

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
25 November 2004 (25.11.2004)

PCT

(10) International Publication Number
WO 2004/101902 A1

(51) International Patent Classification⁷: **E03C 1/12**

(21) International Application Number:
PCT/AU2004/000648

(22) International Filing Date: 17 May 2004 (17.05.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2003902382 16 May 2003 (16.05.2003) AU

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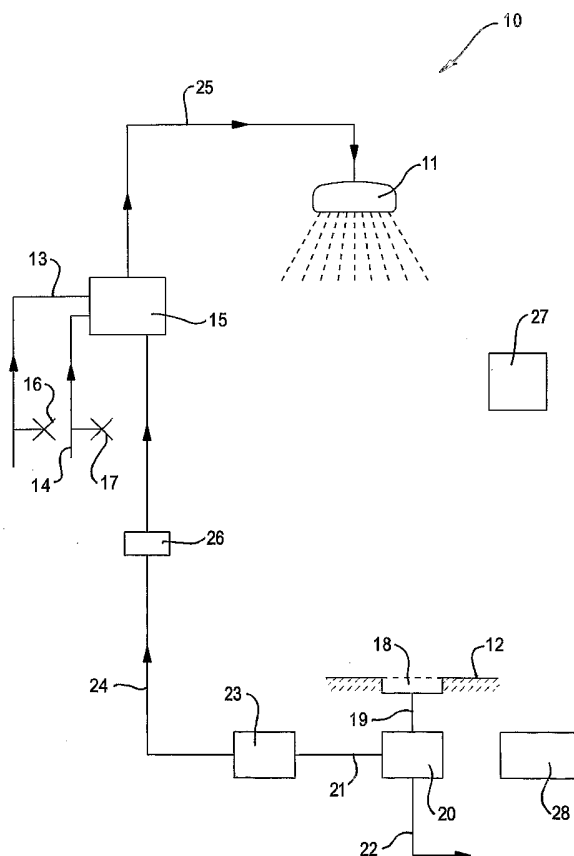
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(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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(54) Title: WATER RECYCLE SYSTEM



(57) Abstract: A water recycle system for recycling water used in a facility (10) of the kind which is connected to a water supply and which has a water discharge outlet (11) for discharging water into the facility (10) and a water drain (18) for draining water from the facility (10). In the system, the drain (18) is selectively in communication with the discharge outlet (11) for return of water back to the discharge outlet (11) from the drain (18) in a recycling condition of the system. The system includes switching means (27) for switching at the option of the user of the facility (10) between the condition of water recycling and a condition of non-recycling in which water is drained from the facility (10) through the drain (18) for disposal. The switching means (27) being operable in the non-recycling condition to permit water which flows to the drain (18) to proceed for disposal, and being operable in the recycling condition to divert water which flows to the drain (18) for discharge through the discharge outlet (11) and to reduce or close the flow of water to the discharge outlet (11) from the water supply.



Published:

— with international search report

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WATER RECYCLE SYSTEM

The present invention relates to a water recycle system which has been developed for use principally in domestic shower arrangements. It is to be appreciated however, that the invention could have use in other water systems, in both domestic and commercial sites, such as basins or sinks.

It is becoming apparent that the global usage of water is exceeding the reserves available. This is particularly the case for dry or arid countries, which often rely on underground water table reserves, which in many cases are being lowered faster than they can be replenished.

There are many instances of water wastage which occur from day to day. Many industries, such as farming industries which rely on irrigation, are devoting substantial time and resources to the reduction of water losses. Domestically, significant water losses occur by wasteful over-use of water. Applicant has identified one area of water loss as residing in shower usage, when the person showering is not engaged in the actual activity of washing, but instead is simply occupying the shower with the shower running, so that the clean water which is dispensed through the shower head is discharged through the shower drain in unsoiled, or substantially unsoiled condition. Many shower users spend only a small amount of showering time actually engaged in washing themselves, so that a substantial amount of the water used during a shower proceeds to the shower drain relatively unsoiled.

It would be desirable if the water which flows through to the shower drain in an unsoiled or substantially unsoiled condition, could be recycled back through the shower, rather than being discharged into the sewerage system.

According to the present invention there is provided a water recycle system for recycling water used in a washing facility of the kind which is connected to a water supply and which has a water discharge outlet for discharging water into said facility and a water drain for draining water from said facility, in said system, said drain being selectively in communication with said discharge outlet

for return of water back to said discharge outlet from said drain in a recycling condition of said system, said system including switching means for switching at the option of the user of the facility between said condition of water recycling and a condition of non-recycling in which water is drained from said facility through said drain for disposal, said switching means being operable in the non-recycling condition to permit water which flows to said drain to proceed for disposal, and being operable in the recycling condition to divert water which flows to said drain for discharge through said discharge outlet and to reduce or close the flow of water to said discharge outlet from said water supply.

