for a shower system may include selecting a control module including a main body part housing a mixing valve and having inlets for connection to supplies of hot and cold water and a water transfer port for water received from the mixing valve, selecting a detachable accessory module connectable to the water transfer port directly or indirectly wherein one of the control module and accessory module has an outlet for connection to a delivery device selected from a flexible hose, a rigid pipe and combinations thereof, and providing a fluid connection between

the mixing valve and the outlet. The detachable accessory module may include the outlet.

[0050] The method may allow a single control module to be provided for use with any selected one of a plurality of different outlet accessory modules whereby the mixer valve may be configured for different shower systems by selecting the appropriate outlet accessory module and connecting the water receiving port of the selected outlet module to the water transfer port of the control module directly or indirectly. Where the selected outlet accessory module is connected to the water transfer port directly, the water receiving port of the selected outlet accessory module may co-operate with the water transfer port of the control module to provide a fluid connection between the control module and the outlet accessory module. Where the selected outlet accessory module is connected to the water transfer port indirectly, an accessory part may be disposed between the control module and the outlet accessory module having a water receiving port that co-operates with the water transfer port of the main body part and a water transfer port that co-operates with a water receiving port of the outlet module. More than one accessory part may be disposed between the control module and the outlet accessory module. Where provided, the or each accessory part provided between the control module and the outlet accessory module may comprise a module for monitoring a characteristic of the outlet water flow from the control module, for example the water flow rate or water pressure or water temperature or combinations thereof and optionally displaying a value of the monitored characteristic(s). Alternatively, the or each accessory part provided between the control module and the outlet accessory module may comprise a module for modifying the outlet water flow from the control module, for example by introducing an additive to the water such as soap, an aromatherapy oil, perfume or fragrance or any other suitable additive.

[051] The outlet accessory module may be configured to attach an accessory part. For example, the outlet accessory module may have a formation such as a socket isolated from the water flow for mounting an accessory part that does not require connection to the water flow to perform its function, i.e. a “dry” accessory part. Thus the outlet accessory module may support an accessory part

including but not limited to a parking socket for shower handset, a soap dish, a storage shelf, a soap/lotion dispenser, a cup holder, a clamp for shampoo/soap/lotion etc, a hook for attaching articles, a clock, a radio or other music player, a USB slot to connect a MP3 or other music player, a Wi-Fi or other wireless receiver such as a Bluetooth speaker for receiving information to relay to a user of the shower such as streaming news, music, weather updates or a schedule, mood lighting, a note pad, a picture display frame that may be a digital photograph frame or a shaving mirror. Alternatively, the outlet accessory module may have a water transfer port for connection to a water receiving port of an accessory part connected to the outlet module that receives or utilises a flow of water to perform its function, i.e. a "wet" accessory part. Thus the outlet accessory module may connect to an accessory part including but not limited to a temperature display of the water, a flow rate meter to measure the flow rate of the water, a soap injector to introduce soap into the water flow, an aromatherapy oil injector to introduce aromatherapy oils into the water flow, an air injector to introduce air into the water flow, an on/off valve actuated by a push button, a shower energy usage calculator that measures properties of the water flow to calculate the energy usage, a shower cost meter that measures properties of the water flow to calculate the cost of showering, or an anti-mist shaving mirror which flows the water past the mirror to maintain the mirror mist free. Where the outlet accessory module has a water transfer port, an accessory device that does not require connection to the water flow to perform its function may be connected to the outlet accessory module so that the water transfer port is closed by the accessory part or remains closed if the transfer port is self-closing.

[0052] The interchangeability of different accessory modules and the options for assembly with different accessory parts connected to or isolated from the water flow allows a wide range of shower systems to be configured using common parts. Also a shower system can be reconfigured by changing the accessory module and/or can have the functionality altered by adding or removing or changing accessory parts. In this way, the end user can customise the design and configuration of the shower system and can later change the design and configuration of the shower system without having to replace the mixing valve which may represent the major cost of any installation.

[0053] There now follows by way of example only a detailed description of exemplary embodiments with reference to the accompanying drawings, in which the same or similar reference numerals are used to indicate corresponding parts where appropriate and wherein ;

[0054] **Figure 1** shows a perspective view of an embodiment of a modular mixer valve of the exposed type;

[0055] **Figure 2** shows the modular mixer valve shown in Figure 1 from the front and above;

[0056] **Figure 3** shows a perspective view of the main body part of the modular mixer valve shown in Figure 1 with the outlet module removed;

[0057] **Figure 4** shows the main body part of the modular mixer valve shown in Figure 3 from the front and above;

[0058] **Figure 5** shows an ablutionary shower system employing the modular mixer valve of Figures 1 to 4;

[0059] **Figure 6** shows a perspective view of an embodiment of a modular mixer valve having the main body part of the modular mixer valve of Figures 1 and 2 and a different outlet module;

[0060] **Figure 7** shows the modular mixer valve shown in Figure 6 from the front and above;

[0061] **Figure 8** shows an ablutionary shower system employing the modular mixer valve of shown Figures 6 and 7;

[0062] **Figure 9** shows a perspective view of an embodiment of a modular mixer valve having the main body part of the modular mixer valve of Figures 1 and 2 and a different outlet module;

[0063] **Figure 10** shows the modular mixer valve shown in Figure 9 from the front and above;

[0064] **Figure 11** shows an ablutionary shower system employing the modular mixer valve of shown Figures 9 and 10;

[0065] **Figure 12** shows a cross sectional view of part of the main body part and outlet module shown in Figures 1 and 2;

[0066] **Figure 13** shows a perspective view of the modular mixer valve of Figures 1 and 2 with a "dry" accessory part attached to the outlet module;

[0067] **Figures 14a and 14b** show alternative "dry" accessory parts;

[0068] **Figure 15** shows a cross-sectional view of a modification to the outlet module shown in Figure 12 for attaching a "wet" accessory part;

[0069] **Figures 16a, 16b, 16c and 16d** show alternative "wet" accessory parts;

[0070] **Figure 17** shows a perspective view of a modification to the modular mixer valve of Figures 1 and 2 to include a "wet" accessory part between the main body part and outlet module;

[0071] **Figure 18** shows a cross-sectional view of part of the main body part and the "wet" accessory part and outlet module of Figure 17;

[0072] **Figure 19** shows a modification to the modular mixer valve of Figure 1;

[0073] **Figure 20** shows a modification to the modular mixer valve of Figure 1;

[0074] **Figures 21a, 21b and 21c** show various configurations of ablutionary shower systems employing modular bar mixer valves of the exposed type;

[0075] **Figures 22a, 22b, 22c and 22d** show various configurations of ablutionary shower systems employing modular mixer valves of the built-in type;

[0076] **Figure 23** shows a detail of the accessory connector shown in Figure 22b and alternative accessory parts for use therewith;

[0077] **Figure 24** shows an embodiment of the parts of a connector system;

[0078] **Figure 25** shows a first part of the connector system and a receiver part for the first part of the connector system;

[0079] **Figure 26** shows a second part of the connector system engaging with an accessory part;

[0080] **Figure 27** shows the accessory part of Figure 26 about to be coupled to the receiver part of Figure 25;

[0081] **Figure 28** shows the locking ring of the connector system partially rotated as the actuator ring is pushed into engagement;

[0082] **Figure 29** shows the actuator ring of the connector system snapped behind the locking ring to couple the parts together;

[0083] **Figure 30** shows the locking ring and actuator ring of the connector system coupled together with the accessory part not shown for clarity;

[0084] **Figure 31** shows a prior art shower system; and

[0085] **Figure 32** shows another prior art shower system.

[0086] A first embodiment of a modular mixer valve 1 is shown in Figures 1 to 4 and an ablutionary system, comprising a shower system, employing the modular mixer valve 1 is shown in Figure 5. This first embodiment shows an exposed

type mixer valve 1. Further embodiments showing a built in type mixer valve are described later.

[0087] With reference to Figures 1 to 4, the mixer valve 1 comprises a main body part 2 or control module. The main body part 2 has separate hot and cold inlets (not shown) for connection to a cold water supply and a hot water supply. In this embodiment, a rear face 3 of the main body part 2 is mounted in use on a wall or similar support surface and the inlets are arranged for concealed connection to supply pipes routed through the wall into the back of the main body part 2. Other arrangements of the inlets may be employed, as is known in the art.

[0088] The main body part 2 houses a mixing valve (not visible) that is arranged to control mixing of the two supplies to provide a desired outgoing water temperature and water flow rate. The main body part 2 includes a temperature control 5 and a flow rate control 6 for user selection of outlet water temperature and flow rate. In all of the embodiments disclosed herein, the controls 5, 6 may be replaced with a single sequential control that adjusts both flow rate and temperature, as will be known to those skilled in the art. The mixing valve may be a thermostatic valve or a non-thermostatic valve, as is known in the art.

[0089] The main body part 2 of the mixer valve has an accessory connector 7 and a removable accessory part 8 or outlet module is provided that connects to the connector 7. Figures 1 and 2 show the main body part 2 with the accessory part 8 connected, and Figures 3 and 4 show the main body part 2 with the accessory part 8 removed. In use, the mixer valve 1 is preferably installed on the wall or similar support surface with a connection axis of the connector 7 orientated horizontally or substantially horizontally with the temperature control 5 and flow rate control 6 on one side and the accessory connector 7 on the opposite side of the main body part 2.

[0090] The accessory connector 7 includes a water transfer port 10, which receives a supply of water through the main body part 2. The water transfer port 10 comprises a closable aperture and is used to supply the accessory part 8, when connected to the connector 7, with a supply of water. The water transfer

port 10 is associated with the connector 7 and includes a seal between the transfer port 10 and the accessory part 8 for reliable transfer of water between the parts 2, 8.

[0091] The accessory part 8 includes a water outlet 4. The water outlet 4 includes a spigot 9 which carries a screw thread for connecting a delivery device, such as a flexible hose having a shower head attached thereto. In use, the water outlet 4 is arranged on the underside of the mixer valve 1 and has a connection axis orientated vertically or substantially vertically.

[0092] In the shower system employing the mixer valve 1 shown in Figure 5, the water outlet 4 of the accessory part 8 is connected to one end of a flexible hose 70 and a handset 72 is attached to the other end of the hose 70. The handset 72 is mounted in a parking socket 71 of a slide rail assembly 73 mounted on the wall. In known manner, the parking socket 71 is mounted on a slide rail 74 and is vertically adjustable along the slide rail 74 to adjust the height of the handset 72. The handset can be removed from the parking socket 71 for manually directing the spray if desired.

[0093] A second embodiment of a modular mixer valve 1 is shown in Figures 6 and 7 and an ablutionary system, comprising a shower system, employing the modular mixer valve 1 is shown in Figure 8. This second embodiment employs the same main body part 2 or control module as the first embodiment and a different removable accessory part 8 or outlet module. In this embodiment, the accessory part 8 has a water outlet 4 provided with a threaded spigot 9 as in the first embodiment and an integrated slide rail 74 of a slide rail assembly 73.

[0094] In the shower system employing the mixer valve 1 shown in Figure 8, the water outlet 4 of the accessory part 8 is connected to one end of a flexible hose 70 and a handset 72 is attached to the other end of the hose 70. The handset 72 is mounted in a parking socket 71 that is vertically adjustable along the integrated slide rail 74 to adjust the height of the handset 72. The handset 72 can be removed from the parking socket 71 for manually directing the spray if desired.

[0095] A third embodiment of a modular mixer valve 1 is shown in Figures 9 and 10 and an ablutionary system, comprising a shower system, employing the modular mixer valve 1 is shown in Figure 11. This third embodiment employs the same main body part 2 or control module as the first and second embodiments and a different removable accessory part 8 or outlet module. In this embodiment, the accessory part 8 has a first water outlet 4 provided with a threaded spigot 9 as in the first embodiment and a second water outlet 4'. The accessory part 8 also includes a diverter valve member (not visible) and a diverter valve member control 11. The diverter valve member switches the outlet path within the accessory part 8 between water outlet 4 and water outlet 4'. Thus, water received from the water transfer port 10 is diverted to either outlet 4 or 4' according to the position of the diverter valve member. It will be appreciated that the diverter valve member may be such that both water outlets 4, 4' can be supplied with water simultaneously.

