Title: WATER FLOW CONTROL AND ADJUSTING TAP

Abstract: A tap (1) for controlling and adjusting the water supply to a bath tub (2) comprises water supply means consisting of an outlet (30) and a hand shower (31) and a seat (27) for housing an hand shower (31) in rest condition. Moreover, the tap comprises at least one processing unit to command the supplying of the supply means. The tap is characterized by comprising first sensors (104) connected to the processing unit (100) for detecting the presence of the hand shower 31 on the seat (27).
"Water flow control and adjusting tap"

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DESCRIPTION

The invention relates to a water flow control and adjusting tap, in particular for a bath tub or the like.

As is well known, traditional mechanically operated taps specifically designed for bath tubs are commercially available, said taps allowing the water to be switched from an outlet of the tap to a hand shower by manually operating a suitable lever or mechanical control.

More sophisticated electronically controlled taps also exist commercially, these taps being able to be controlled remotely for mixing hot and cold water or for switching the water from the tap to the hand shower; in such taps the control keys are usually arranged on a control box which is fixed to a wall or on a remote control unit.

This results in their being awkward to use, in particular for the user who is already inside the bath tub.

The object of the present invention is to provide a control and adjusting tap which is improved in terms of integration with the programming means.

A specific problem of the bath tubs and the taps used with them is also that of automated control of the quantity of water which is allowed to flow from the tap into the bath tub.

In order to prevent the water from overflowing, the bath tubs are usually provided with an overflow outlet which, however, is sometimes not sufficient to prevent the water from flowing over the edge of the bath tub (for example when the amount of water supplied from the tap outlet is greater than the amount of water which can be discharged via the overflow).

In such cases not only is there wastage of water, which has been at the centre of attention in recent years (since there has been a reduction in the world’s water reserves and any measure aimed at preventing or limiting wastage is undoubtedly desirable), but also the user is obliged to be present for the whole of the time during filling of the bath tub.

A specific object of the present invention is therefore to provide a tap which allows one to determine in advance the amount of water which is to be introduced into the bath tub, and therefore the filling level of the latter, and in particular which allows one to choose between several filling levels so that when the desired level is reached the tap automatically interrupts the water flow to the tap supply outlet.

The object is achieved by a water flow control and adjusting tap in accordance with that claimed in Claim 1.

The system according to the invention achieves the following advantages:

- optimum integration of controls and tap;
- easy programming of numerous functions even when the user is already inside the bath tab and therefore not able to move freely;
- advance programming of the quantity of water to be filled into the bath tub, resulting in a significant saving in the amount of water used.

The characteristic features and further advantages of the invention will emerge from the description, provided hereinbelow, of an example of embodiment thereof, provided by way of a non-limiting example, with reference to the accompanying drawings in which:

- Figures 1a and 1b show schematically an exploded view of a control and adjusting tap according to the invention;
- Figure 2 shows schematically the tap according to Figures 1a and 1b assembled and with the hand shower in an operating condition;
- Figure 3 shows schematically the tap according to Figures 1a and 1b assembled and with the hand shower in a rest condition;
- Figures 4a, 4b and 4c show respectively a bottom plan view, a front view and a side view of the tap according to Figures 1a and 1b;
- Figure 5 shows from above the tap according to Figures 1a and 1b and some of its aesthetic features;
- Figure 6 shows a block diagram of the electronic components for processing the commands received from the tap and from other data detection means.

**DETAILED DESCRIPTION**

A water flow control and adjusting tap is denoted overall by the reference number 1 in the accompanying figures. This tap 1 controls and adjusts the water flow into a bath tub (the top edge of which is indicated by the reference number 2 in Figures 4b and 4c); the tap 1 is arranged, so as to be visible, on one edge of the bath tub itself.

It comprises a seal 11 for joining together in a watertight manner the bath tub 2 and a base 13 which is fixed to the bath tub edge with the seal 11 being arranged in between.

In an alternative embodiment the seal 11 can be composed of three adjacent parts.

The base 13 is composed of three compartments 15, 17, 19 provided with respective holes 14, 16, 18, one (14) of which is designed to receive the power supply cables for a keyboard 32 for controlling the tap 1, while the other two holes (16, 18) are designed to allow the water to pass through.

