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DescriptionSanitary tap for automatic water deliveryTechnical field

This invention relates to a sanitary tap for automatic water delivery.

5 Background art

To deliver/mix the hot and/or cold water, known taps generally require the operation of suitable control members, generally by contact with the user's hand (or foot).

10 Taps are also known which deliver water when the user positions his hands close to the tap, to activate a proximity sensor which determines water delivery. However such taps deliver water at only a single predetermined temperature, it not being possible to adjust the temperature other than by manually adjusting the control members (in the normal manner).

15 The object of the present invention is to provide a sanitary tap able to deliver water at the desired temperature without contact being required between the hands (or another part of the body) of the user and a part of the tap.

20 The purpose of this is to make the use of the tap more comfortable, more rapid and more hygienic.

A typical application of the tap of the invention is in washrooms open to the public (restaurants, public toilets, offices, communities, public transport, etc.) where the requirements of hygiene are particularly felt.

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Disclosure of the invention

According to the invention, the tap comprises:

- a sensor means for determining the distance between the tap and the user's hands;
- 30 - means for regulating the temperature of the water fed to the delivery port of the tap; and
- means for processing the distance values provided by the

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sensor means and for consequently controlling the water temperature regulating means such that the temperature of the water delivered by the port 11 differs on the basis of the differing distance of the user's hands 3 from the tap.

5 When in use, the user positions his hands below the tap, which then delivers water at a temperature which differs in accordance with the distance between the hands and the tap. For example, the temperature can be higher the greater this distance, or vice versa.

10 The user can then control the water delivery and determine its temperature simply by placing his hands at the required distance under the tap delivery port without touching any part of it. The invention is described in detail hereinafter with the aid of the accompanying figures, which illustrate one embodiment thereof.

15 Figure 1 is a schematic view of the tap according to the invention.

Figure 2 is a schematic representation of one embodiment of the temperature regulating means 40.

The tap of the invention, shown very schematically in Figure 1, is indicated overall by 1 and comprises a usual water deliver port 11, and is typically positioned above a wash basin 2 in which the delivered water is collected.

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With the tap 1 there is associated a sensor means 20 arranged to determine the distance of the user's hands 3 from the tap.

25 The sensor means 20 is positioned close to the delivery port 1 (as shown in Figure 1), and faces the underlying wash basin 2.

The sensor means 20 can be of infrared reflecting type, or can incorporate laser diodes or ultrasound means.

The tap also comprises means 30 for processing the distance values provided by the sensor means 20.

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Specifically, the means 30 comprise a microcontroller 31 which processes the information received from the sensor means 20 to implement the desired function.

The means 30 act on the temperature regulating means 40 for the water fed to the delivery port 11.

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The microcontroller 31 contains software for controlling the means

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40 such that the delivered temperature depends on the distance of the hands 3 from the sensor 20.

For example, the microcontroller 31 operates by dividing the space below the port 11 into several sectors and associating with each
5 sector a respective delivered water temperature.

For example, on positioning the hands 3 within the sector nearest to the port 11, this delivers water at "cold" temperature; on positioning the hands 3 within the sector farthest from the port 11, this delivers water at "hot" temperature; finally on
10 positioning the hands 3 within one of the intermediate sectors, the port 11 delivers water at "tepid" temperature, hot to a greater or lesser extent.

The software of the microcontroller 31 can be such as to cause the delivered water temperature to vary instantaneously as the
15 distance of the hands 3 from the port 11 varies.

Alternatively the temperature determined by the presence of the hand 3 in any one of the sectors can be made to remain constant for a predetermined time period, even if the hands are moved into another sector. In the embodiment shown in Figure 2, the means 40
20 comprise a plurality of on-off solenoid valves each connected to a source 42 feeding cold water to the tap, or to a source 43 feeding hot water to the tap.

The outlets of the valves 41 are all connected to a single exit pipe 44 in which the water is mixed and fed to the port 11.

By means of an interconnection device 32 between the
25 microcontroller 31 and the valves 41, the opening and closure of these latter is controlled by the software of the microcontroller 31 in accordance with different combinations, with each of which there corresponds a respective mixture of hot and cold water
30 having a respective temperature, all said temperatures being different.

In the embodiment shown in Figure 2 four valves 41 are provided, with them there being associated constricting means 45 for regulating the flow rate.

35 Those valves 41 indicated by V1 and V2 are connected to the cold water source 42, whereas those valves 41 indicated by V3 and V4

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are connected to the hot water source 43.

The constricting means 45 are adjusted such that the flow rate through the valves V2 and V4 is one half of that through the valves V1 and V3.

5 Hence by operating the valves V1-V4, five different combinations are obtained with five corresponding temperatures, namely a cold temperature, a hot temperature and three intermediate temperatures, plus a configuration in which the tap delivers no water, as shown in the following table:

	V1	V2	V3	V4	
10	on	on	off	off	--> cold temperature, flow = 3/4 max
	on	on	off	on	--> nearly cold temperature, flow = max
	on	off	on	off	--> medium temperature, flow = max
	off	on	on	on	--> nearly hot temperature, flow = max
15	off	off	on	on	--> hot temperature, flow = 3/4 max
	off	off	off	off	--> tap closed

In a different embodiment (not shown) of the means 40, these use proportional valves for mixing the hot and cold water together.

Further accessory means can be associated with the tap of the invention to facilitate its use.

20 One of these accessories is a water temperature indicator, in particular a light-emitting indicator of the delivered water temperature, positioned typically on the top of the delivery port 11 to provide signals of different colour according to the water temperature so that the user can be aware of the delivered water temperature not only by direct contact with the hands but also by sight.

25 A temperature sensor (not shown in the figures) for the delivered water can also be positioned such as to be grazed thereby and be arranged to close the hot water source 43 if the delivered water temperature exceeds a preset maximum value.

30 The regulating means 40 can be of a type different from those illustrated. They can for example comprise electrical resistance elements immersed in the water stream to the port 11, to be activated by the means 30 such as to heat the delivered water to different temperatures.

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Numerous modifications of a practical and applicational nature can be made to the invention, without leaving the scope of the inventive idea as hereinafter claimed.

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Claims

1. A sanitary tap for automatic water delivery ,
characterised by comprising:
 - a sensor means (20) for determining the distance between the
tap and the user's hands (3);
 - 5 - means (40) for regulating the temperature of the water fed to
the delivery port (11) of the tap; and
 - means (30) for processing the distance values provided by the
sensor means (20) and for consequently controlling the water
temperature regulating means (40) such that the temperature of the
10 water delivered by the port (11) differs on the basis of the
differing distance of the user's hands (3) from the tap.
2. A tap as claimed in claim 1, characterised in that said
means (30) for processing the distance values operate by dividing
15 the space below the tap into several sectors and associating with
each sector a determined delivered water temperature.
3. A tap as claimed in claim 1, characterised in that said
sensor means (20) is positioned close to the water delivery port
20 (11).
4. A tap as claimed in claim 1, characterised in that said
water temperature regulating means (40) comprise a plurality of
on-off valves (41), each connected to a cold water source (42) or
25 to a hot water source (43) and having their outlets all connected
to the delivery port (11) of the tap, said valves (41) being
opened and closed by said processing means (30) in different
combinations, each of which corresponds to a respective hot/cold
water mixture having a respective temperature.



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