[0096] In the shower system shown in Figure 11, the first water outlet 4 is arranged on the underside of the mixer valve 1 and the second outlet 4' is arranged on the topside of the mixer valve assembly so that both outlets 4, 4' are orientated vertically or substantially vertically. The outlet 4 of the accessory part 8 is connected to one end of a flexible hose 70 and a handset 72 is attached to the other end of the hose 70. The outlet 4' is connected to one end of a rigid water supply pipe assembly 75 and a fixed over head shower 76 is attached to the other end of the water supply pipe assembly 75. A vertical portion 74 of the water supply pipe assembly 75 doubles as a slide rail for a parking socket 71 for the handset 72 that is vertically adjustable along the slide rail 74 to adjust the height of the handset 72. The handset 72 can be removed from the parking socket 71 for manually directing the spray if desired. In a modification (not shown) a separate slide rail assembly may be provided mounted on the wall or similar support surface as shown in Figure 5

[0097] As will be apparent from the description of the embodiments of Figures 1 to 11, a modular mixer valve 1 is provided having a main body part 2 or control module for connection to supplies of hot and cold water. The main body part 2

houses a mixing valve for user selection of outlet water temperature and flow rate. The main body part 2 can be configured for installation in different shower systems by selectively connecting different accessory parts 8 or outlet modules to the accessory connector 7 of the main body part 2 for orientating one or more outlets separate from the water transfer port 10 for connection to a water delivery conduit supplying water to a shower spray head. The different accessory parts 8 thus provide interchangeable rigid outlet modules or manifolds that can be easily detached and replaced to allow the mixer valve 1 to be customized using the same main body part 2 or control module. This modular design of the mixer valve 1 allows the shower system to be customized and easily tailored to a user's requirements.

[0098] Referring now to Figure 12, a cross-section through the accessory part 8 of the first embodiment is shown connected to the main body part 2 of the mixer valve 1 (only a portion of which is shown for clarity wherein the dashed lines show where the main body continues).

[0099] The accessory part 8 includes a chamber 16 and a water receiving port including a hollow port engaging member 13 in communication with the chamber 16. The port engaging member 13 is adapted to be received within the water transfer port 10 of the main body part 2. Accordingly, the transfer port 10 includes a tubular collar 14 within which the port engaging member 13 is received. It will be appreciated that the collar 14 could be any suitable shape such as elliptical or square as non-limiting examples.

[0100] The transfer port 10 is surrounded by a shroud 19, which comprises a portion of the main body part 2 that extends distal to the port 10. The port engaging member 13 includes a groove 15 that carries a sealing element such as an O-ring (not shown), which seals against the tubular collar 14. Thus, water is able to flow from the main body part 2, through the collar 14 and port engaging member 13 into the chamber 16 of the accessory part 8.

[0101] The chamber 16 is also in communication with the water outlet 4 and in this embodiment allows water to flow freely through the chamber 16 to the

outlet 4. In this way, outlet water from the mixing valve flows to the outlet 4 through a waterway that includes the accessory part 8. The accessory part 8 is thus a "wet" accessory part in that it receives a flow of water from the main body part 2. It will be appreciated that any of the interchangeable accessory parts 8 of the embodiments of Figures 1 to 11 may be mounted on the main body part 2 in similar manner.

[0102] The accessory part 8 also includes an end cap 18 that is removable to reveal a socket 24 in the end of the accessory part 8 that is isolated from the flow of water through the accessory part 8. The socket 24 is configured for mounting a further accessory part (not shown) for increasing the functionality of the shower system. The further accessory part is thus a "dry" accessory part in that it does not receive a flow water from the main body part 2.

[0103] Figure 13 shows the "wet" accessory part 8 of the first embodiment with a further "dry" accessory part 8' mounted thereon. The further accessory part 8'includes a base part 61 that seats in the socket 24 and a ring shaped holder 60 for mounting a removable soap dish (not shown). The base part 61 may be releasably secured by any suitable means, for example a grub screw mounted in wall of the socket 24 to engage a groove extending around the perimeter of the base part 61. The holder 60 may be of oval-shape or any other shape and may be configured to support other articles.

[0104] Figure 14a shows a "dry" accessory part 8' including a cup holder 62 and cup 63 and Figure 14b shows "a dry" accessory part including a bottle holder 64 and pump operated soap bottle 65. Other examples of "dry" accessories that may be employed with the accessory part 8 of the first embodiment will be apparent to those skilled in the art. The accessory part of the second and third embodiments may likewise be provided with a removable end cap for mounting a "dry" accessory part 8'.

[0105] Referring now to Figure 15, there is shown a modification to the accessory part 8 of the first embodiment to include a further accessory connector 49 and a further water transfer port 17. The accessory part 8 includes a shroud 29 that

comprises an annular flange that surrounds the further water transfer port 17. In Figure 15, the further water transfer port 17 is closed by a removable end cap 18.

[0106] The cap 18 includes a tubular plug 20 that plugs the further water transfer port 17 and an end cover 21. The plug 20 extends from the end cover 21 and includes a groove 22 that carries an annular seal such as an O-ring (not shown) to seal between the plug 20 and the further water transfer port 17. The end cover 21 is sized and arranged to close the end of the accessory part 8 and meet with an external surface 23 of the shroud 29. The plug 20 closes the further water transfer port 17. Alternatively, the further transfer port may be self closing.

[0107] In use, the end cap 18 may be removed and a further "wet" accessory part connected to the accessory part 8. Thus, the further "wet" accessory part may have a port engaging member including a water receiving port adapted to be received in the further water transfer port 17 of the accessory part 8 and sealed by a seal such as an O-ring (not shown) in similar manner to the seal between the plug 20 and the water transfer port 17. Alternatively, a "dry" accessory part may be connected to the accessory part 8. Thus, the "dry" accessory part closes the water transfer port 17 of the accessory part 8. The accessory parts of the second and third embodiments may likewise be provided with a removable end cap and transfer port for mounting a "wet" accessory part 8" or a "dry" accessory part.

[0108] Figures 16a, 16b, 16c and 16d show examples of "wet" accessory parts 8" that can be used with the accessory part 8 of the first embodiment. Figure 16a shows an accessory part 8" having a temperature sensor (not shown) and a temperature display 66 to provide a read-out of the water temperature. The temperature sensor may extend into a chamber 16 within the part 8 to measure the temperature of the water flowing therethrough. Alternatively, the temperature sensor may be located on a wall section of the waterway and measure the temperature of the water flowing therethrough, for example by conduction of heat through the wall section. Figure 16b shows an accessory part 8" having a clock and/or timer 67. The clock may operate independently of the water flow and the timer may start and stop timing on detection of a change in the flow through the accessory part 8. Figure 16c shows an accessory part 8" having an on/off

switch 68 or valve that controls flow to the water outlet 4. Figure 16d shows an accessory part 8" having a soap/oil infusing device 69. The soap/oil infusing device 69 is arranged to introduce soap/oil into the water flowing into the accessory part 8 and out through the water outlet 4. The accessory parts shown in Figures 16a to 16d are "wet" accessory parts in that they utilise the flow of water to the outlet 4 to provide additional functionality. Other examples of "wet" accessory parts that may be employed with the accessory part 8 of the first embodiment will be apparent to those skilled in the art. The accessory parts of the second and third embodiments may likewise be provided with a removable end cap and transfer port for mounting a "wet" accessory part 8". In other embodiments, the accessory part 8 may include any of the accessory parts 8" in a single accessory part.

[0109] In the embodiments described thus far, the accessory part 8 comprising the water outlet module with one or more outlets is mounted directly on the main body part 2 of the mixer valve 1 and one or more further "wet" or "dry" accessory parts may be mounted on the accessory part 8. However, this is not essential and an arrangement having a further "wet" accessory part 8" connected between the main body part 2 and the accessory part 8 or outlet module is shown in Figures 17 and 18.

[0110] The further "wet" accessory part 8" includes a water receiving port having a port engaging member 13" to engage with the water transfer port 10 of the main body part 2. The further accessory part 8" also includes a water transfer port 17", which is in fluid communication with the port engaging member 13" via the chamber 16". In this embodiment, the further accessory part 8" includes a temperature sensing element (not shown) and a temperature display 100. The temperature sensing element is arranged to measure the temperature of the water flowing in the chamber 16" and present the temperature to a user on the temperature display 100 located on the external surface. The outlet module is of a similar general construction to the accessory part 8 of the first embodiment and the port engaging member 13 engages with the water transfer port 17" of the further accessory part 8" and the water outlet 4 is connectable to a delivery device such as a flexible hose as described previously. The outlet module may

comprise any of the other outlet modules described herein. The accessory parts 8, 8" are connected in series and more than one "wet" accessory part may be connected between the main body part 2 and the accessory part 8 comprising the outlet module. Alternatively or additionally one or more "wet" or "dry" accessory parts may be connected after the accessory part 8 comprising the outlet module. In a modification (not shown), a further "wet" accessory part 8" may include a further water outlet for connection to a further delivery device such as previously described herein. All possible combinations of wet and dry accessory parts are envisaged and are within the scope of the invention.

[0111] Referring now to Figure 19, a modification of the first embodiment is shown in which the accessory part 8 includes a temperature sensor and temperature display 100 for displaying the outlet water temperature. The temperature sensor may be replaced by any other device that utilises a fluid flow to perform its function such as those described herein. The outlet module may comprise any of the other outlet modules described herein.

[0112] Referring now to Figure 20, another modification of the first embodiment, is shown in which the main body part 2 has an outlet 4 on the underside for connection to a fluid delivery device such as a flexible hose for a shower handset and the accessory part 8 connected to the main body part 2 does not have an outlet. In a modification, the outlet may be on the topside of the min body part for connection to a rigid pipe supplying an overhead shower. The accessory part 8 may be a "wet" accessory part or a "dry" accessory part as described herein. In Figure 20, the accessory part 8 is a "wet" accessory part including a temperature sensor (not shown) that utilises a flow of water for monitoring outlet water temperature and providing an indication of the temperature via a temperature display 100. Any other accessory part that receives or utilises a flow of water for its function may be employed. This embodiment may employ more than one accessory part as described herein.

[0113] In a modification (not shown) of Figure 20, the accessory part 8 may have an outlet in addition to the outlet on the main valve body. The outlets may be connected to any of the water delivery devices such as those described herein.

The accessory part may have a control for preventing/allowing water flow to the accessory outlet in addition to water flow to the outlet on the main body part 2.

[0114] Referring now to Figures 21a, 21b and 21c, further embodiments of a different modular mixer valve 1 of the exposed type including a bar mixer valve and ablutionary systems employing such valve are shown.

[0115] The bar mixer valve shown in Figures 21a, 21b and 21c has a tubular, generally cylindrical main body part 110 or control module with separate inlets for connection to a supply 111 of hot water and a supply 112 of cold water respectively. The main body part 110 or control module contains a mixing valve to control mixing of the hot and cold water to provide a desired outgoing water temperature and water flow rate. The main body part 110 includes a temperature control 113 and a flow rate control 114 for user selection of outlet water temperature and flow rate. The controls 113, 114 may be replaced with a single sequential control that adjusts both flow rate and temperature, as will be known to those skilled in the art. The mixing valve may be a thermostatic valve or a non-thermostatic valve, as is known in the art. The controls 113 are located at one end of the main body part 110. An accessory connector and water transfer port (not shown) generally similar to the embodiments of Figures 1 to 11 are located at the opposite end of the main body part 110 for connection to an accessory part.

[0116] In Figure 21a, a first "wet" accessory part 8" includes an oil injector that introduces aromatherapy oil, or the like, into the water that flows from the main body part 110 through the accessory part 8". A further "wet" accessory part 8 is connected to the further accessory connector of the accessory part 8". The further accessory part 8 comprises an outlet module generally similar to the outlet module shown in Figures 9 to 11 to include a diverter valve that directs the water received from the main body part 110 via the first accessory part 8" to a fixed shower head 114 via rigid conduit 115 and to a movable handset 116 via a flexible hose 117 separately or in combination. The outlet module 8 includes a control lever 118 to control which water outlet, and therefore delivery device, the water is diverted to. The outlet module 8 may also have a further accessory

connecter and further water transfer port that is closed by a water transfer port cap 119.

[0117] In Figure 21b, a first "wet" accessory part 8" includes a temperature sensor that measures the temperature of the water that flows through it and a temperature display 120 that displays the temperature. A further "wet" accessory part 8 is connected to the further accessory connector of the accessory part 8". The further accessory part 8 comprises an outlet module generally similar to the outlet module shown in Figures 1 to 5 for the connection of a movable handset 116 via a flexible hose 117.

[0118] In Figure 21c, the first "wet" accessory 8 comprises an outlet module generally similar to the outlet module of Figure 21a to include a diverter valve that directs the water received from the main body part 110 to a fixed shower head 114 via conduit 115 and to a movable handset 116 via hose 117 separately or in combination. In this embodiment, a further water transfer port of the first "wet" accessory 8 is closed by a further "dry" accessory part 8' connected to the further accessory connector of the outlet module. The further accessory part 8' comprises a holder for a soap dish but may comprise any other "dry" accessory part such as those described herein.