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The switching means can include valve means disposed within the drain which are operable in the non-recycling condition to allow water to flow through the drain for disposal and which is operable in the recycling condition to substantially prevent flow of water through the drain for return of water to the discharge outlet. Any suitable valve means can be employed, although the preference is for a flap valve.

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Operation of the valve preferably is automatic, upon the switching means being initiated by a user of the facility to switch in either direction between the recycling condition and the non-recycling condition. Alternatively the valve can be operated manually, although that imposes certain requirements on the user and therefore automatic operation is preferred.

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The system preferably further includes pumping means for pumping water from said drain to said discharge outlet in the recycling condition. The pumping means preferably includes a pump which includes an inlet to which water is diverted when the switching means is switched to the recycling condition. Preferably the pump inlet is in communication with a reservoir to which water is diverted in the recycling condition and operation of the pump takes place only when the reservoir has a sufficient volume of water, or water capacity to properly feed the pump.

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The pumping means preferably includes flow rate management to ensure a proper supply of water to the pump inlet. That is, if water is pumped from the

drain too quickly, the pump inlet supply will not be adequate. Thus, the pumping rate can be monitored to ensure the supply at the drain is not comprised by excess delivery to the discharge outlet.

- 5 The recycle system can further include filtering means which are provided between the drain and the discharge outlet, for filtering the water which is diverted from the drain in the recycling condition. While it is envisaged that the recycling condition will only be initiated when a person using the water facility is not causing the water of the facility to become soiled, nevertheless filtering may
10 be useful to ensure high quality of recycled water or to purify the recycled water being discharged through the discharge outlet.

The filtering means preferably includes a filter disposed in the flow path of diverted water prior to the pump. The filtering means can alternatively, or
15 additionally include a filter disposed in the flow path of diverted water after the pump.

Instead of, or in addition to filtering means, other forms of purifying may be employed. UV purifying could be employed if high quality purification is
20 required. This treatment could purify the recycled water to an extent whereby the same water could be used by two or more shower users.

The recycle system preferably also includes control means to control flow of water from the water supply to the discharge outlet so that in the recycling
25 condition, flow of water from the water supply is at least reduced compared to flow in the non-recycling condition. It is preferred that flow of water is stopped shortly after the switching means are switched from the non-recycling condition to the recycling condition, and it is preferable that the control means monitors the need for supply of water from the water supply during the recycling condition
30 and supplies water as required. It may be for example, that the recycled water loses heat and therefore supply of heated water from the water supply can increase the temperature of the recycled water. It is therefore preferable that the control means monitors the temperature of the water being diverted from the drain and supplies heated water as required.

- Alternatively, the recycled water can be heated at an appropriate position in the water flow between the drain and the discharge outlet by a suitable heating arrangement. An in-line heater with an element past which the water flows can be employed. The heater can communicate with the control means to set the
- 5 desired water temperature, while suitable temperature limiting means can be employed to limit the upper water temperature to avoid scolding. An electrical safety system can be employed to shut down the electric supply in the event of failure that could result in electrocution.
- 10 The control means can alternatively include a manually operable valve arrangement for permitting and adjusting the flow of water from the water supply in the recycling condition. This may comprise a valve associated with the heated water supply for the reasons discussed above. In this arrangement, the user can manually adjust the amount of heated water flowing to the discharge
- 15 outlet in the recycling condition to increase the temperature of the water being discharged. The valve arrangement can also include another valve associated with an unheated water supply, and this may be advantageous in the event that the temperature of the recycled water exceeds a desired temperature. The valves discussed above can be of the standard kind already used in showers,
- 20 sinks, basins and the like, which are manually operated by user to produce a discharge of water that is of a desired pressure and temperature. Thus, the valves of the invention do not necessarily need to be additional to those already usually applied and indeed more modern valves often incorporate a single lever which can be employed to provide both hot and cold water at different
- 25 temperatures, and this type of valve can be incorporated into the manually operable valve arrangement discussed above.

The control means therefore can monitor both temperature and pressure at the discharge outlet and make suitable adjustments as required. To automatically

30 adjust the discharge outlet parameters, the control means can be programmable and any suitable arrangement for this can be applied. The control means can include a control pad accessible by the facility user, such as within a shower recess and the control pad can display the temperature which previously had been manually selected and then maintain the temperature of

the recycled water as previously selected. The recycled water temperature preferably can also be raised or lowered by manipulation of the control panel.

It will be appreciated that alteration of the discharge outlet pressure might be made by addition of water from the water supply, or by changing the pumping speed of a pumping arrangement if provided.

Advantageously, the invention can be arranged so that desirable additives can be added to the recycled water. Such additives can include bathing salts, perfumes, cleaning agents or any other suitable additives. The additives can be arranged to be fed to the fresh water or the recycled water as required. For example, soap could be fed to fresh water for non-recycling usage, while bathing oils or salts could be fed for recycling use.

For hygiene reasons, it is preferred that the system fully drains all water, particularly recycled water, at the finish of each use of the facility.