One of the longer sides of the base 13 has, formed along practically the whole of its length, a shaped step 21 which houses a perimetral portion of a transparent panel 23, usually made of glass, which is mounted so as to project from the base 13 and acts as a tumble flat surface for the water.

A tray 25 for containing the water is joined from above to the base 13 with, arranged in between, the transparent panel 23 which is partially seated inside the shaped step 21; the tray 25 is integral with a plate or seat 27 which acts as a housing for a hand shower 31 in the rest condition; this tray has moreover a greater depth than the thickness of the plate 27 and forms
a chamber for receiving the water to be supplied to the bath tub via a slit-shaped outlet 30 which is formed in the base of the tray 25 and along practically the whole of its length.

Once this tray 25 is combined with the base 13, with the transparent panel 23 arranged in between, the slit-shaped outlet 30 allows the water to pass from the inside to the outside of the tray 25 into the bath tub 2, flowing over the transparent panel 23. In particular, a gasket seal (not shown) may be provided between the tray 25 and the base 13.

According to an alternative embodiment of the present invention, the base 13 and the tray 25 are a single body.

The tray 25 is covered at the top by a resistive glass pane 29 which houses means 32 for programming operation of the tap 1, in particular touch-sensitive keys shown in detail in Figure 5.

The hand shower 31, in the rest condition, occupies the difference in thickness between the plate 27 and the tray 25 so that the compact unit has a substantially flat top surface.

A flexible pipe (not shown in the figures) leads out of the plate 27 and allows the water to be supplied to the hand shower 31 as well as any orientation of the hand shower in the operating condition; a mechanical watertight articulated joint allows the water supply pipe to be arranged aligned with the hand shower, when water is supplied, and at right angles thereto in the rest condition (no water supplied).

In an alternative embodiment, the articulated joint can be replaced by a pipe fitting adapted to maintain the flexible pipe at right angles from the hand shower both during the supply and during the rest condition.

According to the invention, the programming means 32 are integrated in the supply unit and are visible on the upper base thereof.

From the above description it can therefore be seen how the tap 1 incorporates separate water supply means such as an outlet (slit-shaped outlet 30) or a hand shower 31, the hand shower having a compact form and being integrated in the unit so that the latter is uniform and compact in the rest condition, i.e. when no water is supplied.

In accordance with Figure 4b, the supply tap 1 is supplied with water via suitable water connection pipes, which are preferably arranged below the bath tub or in any case in areas of the bath tub which are not visible.

In detail, a pipe 42 supplies water to the tap 1, in particular to the outlet 30, via the hole 16, while a pipe 44 supplies water to the tap 1, in particular to the hand shower 31, via the hole 18.

With reference to Figure 6, a microchip processing unit 100 receives commands from the programming means 32 and data detected by sensing means suitably located in the vicinity of the bath tub and the tap 1 and process all these commands/data so as to send back operating information to the tap.
In greater detail, the sensing means comprise first sensing means 104, sensors for detecting the presence of the hand shower 31 which check whether the hand shower is in the operating condition or rest condition namely whether the hand shower is raised from or resting on the plate 27, respectively, for emitting a correspondent consent signal to the supply or a command for supplying as will be clear hereinbelow.

The sensor means also comprise second sensing means, level sensors 103, which detect the filling level of the bath tub.

If the sensors 104 indicate that the hand shower is in the rest condition and therefore resting on the plate 27, the processing unit 100 maintains a command for ensuring that no water is supplied by the hand shower; otherwise it emits a command for supplying water or automatically or as a result of an user selection.

In a per se known manner, in the case of automatic supplying when the hand shower is lifted, the emission of the supplying command can be delayed, in such a way that the water supplying happens with a know delay, permitting the user to positioning the hand shower.

Such sensor 104 can be a magnetic sensor, mechanical, or preferably optical.

The commands processed by the unit 100 comprise, moreover, those commands sent by the already mentioned programming means 32, in particular touch-sensitive keys, which offer a wide range of possibilities for programming the water supply, which are briefly listed below:

ON/OFF: Switching the tap on and activation of water supply from the main outlet.

SHOWER: Switching the water supply between tap outlet and shower; this switching operation may be performed only if the hand shower has been removed from the rest position (an optical presence sensor described above prevents activation in the rest condition).

BATH: Setting the filling level of the bath tub to one of three predefined levels, or continuous filling without specifying the level.

ARROW KEYS: Control for increasing or decreasing the water temperature.