[0119] The shower installations described to date employ modular mixer valves of the exposed type. Figures 22a, 22b, 22c and 22d show various configurations of ablutionary shower systems employing modular mixer valves 1 of the built-in type.

[0120] Figure 22a shows a system where the main body part (not shown) is recessed in a wall and concealed by a wall mounted panel or plate 80. Concentric temperature/flow controls 5, 6 are provided on the wall mounted panel 80 for controlling the temperature and/or flow rate of the outlet water. The panel 80 also includes an accessory connector that has an accessory part 8 comprising an outlet module with a water outlet 4 connected to it. The main body part or control module, which contains the mixing valve for the shower, may, in this example, be integral with the panel 80 and the accessory connector receives outlet

water from the mixing valve. The accessory part 8 or outlet module may be substantially similar to the accessory part shown in Figures 6 to 8 with the outlet 4 connected to a handset 72 via a flexible hose 70 and with an integrated slide rail 74 for mounting a parking socket 71 for the handset 72.

[0121] Figure 22b shows a system in which coaxial temperature/flow controls 5, 6 are provided on a first wall mounted panel or plate 81 for controlling the temperature and/or flow rate of the outlet water. The main body part or control module of the mixer valve (not visible) may be integral with the panel 81 and contain a mixing valve that is controlled by controls 5, 6. A second, separate, wall mounted panel or plate 82 includes the accessory connector that has an accessory part 8 or outlet module connected to it. The panels 81, 82 may be disposed one above the other as shown although this is not essential. The accessory connector may be connected to the main body part 2 via a conduit located behind the wall. The accessory part 8 may be substantially similar to the accessory part shown in Figures 1 to 5 with the outlet 4 connected to a flexible hose 70 attached to a handset 72 mounted on a parking socket 71 of a slide rail assembly 73.

[0122] Figure 22c shows an arrangement having a first wall mounted panel or plate 81 provided with coaxial temperature/flow controls 5, 6 for controlling the temperature and/or flow rate of the outlet water and a second, separate, wall mounted panel or plate 82 that includes the accessory connector that has an accessory part 8 connected to it. The panels 81, 82 may be disposed side-by-side as shown although this is not essential. The accessory connector may be connected to the main body part 2 or control module via a conduit located behind the wall. The accessory part 8 or outlet module may be substantially the same as that shown in Figures 6 to 8 with the outlet 4 connected to a flexible hose 70 and with an integrated slide rail 74 for mounting a parking socket 71 for a handset 72 connected to the hose.

[0123] Figure 22d shows a configuration similar to Figure 22c except the accessory part 8 is replaced with an accessory part substantially as shown in Figures 9 to 11 to include separate outlets 4, 4' and a diverter valve for directing

water to a handset 72 via a flexible hose 70 and to a fixed over head shower 76 via a rigid pipe assembly 75 separately or in combination. The rigid pipe assembly may have a portion that functions as a slide rail for a parking socket 71 for the handset 72.

[0124] It will be appreciated that the arrangements of the accessory part 8 shown in Figures 22b, 22c and 22d could be provided with the single panel or plate 80 as shown in Figure 22a. The arrangement of the main body part (not visible) in Figures 22c and 22d may be the same as that described for Figure 22b. The concentric controls 5, 6 in Figures 22a, 22b, 22c and 22d may be replaced by controls arranged separately from each other, for example side by side or any other suitable configuration.

[0125] Figure 23 shows the accessory part 8 of Figure 22b with the sealing cap 18 removed to reveal a further accessory connector 49. A further water transfer port 17 is also provided to supply water to a further "wet" accessory part 8" if required. Alternatively, a "dry" accessory part 8' may be provided that closes the further water transfer port 17. Alternatively the accessory part 8 may be of the type shown in Figures 12 and 13 for mounting a "dry" accessory part only. All configurations of "wet" and "dry" accessory parts as described herein may be employed.

[0126] Figure 23 also shows a variety of further "dry" and "wet" accessory parts 8', 8" that may be connected to the further accessory connector 49. The "dry" accessory parts 8' include a hook 90 for attaching an article such as a sponge, and a holder 91 for supporting a soap dish 92 or a soap dispenser 93 or any other article such as a cup (not shown). The "wet" accessory part 8" may include a temperature sensor and a temperature display 100. A second water outlet 4' may also be provided giving the user more options for configuring the shower system. Such "wet" accessory parts 8" may include a still further accessory connector 49' so a still further "wet" or "dry" accessory part 8 can be connected. All configurations and combinations of wet and dry accessory parts such as described herein may be employed with the built-in mixer valves.

[0127] In each of the preceding embodiments, accessory parts 8, 8' and 8" may be connected to each other or to the accessory connector 7 of the main body part 2 by a connector system 30. An embodiment of a connector system 30 is shown in Figures 24 to 30, although references to a connector system are not limited to the specific arrangement shown in Figures 24 to 30.

[0128] The connector system 30 includes two main parts; a locking ring 31 and an activator ring 32 shown in Figure 24. The locking ring 31 is arranged to be mounted within the shroud 19, 29 that surrounds the water transfer port 10 or further water transfer port 17 of the main body part 7 or accessory part 8. The activator ring 32 is arranged to be mounted to the port engaging member 13 of the accessory part 8.

[0129] The locking ring 31 comprises a ring body that includes a plurality of mounting clips 33 circumferentially spaced around its outer surface. The mounting clips 33 extend from one axial side of the locking ring are hinged therefrom by hinges 34. The hinges 34 are resilient and are adapted such that a free end of each mounting clip stands radially outward of the ring body and can be compressed radially inwardly against the force of the hinges 34. The locking ring 31 also includes a plurality of resilient flanges 35 or tabs that extend radially outwardly and are oriented in an axial direction. The resilient flanges are thus arranged to flex in a circumferential direction. The inwardly facing surface of the ring body includes a plurality of circumferentially spaced locking ramps 36. The locking ramps 36 comprise wedge shaped projections and each includes a bearing surface 37 that is inclined to the axial direction. The locking ramps 36 also include a stepped retaining surface 38.

[0130] Figure 25 shows the locking ring 31 about to be mounted within the shroud 19, 29. The shroud 19, 29 comprises an annular flange having a radially inwardly extending lip 40 that projects from its free end. The shroud 19, 29 also includes a plurality of axially extending grooves 41 formed in its inwardly facing surface. The grooves 41 extend through the lip 40 at the free end and are complimentary to the resilient flanges 35. Two diametrically opposed apertures 39 are provided either side of the water transfer port 10, 17, the purpose

of which will be described below. When the locking ring 31 is mounted into the shroud 19, 29, the resilient flanges 35 are aligned with the grooves 41 and the mounting clips 33 are arranged to be compressed about their hinges 34 as they pass within the lip 40. Once the locking ring 31 clears the lip 40 and sits in its mounted position within the shroud, the mounting clips 33 resile radially outwardly to engage behind the lip 40 thereby securing the locking ring within the shroud with the resilient flanges 35 in the grooves 41. The mounting clips 33 are arranged to prevent the locking ring moving axially within the shroud, but allow rotational movement, which is resisted by the resilient flanges 35.

[0131] Figure 26 shows the activator ring 32 mounted on the accessory part 8. The activator ring 32 comprises a ring body 43 having a plurality of circumferentially spaced rotation teeth 44 that extend radially outwardly. The ring body 43 also includes two axially extending lugs 45 that are located on the same side of the ring body but are located in diametrically opposed positions. The lugs 45 are complimentary to the apertures 39. The activator ring 32 is secured to the port engaging member 13 by adhesive (although it may be a friction fit, a circlip or a releasable connection).

[0132] Figure 27 shows the accessory part 8 with the activator ring 32 mounted thereon partially engaged with the accessory connector 7 of the main body part 2 (or another accessory part 8) with its associated locking ring 31 mounted with the shroud 19. The lugs 45 are of a length such that they engage with the apertures 39 prior to the rotation teeth 44 meeting the locking ring 31. Engagement of the lugs 45 with the apertures 39 prevents the activator ring 32 from rotating relative to the transfer port 10 and shroud 19, 29. As the accessory part 8 is pushed towards the main body part 2 (or another accessory part 8) the rotation teeth 44 engage with the bearing surface 37 of the locking ramps 36.

[0133] Figure 28 shows one of the rotation teeth 44 as it is pushed in the direction of arrow 46. As the activator ring 32 cannot rotate due to the lugs 45 being engaged in the apertures 39, the rotation teeth 44 bear against the locking ramps 36 and thus rotate the locking ring in an anti-clockwise direction as shown by arrow 47. Rotation of the locking ring 31 causes the resilient flanges 35 to

flex as the free ends of the flanges 35 are retained within the grooves 41. This resists the rotation of the locking ring 31.

[0134] Figure 29 shows the position of the locking ring 31 relative to the activator ring 32 and, in particular, the position of the rotation teeth 44 to the locking ramps 36 when the connector system 30 is in its locked position. Once each of the rotation teeth 44 have reached the end of the bearing surface 37, the locking ring 31 is able to resile back to its original position under the force of the resilient flanges 35 in direction shown by arrow 48. Accordingly, the rotation teeth 44 become trapped behind the locking ramps 36 and bear against the stepped retaining surface 38.

[0135] Figure 30 shows the rings 31, 32 connected with the accessory part 8 removed for clarity. A release aperture 50 is shown in the shroud 19, 29 which allows a tool to be inserted, which can rotate the locking ring 31 to release the activator ring 32 from the locked position. The rings 31, 32 can thus be separated to detach accessory part 8 from the main body part 2 (or another accessory part 8). While Figures 24 to 30 primarily show the interengagement between an accessory part 8 and a main valve body part 2, the same components and principle applies when connecting a further accessory part 8' to an accessory part 8.

[0136] The connector system 30 may have alternative configurations that allow the accessory connector 7 or further accessory connector 49 to connect to an accessory part 8 or further accessory part 8', 8" respectively. Thus, the accessory connector 7, 49 will have a first part of the connector system and the accessory part 8, 8', 8" will have a complimentary part of the connector system so that the parts can be securely but removably connected together. In particular, the connector system may comprise a snap fit system wherein a retaining element is provided on one part 2, 8, 8', 8" and a resilient element arranged to engage behind or within the retaining element is provided on the other part. Alternatively, the connector system may comprise a grub screw and recess arrangement. Thus, the accessory connector 7, 49 may include a recess or groove and the accessory part 8 or further accessory part 8', 8" may include a grub screw that can be screwed in to engage with the recess or groove. Alternatively, the

connector system may comprise a bayonet connector. Thus, one of the parts to be connected may be provided with one or more bayonet connector formations such as lugs configured to engage one or more mating bayonet connector formations such as recesses on the other part. The bayonet formations may engage with a push/twist action and disengage with a reverse action. A biasing force may be provided that assists maintaining a positive engagement of the bayonet formations reducing movement (play) between the connected parts and providing a firm, stable connection between the parts. The biasing force may also assist separation of the parts when disconnecting the parts. The orientation of the parts when connected may be defined by employing an asymmetric bayonet connector system that prevents the parts being assembled incorrectly.

[0137] As will be appreciated from the foregoing description, the mixer valve may include one or more accessory parts, each having different functionality, which can be selected and assembled in a variety of configurations to customize the functionality of a shower system employing the mixer valve. Thus, the mixer valve may have a main body part or control module having a mixing valve for mixing hot and cold water to provide outlet water having a desired temperature and a transfer port arranged between the mixing valve and an outlet that, in use, is connectable to a conduit such as a flexible hose or a rigid pipe for supplying outlet water from the mixer valve to a shower head. The mixer valve can be customised by connecting an accessory module to the transfer port. The accessory module can be a “wet” accessory module that receives or utilises a flow of outlet water via the transfer port to perform its function. Alternatively, the accessory module can be a “dry” accessory module that closes the transfer port. The “wet” accessory module can have the outlet or connect to a further accessory module having the outlet such that the water flows from the main body part of the mixer valve through the accessory module(s) to the outlet. Alternatively or additionally, the main body part may have the outlet. The “wet” accessory module may utilise the water flow to the outlet to perform a function. For example, the “wet” accessory module may measure temperature, pressure or flow rate of the outlet water or introduce a product into the water flow or modify the water flow or have any other use such as described herein. The “dry accessory module may perform a function that does not require a fluid flow to perform its

function. For example, the "dry" accessory module may dispense a product or attach a product or have any other use such as described herein. More than one accessory module may be provided. Multiple accessory modules may be connected in series and may comprise "wet" modules or "dry" modules or a combination of "wet" and "dry" modules. The main body part may have more than one transfer port for attaching an accessory module. The functionality of the mixer valve can be changed by adding, removing or replacing an accessory module to adapt the mixer valve without changing the control module as desired.