A further development of the invention relates to a self-cleaning shower head which includes water discharge openings in opposite broad surfaces thereof and which can be rotated through an axis between the broad surfaces so that blockages in the water openings can be flushed. In this respect, it is envisaged that the shower head would be oriented for flow of water through one of the broad surfaces and when the openings of that broad surface are blocked, the head could be rotated to cause water to flow through the openings of the other of the broad surfaces and at the same time, water which flows into the head would flush the blockage material in the openings of the other of the broad surfaces.

In the drain of the invention, a drain tube may be provided which is oriented substantially vertically within the drain to define a central flow passage therethrough, while an outer surface of the drain tube is spaced from an inner surface of the drain to define an external flow passage between those surfaces. In the recycling condition, water can flow downwardly into the drain through the central flow passage of the drain tube and can be diverted to flow upwardly

through the drain through the external flow passage for delivery to the discharge outlet. The opposite arrangement can equally apply.

5 The invention advantageously can be provided in a mobile form, such as provided on or trailed by a truck or prime mover.

10 It will be convenient now to refer to the attached drawings, which show example embodiments of the invention of the foregoing kind. A person skilled in the art will however appreciate that the attached drawings and associated description are examples only and therefore do not supersede the generality of the preceding broad description of the invention.

15 Figure 1 is a schematic view of a water recycle system according to one embodiment of the invention.

Figure 2 is a perspective view of a shower recess in which is disposed a water recycle system according to the invention.

20 Figure 3 is a cross-sectional view of the drain arrangement shown in Figure 2.

Figure 4 is a detailed arrangement of a shower head assembly according to one embodiment of the invention.

25 Figure 1 shows in schematic form, a water recycle system as employed in a showering facility 10. The facility 10 includes a shower head 11 which discharges water into a shower recess, only the base 12 of which is illustrated. In most domestic installations, the shower recess would additionally include three walls and either a door or curtain to contain water discharged through the shower head 11 within the shower recess. However, the present invention is
30 equally applicable to shower facilities that might be employed in commercial sites or in public buildings, such as fitness centres, swimming pools etc. in which a row of shower heads 11 is disposed in an open shower recess.

In commercial applications, the control means can extend to a control management system that controls a plurality of shower facilities. Shower users could be allocated a set water allocation for a set cash amount or daily use and the management system could monitor water usage and deduct that usage from
5 the allocation. The shower user could monitor water usage through a visual indicator in a control pad located in the shower recess. Thus the shower user can chose the amount of fresh and recycled water used during showering, and pay for example, on the basis of fresh water usage.

10 The showering facility 10 includes a hot water conduit 13 and a cold water conduit 14. The hot water conduit 13 extends to or in communication with a water heater, while the cold water conduit 14 extends in communication either with a supply of cold water such as tank water, or with mains water. Each of the conduits 13 and 14 is connected to a water mixing valve 15 which can take any
15 suitable form for proportional mixing of hot and cold water for later discharge through the shower head 11. The valve 15 may take any known form, such as a thermostatic valve which limits the maximum upward temperature of the water discharged through the shower head 11, or it may take any other suitable form as known in the art.

20 Alternatively, the conduits 13 and 14 may include valves which are operable by the shower user so that the shower user can regulate the temperature of water discharged through the shower head 11. Such valves could take the form of taps 16 and 17 which include a rotatable stem and which can be rotated by the
25 user to regulate the water temperature in a known way.

In a further alternative and preferred arrangement, the showering facility 10 includes both the valve 15 and the taps 16 and 17 for temperature and pressure control.

30 The showering facility 10 further includes a drain 18 disposed in the recess base 12 which communicates with a discharge outlet 19 for discharge of water through to sewerage or the like. As shown, the discharge outlet 19

communicates with a valve 20 which is in communication with each of a recycle conduit 21 and a discharge conduit 22.

5 The valve 20 is operable, upon selection by a shower user, to selectively direct water discharged through the drain 18, either through the recycle conduit 21 or the discharge conduit 22. That operation is discussed in more detail later herein.

10 The recycle conduit 21 extends from the valve 20 to the valve 15, so that water which is directed into the recycle conduit 21 can be recycled for discharge through the shower head 11. For this, a pump 23 is provided and the pump 23 is fed through the recycle conduit 21 to pump recycled water through the connecting conduit 24, then through the valve 15 and into the outlet conduit 25. In a preferred arrangement, the recycle conduit 21 feeds into a reservoir (not
15 shown), to which the pump 23 is connected, so that when the recycling condition is initiated by a shower user, the reservoir is filled to an acceptable level to ensure proper feed of recycled water to the pump, prior to the pump commencing pumping of recycled water through the connecting conduit 24.