The touch-sensitive controls allow filling of the bath tub to be controlled with the possibility of automatic pre-selection of the filling levels and a feature for self-memorising the levels depending on the capacity of the bath tub which is to be used.

In particular, according to an embodiment of the present invention, the step of self-memorising consists of a first filling until a maximum level, during which the processing unit memorizes the filling time.

The subsequent partial fillings can be calculated by the processing unit taking into account the initially taken time for a complete filling. In this connection the level sensor can be advantageously reduced to a simple maximum sensor.

The level sensor 103 can be, i.e. a capacitive sensor placed on the edge 2 of the bath tub. Nevertheless, other type of sensors, for example mechanical sensors, can be provided in a per
se known manner.

If the sensing means 103 detect that the water has reached a programmed level, this data is received by the processing unit 100 which generates a corresponding command for interrupting the water supply to the tap 1.

The water is supplied to the tap 1 by mixer means 110 able to mix the quantity of hot water and cold water depending on the preset temperature command processed by the processing unit 100.

The mixer means are, in particular, of the electromechanical type which are arranged in the base of the bath tub in a concealed position.

Obviously, the keys have been named purely by way of a non-limiting example and further functions may be envisaged without departing from the basic idea of the invention.

Furthermore a timer, which is also programmable, is envisaged, being able to allow delayed activation of filling of the bath tub.

The water supply programming means (32) are able to cause switching of the supply from one to another of said water supply means, i.e., by pressing suitable keys of these means 32, the water supply may be switched from tap outlet to hand shower and vice versa.
CLAIMS

1. Tap (1) for controlling and adjusting the water flow to a bath tub (2), comprising:
   - water supply means consisting of an outlet (30) and a hand shower (31),
   - a seat (27) for housing an hand shower (31) in rest condition;
   - at least one processing unit to command the supplying of the supply means;
   characterized by comprising first sensing means (104) connected to the processing unit (100) for detecting the presence of the hand shower 31 on the seat (27).

2. Control and adjusting tap (1) according to claim 1 characterized by comprising second sensing means (103) able to detect the filling level of the bath tub.

3. Control and adjusting tap (1) according to claim 1 or 2, characterized by comprising water supply programming and control means (32) integrated in the body of said tap (1).

4. Control and adjusting tap (1) according to the preceding Claim, wherein said programming and control means (32) comprise a keyboard.

5. Control and adjusting tap (1) according to Claim 4, wherein said keyboard is formed by touch-sensitive keys.

6. Control and adjusting tap (1) according to any Claims 4 or 5 wherein said keyboard comprises a key for switching from outlet (30) to hand shower (31); said switching could be performed only if the first sensor don’t detect that the hand shower (31) is in said seat.

7. Control and adjusting tap (1) according to any Claims 5 or 6 wherein said keyboard comprises at least a level programming key.

8. Control and adjusting tap (1) according to any one of the preceding claims, comprising a base (13) fixed to the edge of the bath tub (2) with a seal (11) arranged in between.

9. Control and adjusting tap (1) according to Claim 8, wherein said base (13) comprises three compartments (15, 17, 19) provided with respective holes (14, 16 and 18), said hole (14) being designed to receive the power supply cables of said programming means (32), and said holes (16, 18) being designed to allow the water to pass through to said water supply means (30, 31) respectively.

10. Control and adjusting tap (1) according to Claim 9, wherein one of the longer sides of said base (13) has formed therein, a shaped step (21) which houses a perimetral portion of a transparent panel (23) mounted projecting from said base (13), and a tray (25) for containing water is joined from above to said base (13), said tray (25) being integral with a plate (27) which acts as a housing for said hand shower (31) in the rest condition.

11. Control and adjusting tap (1) according to claim 10, wherein said base (13) and said tray (25) are a single body.
12. Control and adjusting tap (1) according to Claim 1, wherein said first sensing means (104) are optical sensors.

13. Control and adjusting tap (1) according to Claim 2, wherein said second sensing means (103) are a capacitive sensor placed on the bathtub edge (2).
**INTERNATIONAL SEARCH REPORT**

**International application No**
PCT/IB2009/054277

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. E03C1/05

G05D23/13

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 G05D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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Further documents are listed in the continuation of Box C. See patent family annex.

**Date of the actual completion of the international search**

10 February 2010

**Date of mailing of the international search report**

25/02/2010

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