[0138] As utilized herein, the terms "substantially", "horizontally", "vertically" and similar terms are intended to have a broad meaning in harmony with the common and accepted usage by those of ordinary skill in the art to which the subject matter of this disclosure pertains. It should be understood by those of skill in the art who review this disclosure that these terms are intended to allow a description of certain features described and claimed without restricting the scope of these features to the precise configurations provided. Accordingly, these terms should be interpreted as indicating that insubstantial or inconsequential modifications or alterations of the subject matter described and claimed are considered to be within the scope of the invention as recited in the appended claims.

[0139] It should be noted that the term "exemplary" as used herein to describe various embodiments is intended to indicate that such embodiments are possible examples, representations, and/or illustrations of possible embodiments (and such term is not intended to connote that such embodiments are necessarily extraordinary or superlative examples).

[0140] The terms "attached," "connected," "secured" and the like as used herein mean the joining of two members directly or indirectly to one another. Such joining may be stationary (e.g., permanent) or moveable (e.g., removable or releasable). Such joining may be achieved with the two members or the two members and any additional intermediate members being integrally formed as a single unitary body with one another or with the two members or the two members and any additional intermediate members being joined to one another.

[0141] References herein to the positions of elements (e.g., "top," "bottom," "above," "below," etc.) are merely used to describe the orientation of various elements in the Figures. It should be noted that the orientation of various elements may differ according to other exemplary embodiments, and that such variations are intended to be encompassed by the present disclosure.

[0142] It is important to note that the construction and arrangement of the mixing valves and related assemblies, installations and systems as shown in the various exemplary embodiments is illustrative only. Although only a few embodiments have been described in detail in this disclosure, those skilled in the art who review this disclosure will readily appreciate that many modifications are possible (e.g., variations in sizes, dimensions, structures, shapes and proportions of the various elements, mounting arrangements, use of materials, colours, orientations, etc.) without materially departing from the novel teachings and advantages of the subject matter described herein. For example, elements shown as integrally formed may be constructed of multiple parts or elements, the position of elements may be reversed or otherwise varied, and the nature or number of discrete elements or positions may be altered or varied. The order or sequence of any process or method steps may be varied or re-sequenced according to alternative embodiments. Any feature or features of any of the embodiments may be employed separately or in combination with any other feature or features of the same or different embodiments and all possibilities are envisaged and within the scope of the invention. Other substitutions, modifications, changes and omissions may also be made in the design, operating conditions and arrangement of the various exemplary embodiments without departing from the scope of the inventions described herein.

CLAIMS

1. A customizable ablutionary system for washing comprising a main body part, a water outlet for delivering water for washing and an accessory connector, the main body part having a water inlet arranged to receive a supply of water, wherein the accessory connector includes a water transfer port and the main body part is adapted to provide a supply of water to the water transfer port of the accessory connector, wherein the system includes at least two, different accessory parts each having different functionality, the accessory connector adapted to removably receive one of the at least two, different accessory parts such that the functionality of the ablutionary system can be customized by connecting the accessory part that has the desired functionality to the accessory connector.

2. A customizable ablutionary system according to claim 1, in which the accessory connector is integral with the main body part or connected to the main body part by a conduit.

3. A customizable ablutionary system according to any preceding claim, in which the water inlet comprises a supply of relatively hot water and a supply of relatively cold water, the main body part including a mixer valve to control the temperature of the water at the water outlet by mixing the hot and cold water supplies.

4. A customizable ablutionary system according to claim 3, wherein the mixer valve is a thermostatic valve.

5. A customizable ablutionary system according to any preceding claim, in which at least one of the accessory parts, in use, is arranged to use the flow of water from the water transfer port.

6. A customizable ablutionary system according to any preceding claim, in which at least one of the accessory parts includes the water outlet.

7. A customizable ablutionary system according to any one of claims 1 to 5, in which the main body part includes the water outlet.

8. A customizable ablutionary system according to any one of claims 1 to 5, in which the main body part is arranged to include the water outlet and at least one of the accessory parts includes a second, separate water outlet.

9. A customizable ablutionary system according to any preceding claim in which at least one of the accessory parts comprises a manifold to direct water received from the water transfer port to a delivery device for use that is adapted to connect to the accessory part.

10. A customizable ablutionary system according to any preceding claim, in which at least one of the accessory parts includes means to provide any of the following; parking socket for shower handset, a soap dish, a storage shelf, a soap/lotion dispenser, a cup holder, a clamp for shampoo/soap/lotion etc, a hook for attaching articles, a clock, a radio or other music player, a USB slot to connect a MP3 or other music player, a Wi-Fi or other wireless receiver such as a Bluetooth speaker for receiving information to relay to a user of the shower such as streaming news, music, weather updates or a schedule, mood lighting, a note pad, a picture display frame that may be a digital photograph frame or a shaving mirror.

11. A customizable ablutionary system according to claim 5, in which at least one of the accessory parts is arranged to receive or utilise the water flow and includes means to provide any of the following; an outlet, a temperature display of the water, a flow rate meter to measure the flow rate of the water, a soap injector to introduce soap into the water flow, an aromatherapy oil injector to introduce aromatherapy oils into the water flow, an air injector to introduce air into the water flow, an on/off valve actuated by a push button, a shower energy usage calculator that measures properties of the water flow to calculate the energy usage, a shower cost meter that measures properties of the water flow to calculate the cost of showering, or an anti-mist shaving mirror which flows the water past the mirror to maintain the mirror mist free.

12. A customizable ablutionary system according to any preceding claim, in which the accessory connector is arranged to engage with a complimentary connecting part on the accessory parts, which together form a connector system, to secure the accessory parts to the accessory connector.

13. A customizable ablutionary system according to claim 12, in which the connector system includes a release element arranged to allow separation of the accessory part from the accessory connector when the release element is actuated.

14. A customizable ablutionary system according to any preceding claim, in which at least one of the accessory parts includes a further accessory connector arranged to receive a further accessory part.

15. A customizable ablutionary system according to claim 14, in which the further accessory connector includes a further water transfer port and the accessory part is arranged to direct a supply of water to the further water transfer port of the further accessory connector.

16. A customizable ablutionary system according to any preceding claim, in which the accessory connector and/or the further accessory connector, if present, comprises (a) a bayonet connector; or (b) a snap fit connector; or (c) a screw thread connector; or (d) a grub screw arranged to engage in a complimentary recess type connector.

17. A customizable ablutionary system according to any preceding claim, in which the ablutionary system includes a removable port cap to sealingly close the water transfer port or further water transfer port, if present, when the port is not in use.

18. A customizable ablutionary system according to any preceding claim in which the main body part is arranged to be exposed in use such that the main body part is visible to a user.

19. A customizable ablutionary system according to any one of claims 1 to 17 in which the main body part is arranged to be concealed in use and the accessory connector is arranged to be exposed such that it is accessible to a user for connecting the accessory parts.

20. A customizable ablutionary system according to any of the preceding claims in which a water outlet is provided in the main body part which connects to a delivery device and the accessory part may or may not include a second water outlet.

21. A customizable ablutionary system according to any preceding claim, in which the ablutionary system includes flow rate controls for controlling the rate of flow of water to the water outlet when in use.

22. A customizable ablutionary system according to claim 21, in which the flow rate controls are provided on the main body part.

23. A customizable ablutionary system according to any preceding claim in which the water outlet, separate from the water transfer port, provides means to connect

a) a delivery device such as a shower hose; or

b) a fixed pipe with fixed shower head; or

c) a body jet bar or a wash down hose for cleaning the shower; or

d) a bath filling spout module.

24. A kit of parts for forming the customizable ablutionary system of any of claims 1 to 23, including a main body part and one accessory part.

25. A kit according to claim 24, in which the accessory part includes a further accessory connector arranged to receive a further accessory part.

26. A kit according to claim 24 or claim 25, in which the kit includes two accessory parts for adding different functionality to the ablutionary system.

27. A kit according to claim 26, in which each of the two accessory parts is arranged to connect selectively to the main body part and/or to the other accessory part.

28. An accessory part for enhancing the functionality of a customizable ablutionary system, such as a shower, the accessory part including part of a connector system to removably connect the accessory part to an accessory connector of a customizable ablutionary system, the accessory part including a water receiving port as part of the connector system to receive a supply of water from the ablutionary system when in use.

29. An accessory part according to claim 28, in which the accessory part includes a water outlet for delivering water for washing or showering.

30. An accessory part according to claim 28, in which the water outlet, separate from the water receiving port, provides means to connect

a) a delivery device such as a shower hose; or

b) a fixed pipe with fixed shower head; or

c) a body jet bar or a wash down hose for cleaning the shower; or

d) a bath filling spout module.

31. An accessory part according to claim 29 or claim 30, in which the water outlet includes a connection means, such as a screw thread, to attach the delivery device for delivering water to a shower head.

32. An accessory part according to any one of claims 28 to claim 31, in which the accessory part includes a water transfer port arranged to receive a supply of water from the ablutionary system through the water receiving port for supplying a further accessory part connected to the water transfer port of the accessory part.

33. An accessory part according to claim 32, in which the accessory part includes a removable transfer port cap to sealingly close the water transfer port when not in use.

34. A modular mixer valve including a detachable accessory part.

35. A modular mixer valve having hot and cold water inlets for connection to supplies of hot and cold water, valve means for controlling mixing of hot and cold water according to user selection of outlet water temperature, an accessory part connectable to a water transfer port, and a water outlet separate from the water transfer port, wherein the accessory part is detachable from the water transfer port.

36. A modular mixer valve according to claim 35 wherein the outlet is provided by the accessory part connected to the water transfer port.

37. A modular mixer valve according to claim 35 wherein the outlet is provided by a part of the valve provided with the water transfer port.

38. A modular mixer valve according to claim 35 wherein both the accessory part and the part of the valve provided with the water transfer port are provided with outlets.

39. A modular mixer valve according to any of claims 35 to 38 including at least one further accessory part connected to the accessory part connected to the water transfer port.

40. A modular mixer valve according to claim 39 wherein said further accessory part is in fluid communication with the accessory part connected to the water transfer port.

41 A modular mixer valve according to claim 40 wherein the outlet is provided by the accessory part connected to the main body part or by the further accessory part.

42. A modular mixer valve according to claim 39 wherein said further accessory part is not in fluid communication with the accessory part connected to the valve body.

43. A modular mixer valve of the exposed type having a valve body that, in use, is exposed, a transfer port in the valve body for connecting a detachable accessory part, and a separate outlet for connection to a water delivery system.

44. A modular mixer valve according to claim 43 wherein the outlet is provided in the valve body or in the accessory part connected to the transfer port.

45. A modular mixer valve according to claim 43 wherein two outlets are provided.

46. A modular mixer valve according to claim 45 wherein one outlet is provided in the valve body and another outlet in the accessory part.

47. A modular mixer valve according to claim 45 wherein both outlets are provided in the accessory part.

48. A modular mixer valve of the built-in type having a valve body that in use is concealed, a transfer port in a connector part that is exposed in use for connecting a detachable accessory part, and a separate outlet for connection to a water delivery system.

49. A modular mixer valve according to claim 48 wherein the outlet is provided in the connector part or in the accessory part connected to the transfer port.

50. A modular mixer valve according to claim 48 wherein two outlets are provided.

51. A modular mixer valve according to claim 50 wherein one outlet is provided in the connector part and another outlet in the accessory part.

52. A modular mixer valve according to claim 50 wherein both outlets are provided in the accessory part.

53. A modular mixer valve according to any of claims 35 to 52 wherein the outlet(s) is/are configured to connect to a water delivery device that delivers water for washing.

54. A modular mixer valve according to claim 53 wherein the delivery device is a flexible shower hose for a handset or a rigid pipe for a fixed shower head or a body jet bar or a wash down hose for cleaning the shower or a bath filling spout module or combinations thereof.

55. A modular mixer valve including a valve body having a main body part provided with inlets for connection to supplies of hot and cold water, valve means for controlling mixing of hot and cold water according to user selection of outlet water temperature, and a water transfer port having a connection axis that, in use, is orientated in a first direction, and the main body part being connectable to an accessory part providing a flow path from the water transfer port through the accessory part to an outlet having a connection axis that, in use, is orientated in a second direction substantially normal to the first direction.

56. A modular mixer valve according to claim 55 wherein the first direction is horizontal or substantially horizontal and the second direction is vertical or substantially vertical.