20 The showering facility 10 further includes a filter 26 which can be employed if required to filter the recycled water and to thereby remove any contaminants which are undesirable for recycle. The filter 26 can take any suitable form and preferably is of a form which can be rinsed so that conveniently, a shower user may quickly rinse the filter while the showering facility 10 is in a non-recycling
25 condition. The filter 26 may be positioned at any point through any of the conduits illustrated, although it is highly preferred to be positioned where shown, as the filter in that position can be made readily accessible to a shower user, moreso than if it was to be positioned say in the recycle conduit 21, or the outlet conduit 25. A further disadvantage of placing the filter 26 in the conduit
30 25, is that it would also serve to filter water received from the valve 15, even though that water may not include any recycled component. However, there would be advantages in placing the filter 26 in the recycle conduit 21, as the recycled water would be filtered prior to entering the pump 23, so that the pump 23 would be less likely to malfunction due to ingress of contaminants.

It is equally possible to include more than a single filter 26, and for example, filters may be provided in each of the recycle conduit 21, the connecting conduit 24 (as shown), and the outlet conduit 25. To overcome the difficulty associated with positioning the filter 26 in the outlet conduit 25 discussed above, the facility 10 may be arranged to bypass such a filter in the event that the facility is not operating in the recycling condition.

The showering facility 10 includes switching means operable by the shower user to switch the facility between non-recycling and recycling conditions. The switching means takes the form of a control panel 27 and the panel can have any suitable configuration and operation, provided the switching function can be achieved.

It is envisaged that the control panel 27 would be remotely connected such as by remote signal, with a control box 28 which is concealed within the shower recess, possibly as shown below the recess base 12, and which is in electrical communication with the various valves and pump discussed above.

Operation of the showering facility 10 can be as follows. A shower user enters the shower as normal and initiates water flow through the shower head 11, by opening each of the taps 16 and 17. The shower user would normally stand out of the flow of water until such time as an acceptable water temperature is reached, whereafter the user would move under the shower head 11 and commence showering.

It is applicant's experience, that many shower users would go through a cleaning procedure only for a short time during their stay within the shower and for a major component of their stay, the shower user would not be applying soaps, shampoos, conditioners or the like. In those times, the water being discharged through the shower head 11 may well be entering the drain 18 in substantially an unchanged state, or in other words, substantially or fully unsoiled. During those times, the shower user has the option to engage the control panel 27 to switch the valve 20, so that water which enters the discharge

outlet 19 from the drain 18, can be diverted not through the discharge conduit 22, but instead to the recycle conduit 21. That selection places the showering facility into the recycling condition.

5 Having selected the recycling condition, water flowing through the recycle conduit 21 flows to the pump 23. The pump 23 is activated to pump the recycled water through the connecting conduit 24 to the water-mixing valve 15. As explained above, to ensure a continuous supply of water to the pump 23, the recycle conduit 21 may feed a reservoir which feeds the pump 23, and the
10 facility 10 may be arranged, so that the pump 23 does not commence operation until the reservoir is at a predetermined level. Other arrangements may equally be employed and for example, the conduit 21 may feed vertically into the pump 23 so that a supply of water is always available, as long as discharge is occurring through the shower head 11.

15 The pump 23 pumps water through the connecting conduit 24, and through the filter 26 if provided, to the water mixing valve 15. The water mixing valve 15 itself is controlled by the control box 28 so that when the facility 10 is in the recycling condition, feed from the hot and cold water conduits 13 and 14 is
20 eliminated, or substantially reduced. It will be appreciated that the recycled water will retain a substantial amount of the heat at discharge from the shower head, as it enters the drain 18 and proceeds through the system, back to the shower head 11. Applicant envisages, that it would be unnecessary to add cold water to the recycled water, and that when the recycling condition is first
25 initiated, there will be little or no need for hot water to be added to the recycled water to maintain the desired temperature. Over time however, as the recycled water is used through several cycles, it may reduce in temperature to the point at which the addition of hot water is required. Thus, the water mixing valve 15 can be arranged to open the conduit 13 to add hot water to the recycled water
30 of the connecting conduit 24 for feed into the outlet conduit 25.

The shower user may elect to return from the recycling condition to the non-recycling condition say if further soap, shampoos etc. are to be employed, by engaging the control panel 27 to switch the control box 28, and therefore the

valve 20 from communication with the recycle conduit 21, back to the discharge conduit 22. The system then is such as to open the valve 15 to flow of water through the hot and cold water conduits 13 and 14, maintaining the temperature set by the shower user previously. At that stage, the system can be arranged so that any recycled water remaining within the connecting conduit 24 and the recycle conduit 21 can be flushed through the valve 20 and into the discharge conduit 22. That can be achieved simply, by reversing the pump 23 and by choosing a suitable valve 20 which allows the change in direction of flow to take place.

10

To ensure that the temperature of water being discharged through the shower head 11 remains as set by the shower user, the valve 15 may include a suitable sensor which is operable to control the proportions of water flowing through the connecting conduit 24 and the hot water conduit 13 when the system is in the recycling condition, as necessary. A sensor may also be disposed at or within the shower head 11 to monitor the actual temperature of water at discharge.