57. A modular mixer valve according to claim 55 or claim 56 wherein the accessory part provides a flow path to an outlet that opens in an upwards direction.

58. A modular mixer valve according to claim 55 or claim 56 wherein the accessory part provides a flow path to an outlet that opens in a downwards direction.

59. A modular mixer valve according to claim 55 or claim 56 wherein the accessory part provides a flow path to separate outlets that open in an upwards direction and a downwards direction.

60. A modular mixer valve according to claim 59 wherein the accessory part includes a diverter valve for selecting one or both outlets.

61. A modular mixer valve according to any of claims 55 to 60 wherein the or each outlet is provided by the accessory part connected to the main body part.

62. A modular mixer valve according to any of claims 55 to 61 wherein the accessory part is detachable.

63. A modular mixer valve according to any of claims 43 to 62 wherein at least one further accessory part is connected to the accessory part connected to the main body part.

64. A modular mixer valve according to claim 63 wherein the further accessory part is in fluid communication with the accessory part connected to the main body part.

65. A modular mixer valve according to claim 63 wherein the further accessory part is not in fluid communication with the accessory part connected to the valve body.

66. A modular mixer valve according to any of claims 55 to 65 wherein the mixer valve is of the exposed type in which the main body part is mounted on a wall or similar support surface.

67. A modular mixer valve according to any of claims 55 to 65 wherein the mixer valve is of the built-in type where the main body part is concealed by a cover plate

68 A modular mixer valve according to any of claims 55 to 67 wherein the outlet is configured for connection to a water delivery device selected from a flexible hose, a rigid pipe or a combination of a flexible hose and a rigid pipe by selection of an accessory part having an appropriate outlet or combination of outlets and assembling a main body part of the valve with the accessory part connected to the main body part directly or indirectly.

69. A modular mixer valve according to any of claims 35 to 68 in which at least one of the accessory parts includes means to provide any of the following; parking socket for shower handset, a soap dish, a storage shelf, a soap/lotion dispenser, a cup holder, a clamp for shampoo/soap/lotion etc, a hook for attaching articles, a clock, a radio or other music player, a USB slot to connect a MP3 or other music player, a Wi-Fi or other wireless receiver such as a Bluetooth speaker for receiving information to relay to a user of the shower such as streaming news, music, weather updates or a schedule, mood lighting, a note pad, a picture display frame that may be a digital photograph frame or a shaving mirror.

70. A modular mixer valve according to any of claims 35 to 68 in which at least one of the accessory parts is arranged to utilise the water flow therethrough and may provide any of the following; a temperature display of the water, a flow rate meter to measure the flow rate of the water, a soap injector to introduce soap into the water flow, an aromatherapy oil injector to introduce aromatherapy oils into the water flow, an air injector to introduce air into the water flow, an on/off valve actuated by a push button, a shower energy usage calculator that measures properties of the water flow to calculate the energy usage, a shower cost meter that measures properties of the water flow to calculate the cost of showering, or an anti-mist shaving mirror which flows the water past the mirror to maintain the mirror mist free.

71. A modular shower system including a mixer valve having a control module and an accessory module selected from a plurality of accessory modules.

72. A modular shower system according to claim 71 wherein the control module includes a main body part with inlets for connection to supplies of hot and cold water and a mixing valve for controlling mixing of the hot and cold water according to user selection of outlet water temperature.

73. A modular shower system according to claim 71 or claim 72 wherein the selected accessory module is an outlet accessory module having at least one outlet for connection to a water delivery system for a shower head.

74. A modular shower system, according to claim 71 or claim 72 wherein the control module has an outlet for connection to a water delivery system for a shower head.

75. A modular shower system according to claim 73 further including at least one accessory module in addition to the selected control module and accessory module.

76. A modular shower system according to claim 75 wherein the at least one accessory module connects to the water path from the control module.

77. A modular shower system according to claim 75 wherein the at least one accessory modules is isolated from the water path from the control module.

78. A modular shower system according to any of claims 71 to 77 wherein the control module is selected from a plurality of control modules.

79. A method of assembling a mixer valve for a shower system includes selecting a control module including a main body part housing a mixing valve and having inlets for connection to supplies of hot and cold water and a water transfer port for water received from the mixing valve, selecting a detachable accessory module connectable to the water transfer port directly or indirectly wherein one of the control module and accessory module has an outlet for connection to a delivery device selected from a

flexible hose, a rigid pipe and combinations thereof, and providing a fluid connection between the mixing valve and the outlet.

80. A method according to claim 79 wherein the selected accessory module is an outlet module having the outlet.

81. A method according to claim 80 wherein the water transfer port is integral with the main body part.

82. A method according to claim 81 wherein the outlet module is connected to the water transfer port.

83. A method according to claim 81 wherein two more accessory modules including the outlet module are connected in series to the water transfer port.

84. A method according to claim 83 wherein one of the accessory modules does not require connection to the water flow to perform its function

85. A method according to claim 83 wherein all the accessory modules require connection to the water flow to perform its function.

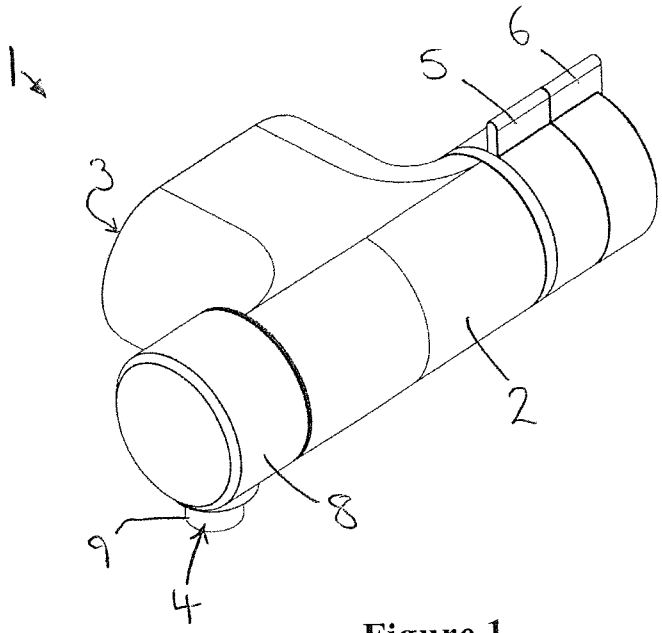


Figure 1

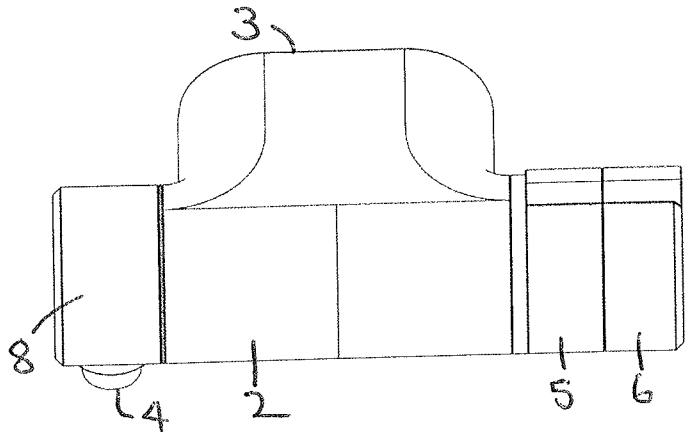


Figure 2

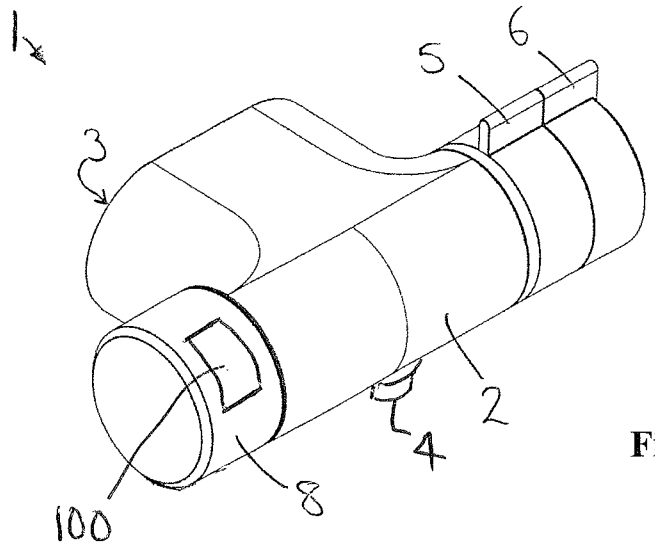


Figure 20

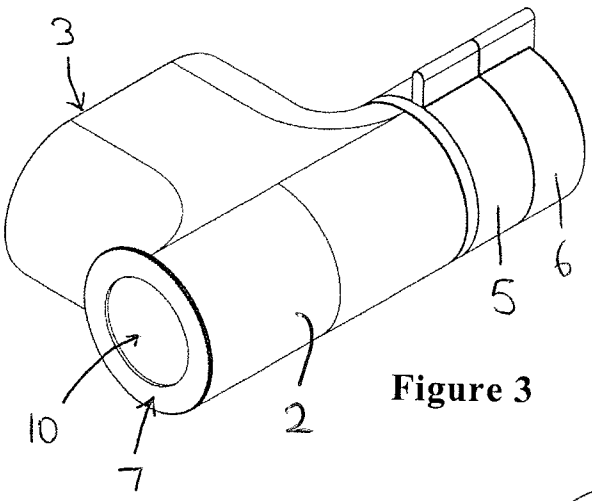


Figure 3

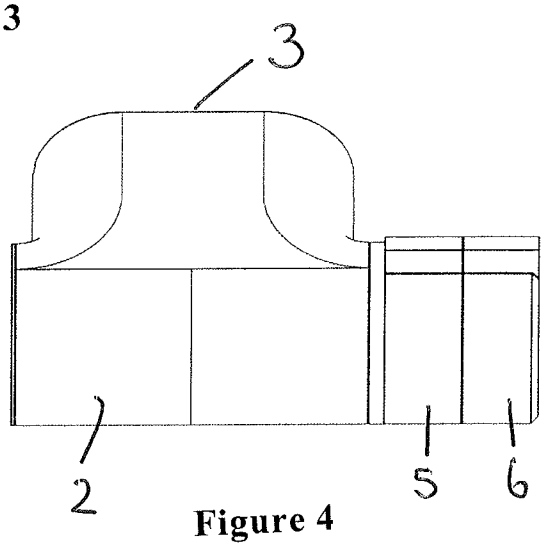


Figure 4

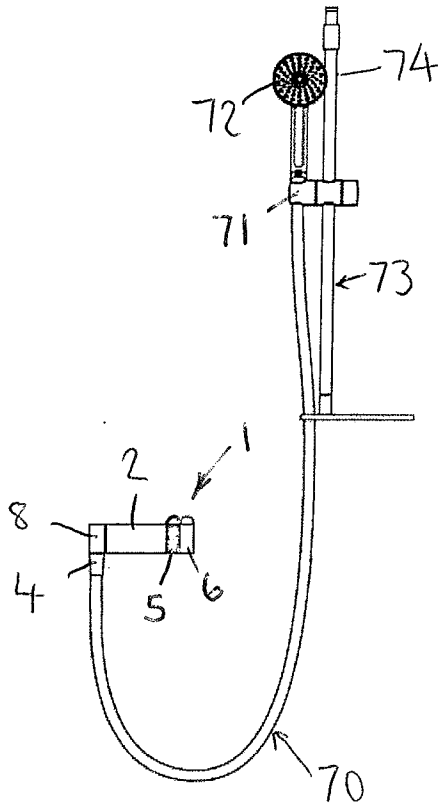


Figure 5

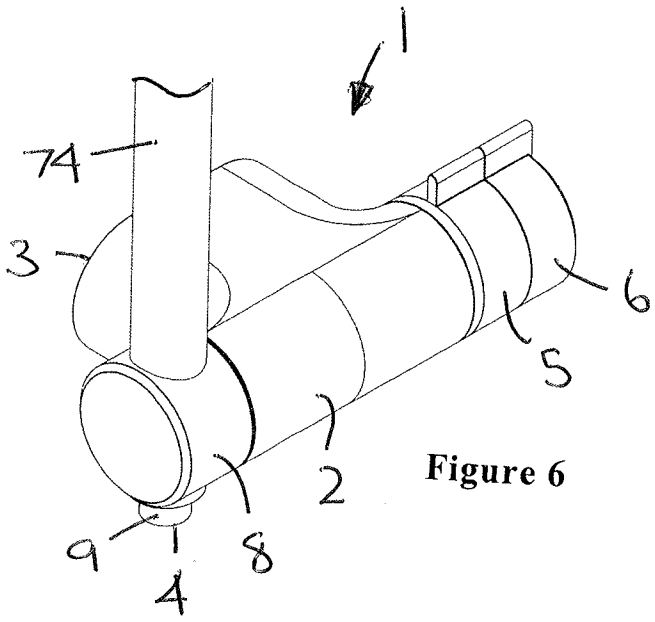


Figure 6

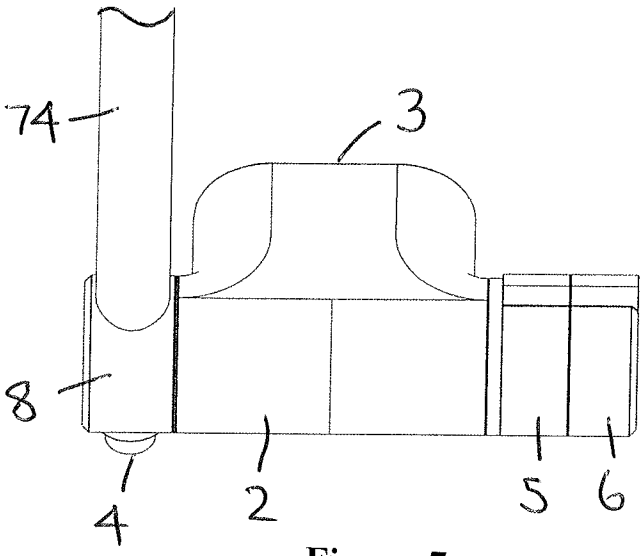


Figure 7

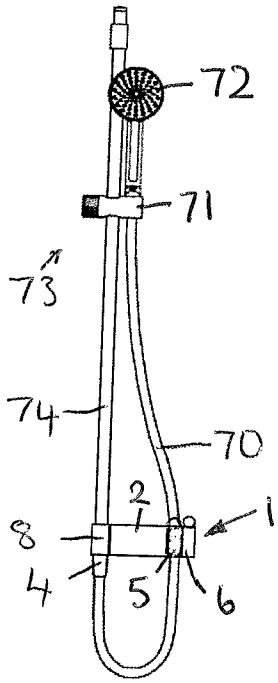


Figure 8

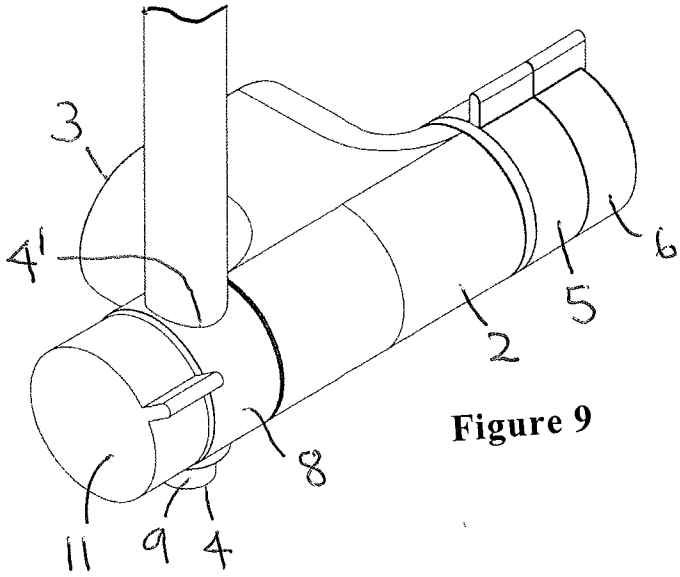


Figure 9

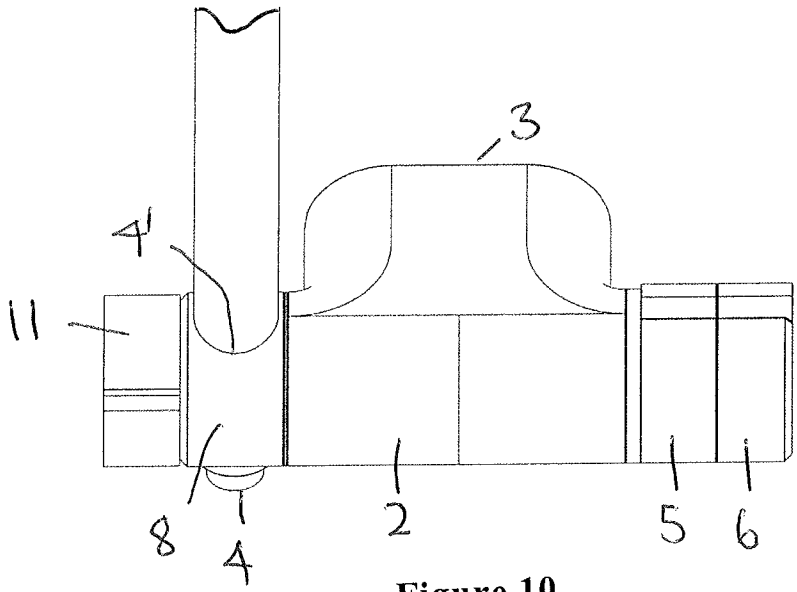
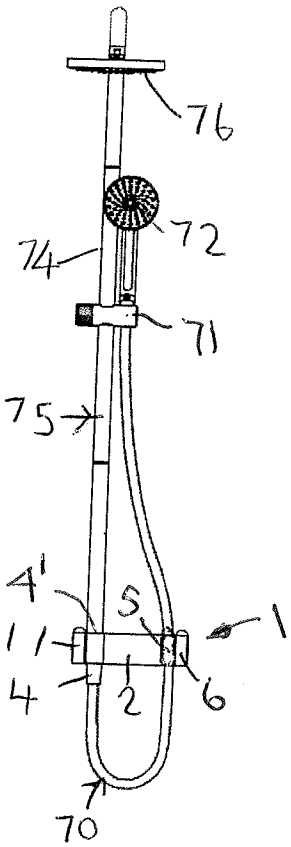


Figure 10



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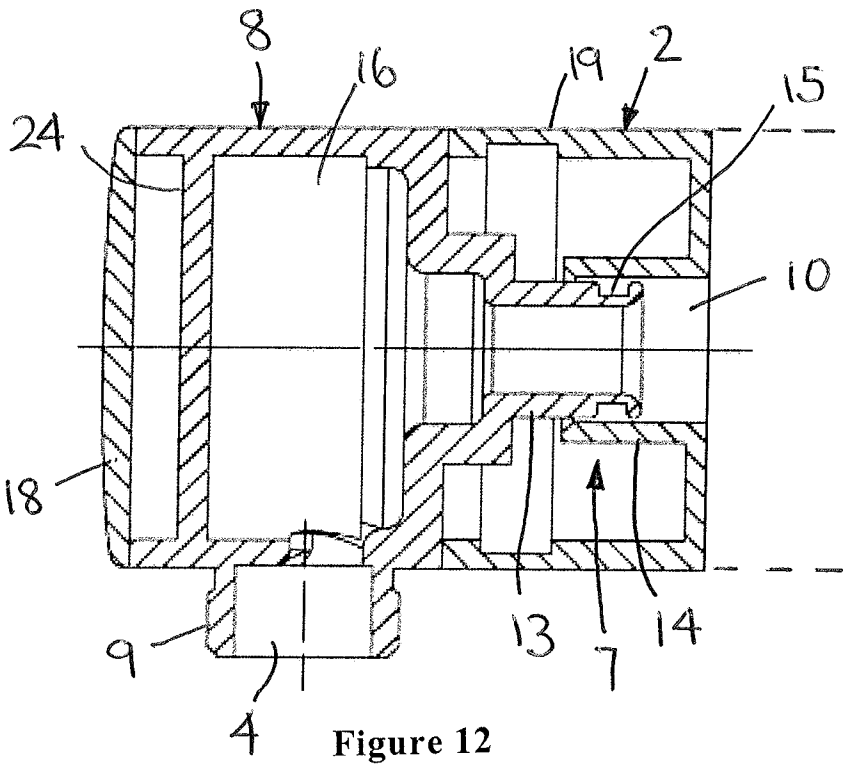

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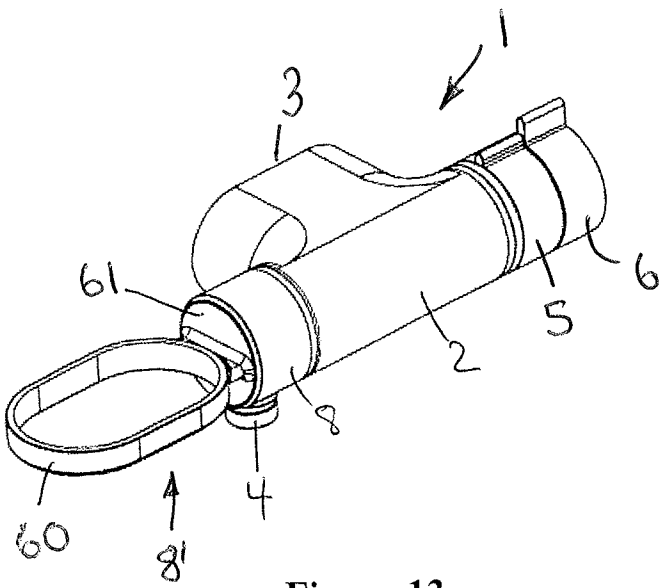