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The control panel 27 may include further instrumentation in order to enhance operation of the facility 10 and in one embodiment, the control panel may include a fine temperature adjustment which provides for adjustment of the temperature of water being discharged through the shower head 11 by several degrees plus or minus. It is believed to be inappropriate to provide for more than fine temperature adjustment in a facility 10 that includes taps 16 and 17, because the taps 16 and 17 provide the major adjustment for temperature setting. However, the control panel 27 can communicate with the control box 28 to adjust the valve 15 and achieve the fine adjustment in temperature as may be required by the shower user.

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The facility also is arranged to automatically return to the non-recycling condition at the end of a shower. Conveniently, this returns the facility 10 from a recycling condition if it is left in that condition by a previous user, so that the next user can operate the facility 10 as a normal shower to achieve the desired temperature and only to select the recycling condition if circumstances permit.

30

The facility can also be arranged to accept additives, such as oils, soaps etc. for ingress into say the connecting conduit 24 or the outlet conduit 25 and this advantageously enables the additives to also be recycled if the recycling condition of the facility 10 is selected. The additives may be provided in a form
5 which can connect to a suitable conduit and instead of the additives being washed away down the discharge drain 22 after only a single discharge through the shower head 11, they may be recycled with the water in which they are added, for as long as the shower user requires. This advantageously can reduce the amount of additive required by the user, while the additives
10 themselves can be utilised to their full extent, rather than only being partially utilised before being lost through the discharge conduit 22.

Figure 2 illustrates a possible actual set up of a water recycling system according to the invention as applied to a shower. In Figure 2, a shower recess
15 30 is provided and while the recess 30 is shown having only two vertical walls, clearly in most arrangements, a third wall is provided with a door or shower screen closing the gap left between the walls. The shower recess 30 includes a structure for providing the water recycle system of the invention and the structure 31 includes a base conduit 32 which extends from a drain 33 to the
20 rear wall 34 of the shower recess 30. Extending vertically upwardly from the base conduit 32, is a wall conduit 35 and extending from the upper end of the wall conduit 35, is a shower head 36. Between the shower head 36 and the base conduit 32, are manually operable valves in the form of taps 37, a control pad 38 and an additives cavity 39 which includes a plurality of bottled additives
25 40.

The recess 30 can be plumbed in a standard manner for supply of hot and cold water to the shower head 36 by manual manipulation of the taps 37. One of the taps typically would control hot water flow, while the other would control cold
30 water flow. That control could be maintained while adopting the water recycle system of the invention.

A pump would normally be housed within the base conduit 32, so that water which is collected through the drain 33 is fed to the pump which then forces the

water vertically through the wall conduit 35 for discharge through the shower head 36.

The drain 33 is illustrated in Figure 3 in more detail, and from this it can be seen
5 that a drain tube 41 is inserted in the standard drain outlet 42 and a flap valve
43 is disposed at the bottom and open end of the drain tube 41. The flap valve
43 is shown in a valve closed position, in which it substantially prevents flow of
water out through the drain 42. Rather, in the position shown, water is diverted
10 back through the gap G between the drain tube 41 and the drain 42 so as to be
diverted into the base conduit 32. Within the conduit 32 typically would be a
pumping arrangement, to then pump that water vertically as described before.

When the water recycle system is in the non-recycling condition, the flat valve
43 is rotated to a position at which water which enters the drain tube 41 can
15 flow freely through the drain 42 for disposal.

Figure 4 is an embodiment of a new form of shower head which can be
employed in a water recycle system according to the invention, as applied to a
shower. The shower head 45 includes a water delivery conduit 46 and a
20 rotatable head portion 47. As shown, the head portion has a series of openings
across the broad face thereof for flow of water therethrough.

The head portion 47 shown in Figure 4 is rotated to a position at about 90° to
normal usage. This illustrates that the shower head arrangement 45 includes a
25 rotatable head portion 47 and a further structural characteristic of the head 45,
is that each side of the head portion 47 includes outlet openings.
Advantageously, when the openings of one broad face of the head portion 47
become blocked, the shower head can be rotated to present the opposite broad
face for flow of water therethrough. The action of water flowing into the head
30 can have an unblocking effect on the blocked openings, and therefore blockage
of the head portion 47 does not necessarily render the shower head 45
unworkable.

The invention described herein is susceptible to variations, modifications and/or additions other than those specifically described and it is to be understood that the invention includes all such variations, modifications and/or additions which fall within the spirit and scope of the above description.