Figure 13

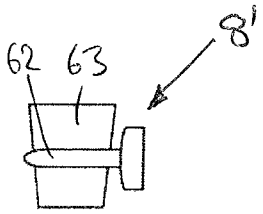


Figure 14a

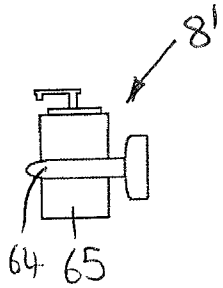


Figure 14b

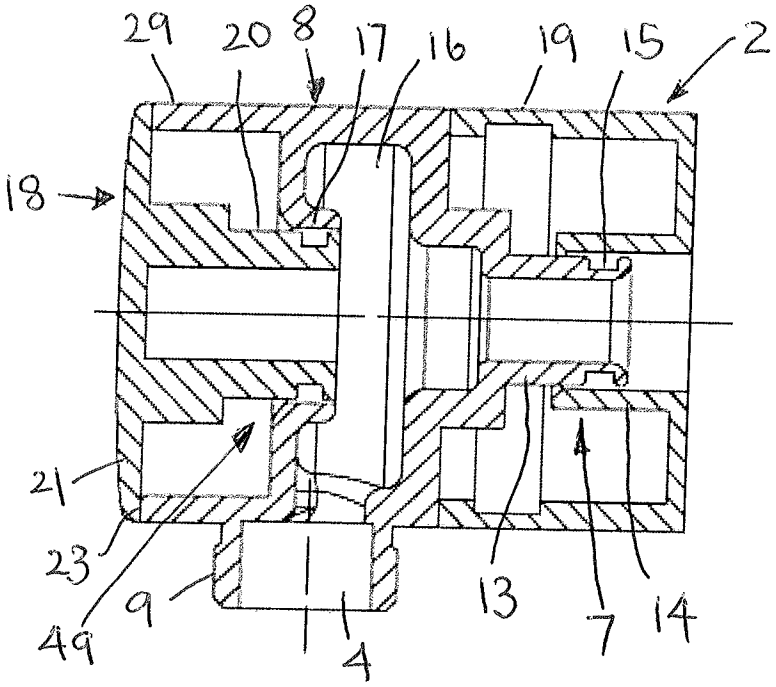


Figure 15

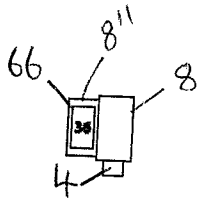


Figure 16a

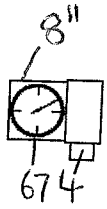


Figure 16b

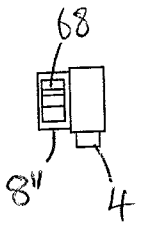


Figure 16c

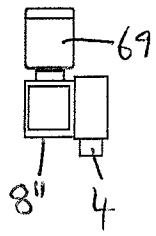


Figure 16d

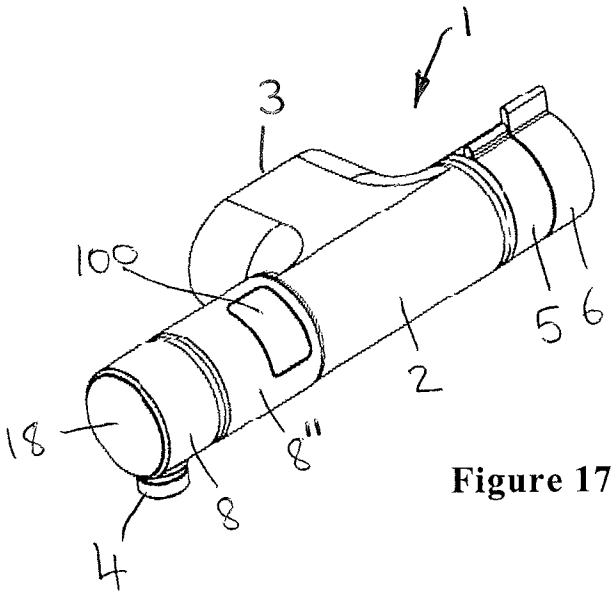
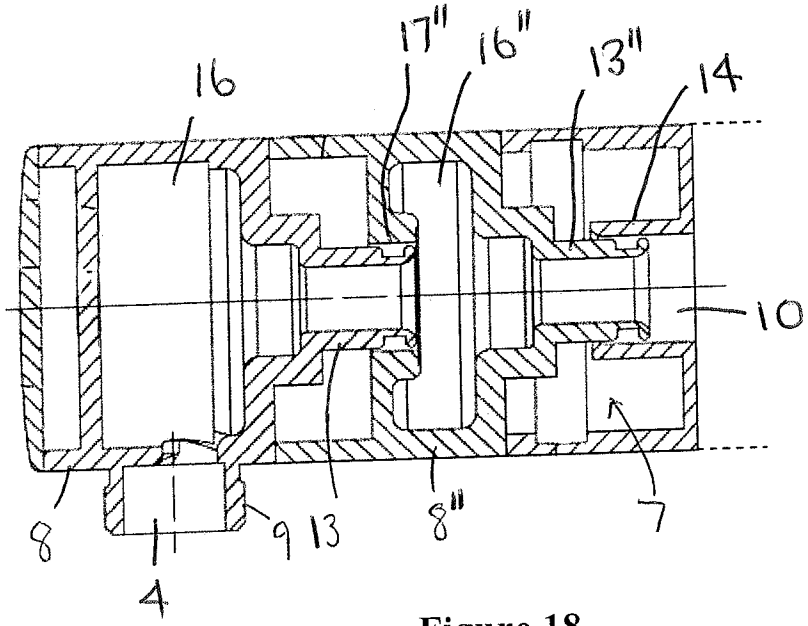


Figure 17



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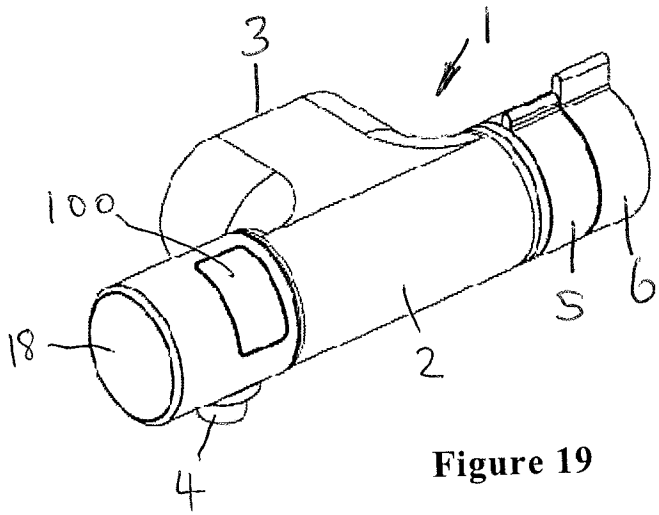