CLAIMS

1. A water recycle system for recycling water used in a facility of the kind which is connected to a water supply and which has a water discharge outlet for
5 discharging water into said facility and a water drain for draining water from said facility, in said system, said drain being selectively in communication with said discharge outlet for return of water back to said discharge outlet from said drain in a recycling condition of said system, said system including switching means for switching at the option of the user of the facility between said condition of
10 water recycling and a condition of non-recycling in which water is drained from said facility through said drain for disposal, said switching means being operable in the non-recycling condition to permit water which flows to said drain to proceed for disposal, and being operable in the recycling condition to divert water which flows to said drain for discharge through said discharge outlet and
15 to reduce or close the flow of water to said discharge outlet from said water supply.
2. A system according to claim 1, wherein said switching means includes valve means disposed within said drain which is operable in the non-recycling
20 condition to allow water to flow through the drain for disposal and which is operable in the recycling condition to substantially prevent flow of water through the drain for return of water to the discharge outlet.
3. A system according to claim 2, wherein said valve means is a flap valve.
25
4. A system according to any one of claims 1 to 3, wherein said system further includes pumping means for pumping water to said discharge outlet.
5. A system according to claim 4, said pumping means including a pump
30 which includes an outlet to which water is diverted when said switching means is switched to said recycling condition.
6. A system according to claim 5, wherein said pump inlet is in communication with a reservoir to which water is diverted in said recycling

condition, and wherein operation of said pump takes place only when said reservoir has sufficient water capacity to feed said pump.

7. A system according to any one of claims 1 to 6, filtering means being
5 provided between said drain and said discharge outlet for filtering diverted water.

8. A system according to claim 7 when dependent on claim 5, said filtering
10 means including a filter disposed in the flowpath of diverted water prior to said pump.

9. A system according to claim 7 when dependent on claim 5, said filtering
means including a filter disposed in the flowpath of diverted water after said
15 pump.

10. A system according to any one of claims 1 to 9, wherein control means
are provided to control flow of water from said water supply to said discharge
outlet so that in said recycling condition flow of water from said water supply is
at least reduced compared to flow in said non-recycling condition.

20 11. A system according to claim 10, wherein reduction in the flow of water
from said water supply to said discharge outlet occurs shortly after said
switching means are switched from said non-recycling condition to said
recycling condition, and wherein said control means monitors the need for
25 supply of water from said water supply and supplies water as required.

12. A system according to claim 11, wherein said water supply includes
supply of heated water, and said control means monitors the temperature of the
water being diverted from said drain to said discharge outlet in said recycling
30 condition and supplies heated water from said water supply as necessary to
maintain a desired discharge outlet temperature.

13. A system according to claim 10, wherein said control means includes a manually operable valve arrangement for permitting and adjusting the flow of water from said water supply in said recycling condition.
- 5 14. A system according to claim 13, said manually operable arrangement including a valve associated with a heated water supply.
15. A system according to claim 13 or 14, said manually operable valve arrangement including a valve associated with an unheated water supply.
- 10 16. A system according to any one of claims 10 to 15, wherein said control means monitors the discharge pressure of water at said discharge outlet and, if necessary, adjusts flow of water from said water supply to said discharge outlet to maintain a desired discharge outlet pressure.
- 15 17. A system according to any one of claims 10 to 15 when dependent on claim 4, wherein said control means monitors the discharge pressure of water at said discharge outlet and, if necessary, adjusts the pumping pressure of said pumping means to maintain a desired discharge outlet pressure.
- 20 18. A system according to any one of claims 1 to 17, wherein said washing facility is a shower, a sink or a basin.
- 25 19. A system according to any one of claims 1 to 18, including facility for adding additives to water flowing from said drain to said discharge outlet in said recycling condition.
- 30 20. A system according to claim 19, said additives including bathing salts, perfumes and cleaning agents.
21. A system according to any one of claims 1 to 20, wherein said washing facility is a shower and said discharge outlet comprises a shower head said shower head having a generally disc-like shape with oppositely facing broad surfaces and a side wall extending between said broad surfaces, said broad

surfaces and said side wall defining a cavity into which water flows for discharge through small openings provided in each of said broad surfaces, said shower head being rotatable about an axis extending through said side wall, so that one of said broad surfaces can be oriented for flow of water through the
5 small openings thereof.

22. A system according to any one of claims 1 to 21, said drain including a drain tube which is oriented substantially vertically within the drain and which defines a central flow passage therethrough, an outer surface of said drain tube
10 being spaced from an inner surface of said drain to define an external flow passage, the arrangement being such that, in said recycling condition, water flows downwardly into said drain through the central flow passage of said drain tube and is diverted to flow upwardly through said external flow path for delivery to said discharge outlet.

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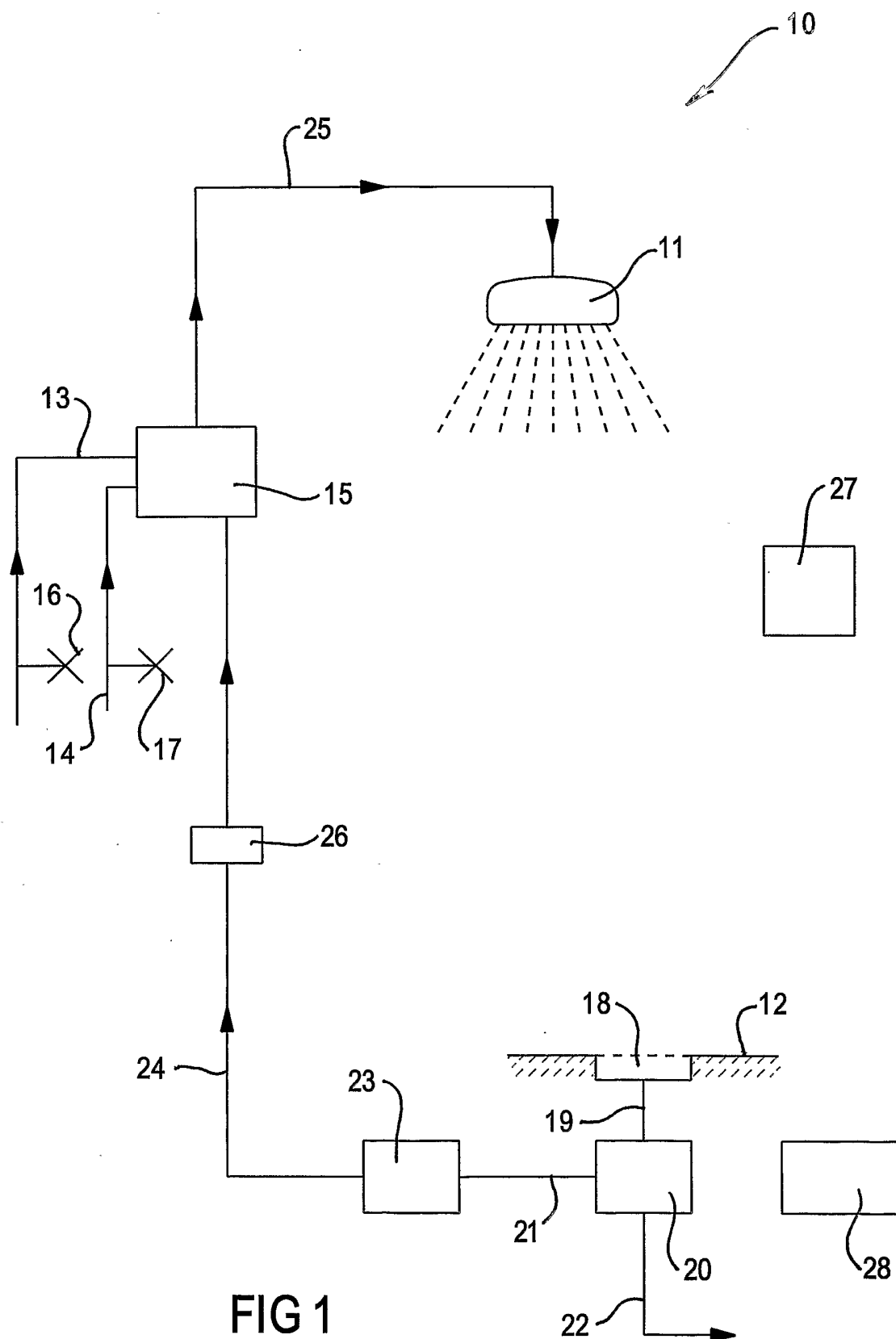
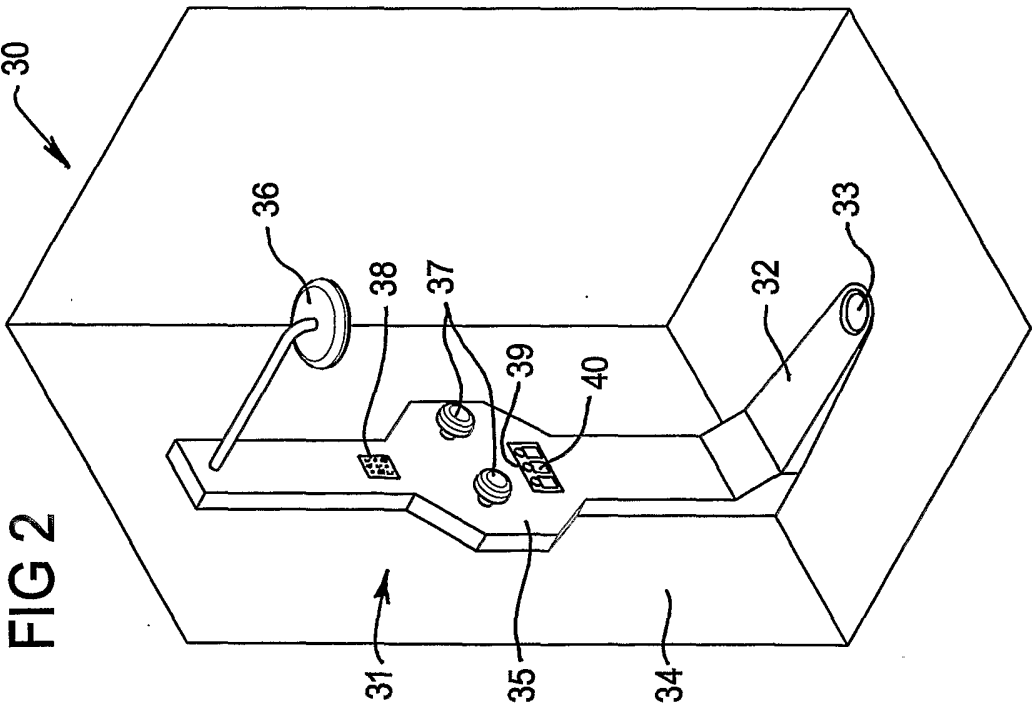
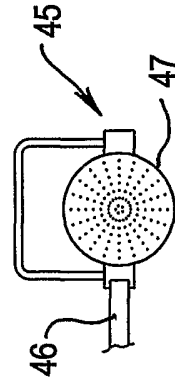
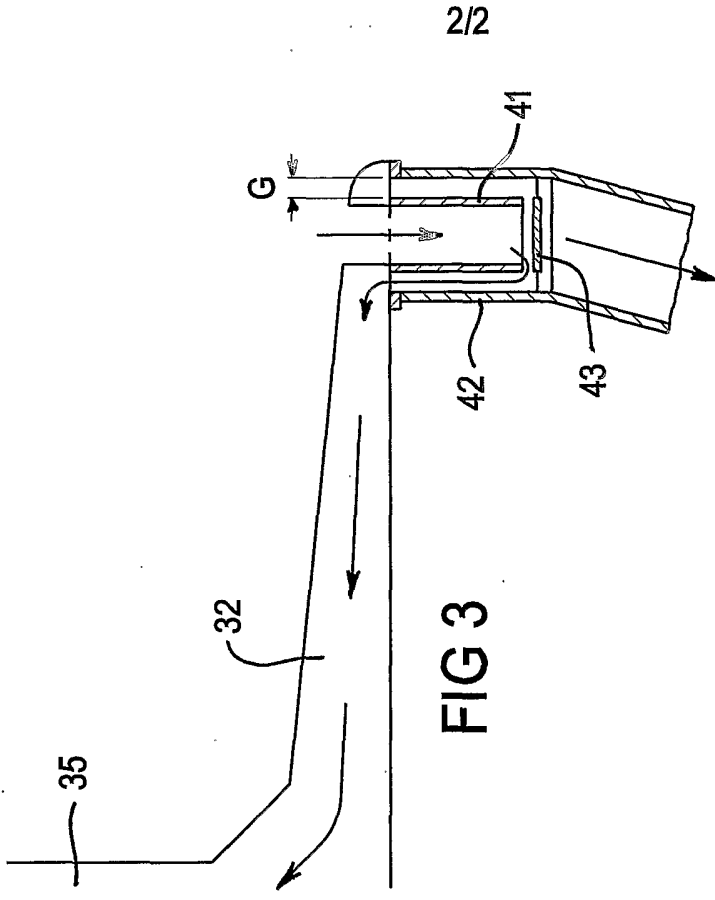