Figure 19

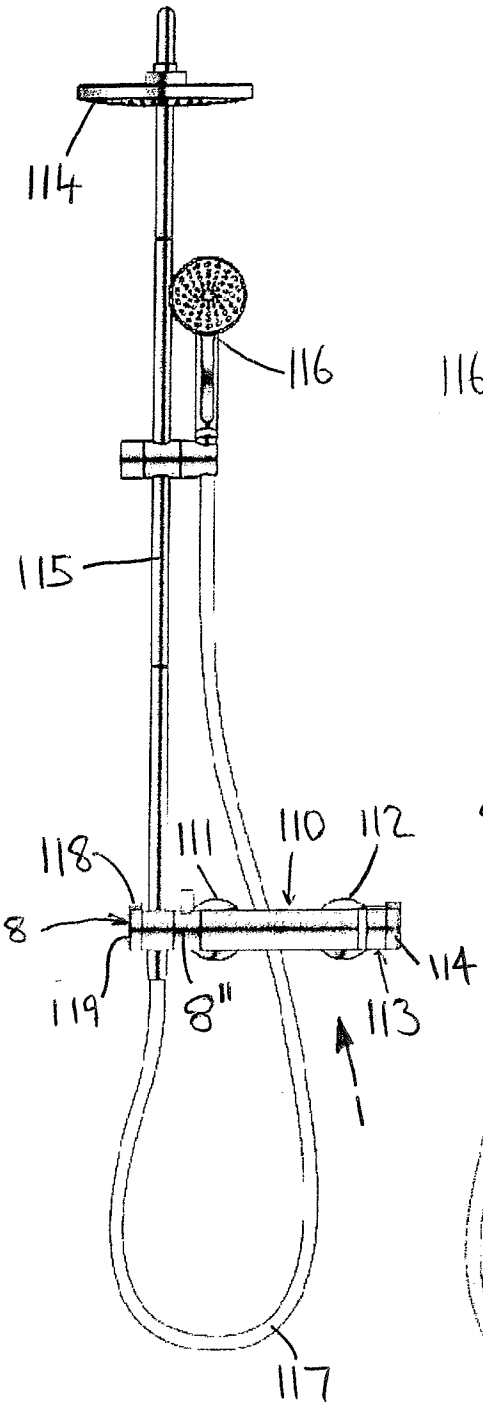


Figure 21a

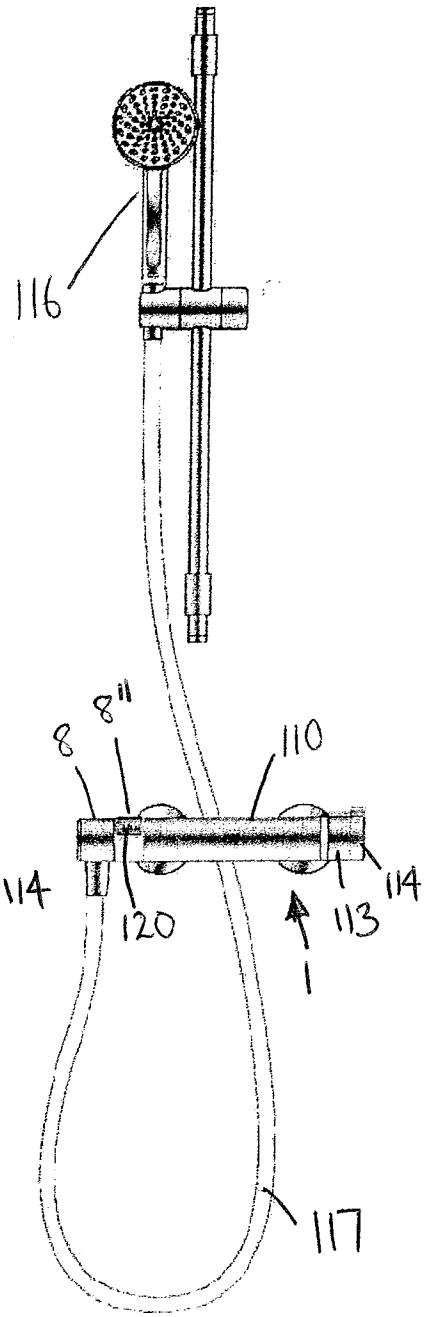


Figure 21b

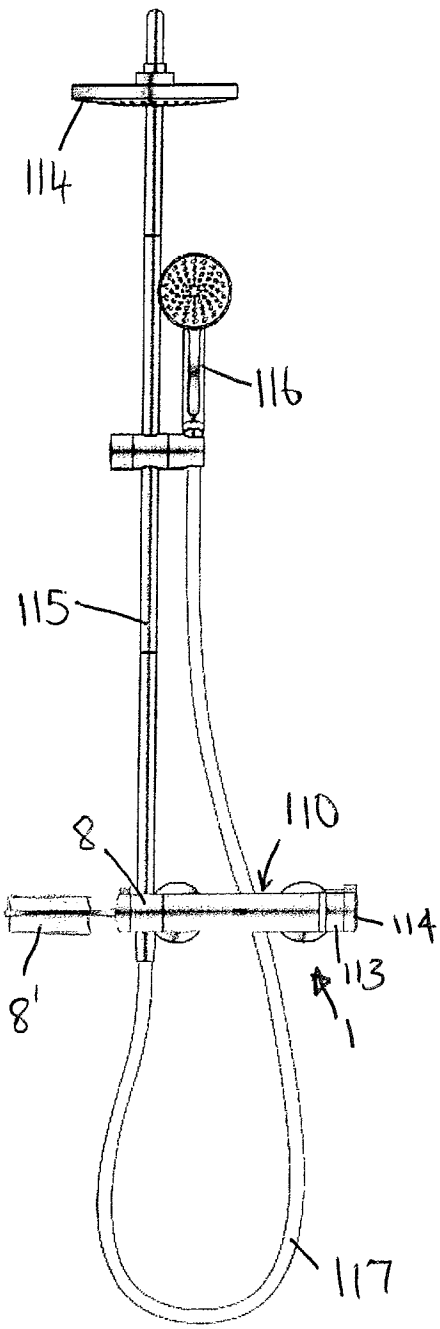


Figure 21c

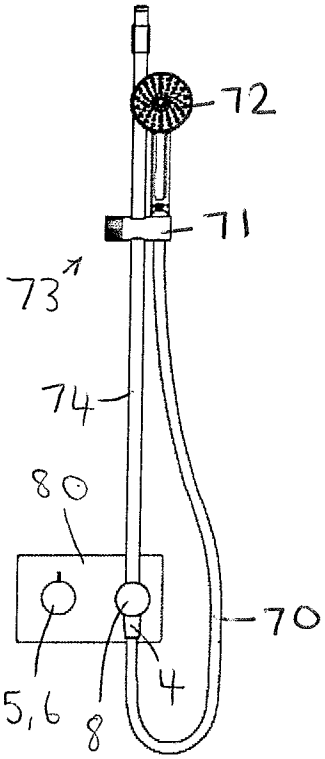


Figure 22a

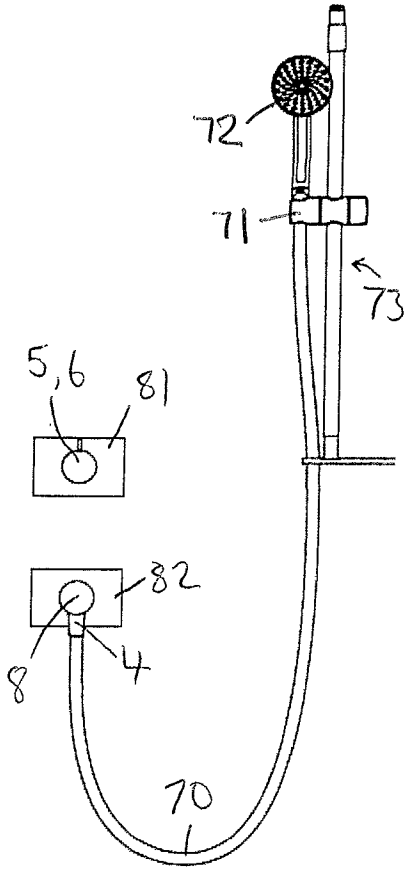


Figure 22b

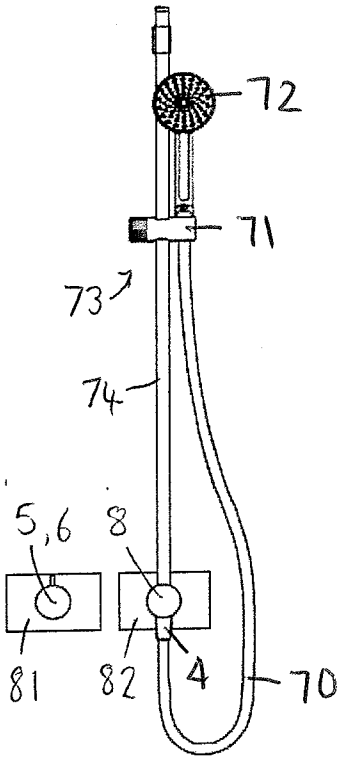


Figure 22c

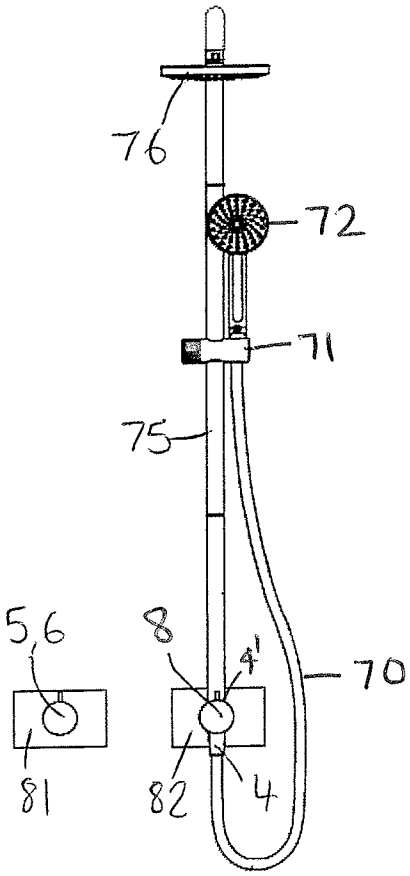
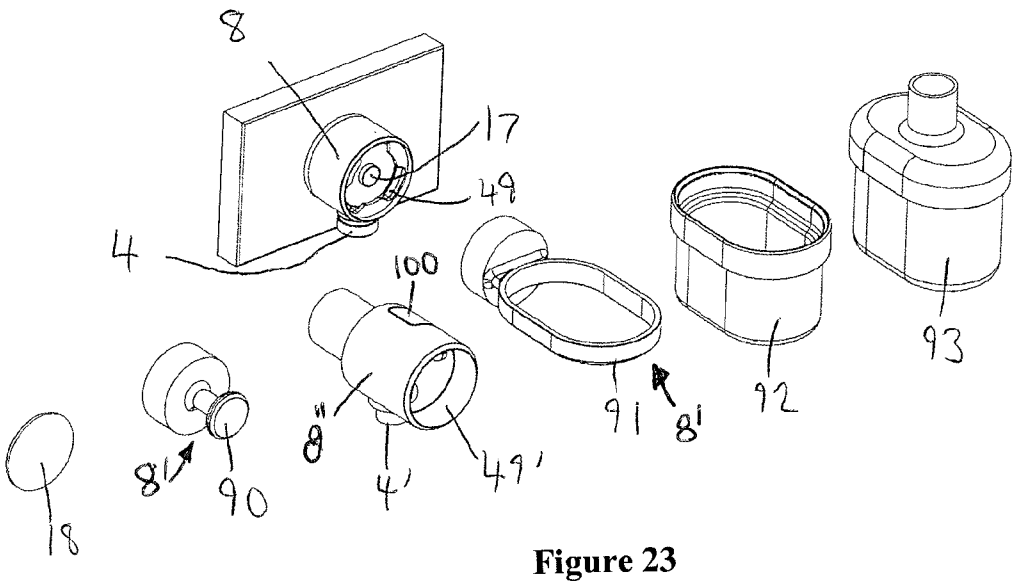


Figure 22d



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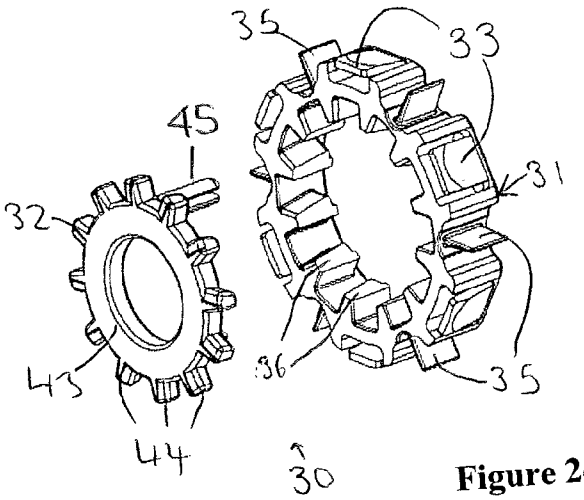


Figure 24

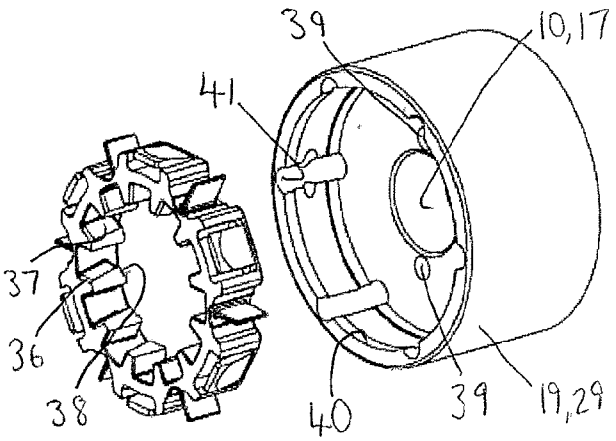


Figure 25

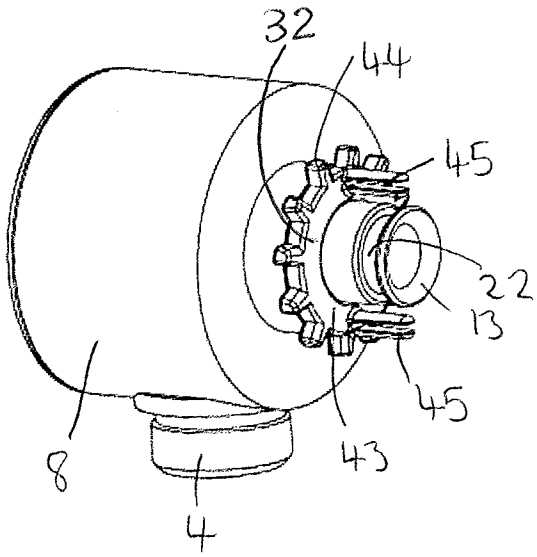


Figure 26

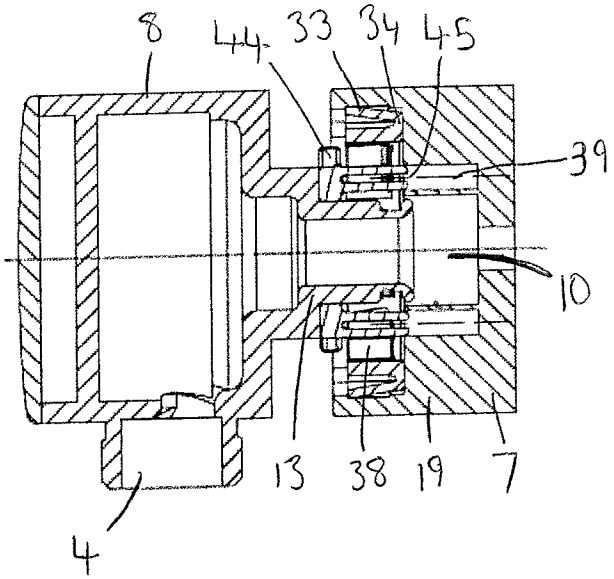


Figure 27

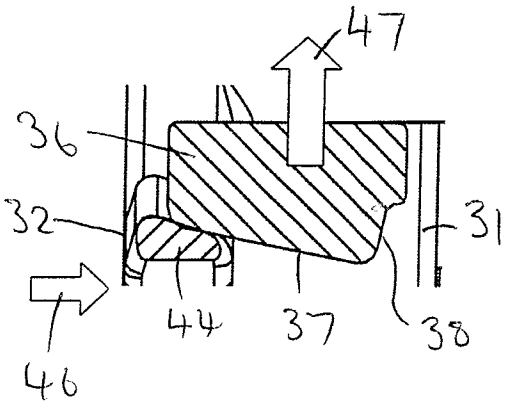
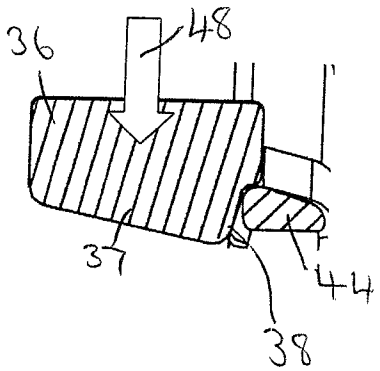


Figure 28



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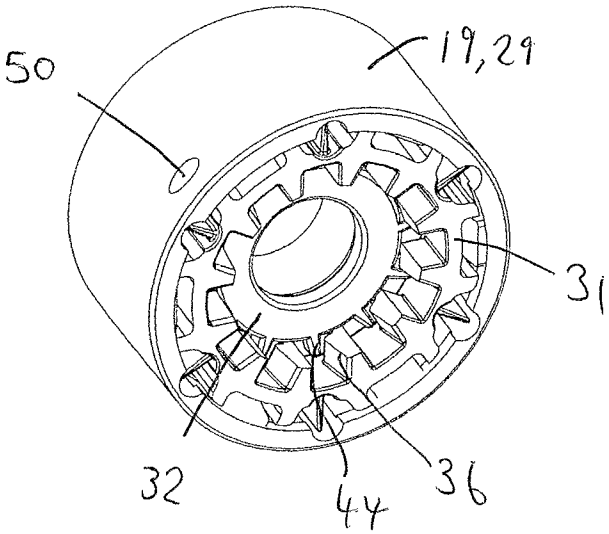

Figure 30

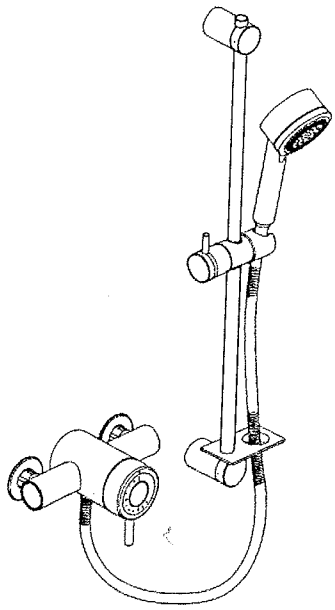

Figure 31 (PRIOR ART)

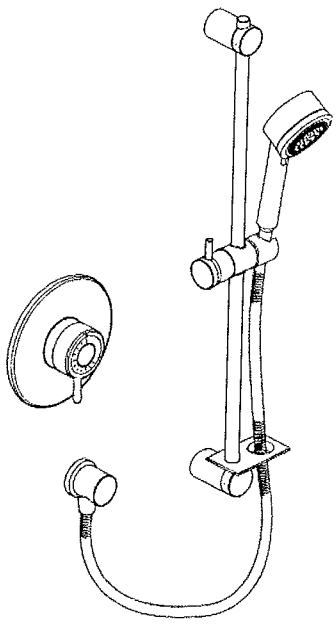

Figure 32 (PRIOR ART)

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2012/051147

A. CLASSIFICATION OF SUBJECT MATTER
INV. E03C1/04
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)
E03C

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	US 4 761 839 A (GANAWAY RICHARD M [US]) 9 August 1988 (1988-08-09) column 1, lines 31-33 column 2, lines 40-60 column 3, lines 1-43 figures 1,2,9,10 ----- -/--	1-7, 11-13, 16,18, 20-22, 24,26, 28-31, 34-41, 43-46, 71-76, 78-83,85

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search	Date of mailing of the international search report
14 September 2012	21/09/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Urbahn, Stephanie

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2012/051147

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 226 431 A1 (RUBINETTERIA EURORAMA S P A [IT]) 8 September 2010 (2010-09-08)	1,3-17, 19-42, 48, 55-65, 67-83,85
A	paragraphs [0004], [0008], [0011], [0013], [0014] paragraphs [0020] - [0024], [0026] - [0029] paragraphs [0032] - [0049], [0052] figures	47

X	US 2004/060109 A1 (HENSLEY DONALD L [US]) 1 April 2004 (2004-04-01)	24,28, 34,35, 42,43
A	paragraphs [0026], [0027], [0032], [0041] - [0046], [0049], [0050] figures 1-3	10,65, 69,77,84

A	FR 2 872 837 A1 (DAVOUDI FARHOOMAN [FR]) 13 January 2006 (2006-01-13) figures	1

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2012/051147

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4761839 A	09-08-1988	NONE	
EP 2226431 A1	08-09-2010	EP 2226431 A1	08-09-2010
		EP 2228494 A1	15-09-2010
US 2004060109 A1	01-04-2004	NONE	
FR 2872837 A1	13-01-2006	NONE	