FIG 1



INTERNATIONAL SEARCH REPORT

 International application No.
PCT/AU2004/000648

A. CLASSIFICATION OF SUBJECT MATTER Int. Cl. ⁷ : E03C 1/12 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) Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: E03C 1/12 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Derwent DWPI - E03C 1/12, A47K 3/28 - keywords - recycle, reuse, divert. Also E03C with same keywords.		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1059403 A (PREVOR INTERNATIONAL) 13 December 2000. All document.	1-22
X	DE 4212688 A (BRANDT) 21 October 1993. All document.	1-20
X	DE 19642873 A (HERRMANN GmbH) 30 April 1998. All document.	1-22
X	JP 2000225168 A (OG GIKEN KK) 15 August 2000. Derwent English language abstract, Accession no. 2000-569502 Class P28.	1-22
X	JP 2000342469 A (BRIDGESTONE CORP) 12 December 2000. Derwent English language abstract, Accession no. 2001-118284 Class P28.	1-22
X	JP 2001104689 A (TAKENAKA KOMUTEN KK) 17 April 2001. Derwent English language abstract, Accession no. 2001-435752 Class Q42.	1-20
X	JP 2002238972 A (SANYO ELECTRIC CO LTD) 27 August 2002. Derwent English language abstract, Accession no. 2002-651994 Class P28.	1-20
☐ Further documents are listed in the continuation of Box C ☒ See patent family annex		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "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	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "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 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family	
Date of the actual completion of the international search 5 July 2004	Date of mailing of the international search report 08 JUL 2004	
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized officer DAVID LEE Telephone No : (02) 6283 2107	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2004/000648

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
JP	2000225168				
JP	2000342469				
JP	2001104689				
JP	2002238972				
EP	1059403	CA	2311272	FR	2794633
		US	6446277		
DE	4212688				
DE	19642873				
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.					
END OF ANNEX					