Title: A FAUCET AND A METHOD OF CONNECTING A CONTROL LEVER IN A FAUCET TO A VALVE

Abstract: A faucet (1) has a body (2) and a control lever (6) for operating a valve mechanism (42) provided within the body (2) of the faucet (1). The control lever (6) is pivotally connected to an outer ring (16) that is received in the upper end of the body (2). A head section (14) of the control lever (6) is flush with the upper surface (18) of the outer ring (16) in a closed position. The head section (14) of the control lever (6) is arranged to pivot within the outer ring (16) about an axis extending transversely to the body (2) to control water flow rate and is rotatable with the outer ring (16) about a longitudinal axis of the body (2) to control water temperature.

FIGURE 4
before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments (Rule 48.2(h))
A FAUCET AND A METHOD OF CONNECTING A CONTROL LEVER IN A FAUCET TO A VALVE

This invention relates to a faucet and to a method of connecting a control lever in a faucet to a valve and in particular an improved faucet lever mechanism utilising a mixing and/or flow control valve.

It is already known to provide a faucet suitable for fitting to a washbasin or the like. Such mixing faucets are typically provided with a base through which connecting inlet pipes are passed and have a discharge arm. A control lever can be swivelled or rotated about one or more axes to control flow and/or temperature of discharged water.

A faucet is known from US 5 358 213 having a faucet body with a discharge arm and a lever arm extending from a cylindrical section seated over and around an upper end of the faucet body. In this design the cylindrical section is located on top of and surrounds the upper end of the faucet body and the lever arm rotates and pivots relative to a vertical axis of the faucet for controlling flow rate and temperature of the discharged water.

Another faucet is known from US 4 698 858 having a faucet body with a discharge arm and a lever arm extending from a cylindrical section seated on and extending upwardly from an upper end of the faucet body. In this design the cylindrical section is arranged above and in line with the upper end of the faucet body and the lever arm rotates and pivots relative to a vertical axis of the faucet for controlling flow rate and temperature of the discharged water.

It is desirable that a lever arm faucet be provided that improves the aesthetic appearance of the faucet. It is also desirable to provide a new and improved method of coupling a control lever to a valve mechanism.

According to a first aspect of the invention there is provided a faucet comprising a body and a control lever, a valve mechanism being provided within the body of the faucet and wherein at least a portion of the control lever is arranged to pivot within the body about an axis extending transversely to the body.
In one embodiment the faucet is provided for use with a washbasin or similar and the faucet may extend upwardly from the washbasin when fitted and in use. In such an embodiment the faucet may have a discharge arm from which water is discharged. In an alternative embodiment the faucet is provided for use in an ablutionary installation such as a shower and may have an outlet for connection to a shower fitting.

In one form, the lever controls flow of water discharged from the faucet. In another form, the lever controls temperature of water discharged from the faucet. In yet another form, the lever controls flow of water and temperature of water discharged from the faucet.

It may be that pivotal movement of the lever about the transverse axis controls flow of water and rotational movement of the lever about a longitudinal axis of the body controls temperature of the water. It will be appreciated however that pivotal movement of the lever about the transverse axis may control temperature of the water and rotational movement of the lever about the longitudinal axis may control flow of water.

The control lever may comprise an arm and a head section. The head section may be at least partially circular. The head section may be arranged to fit within an outer ring. The outer ring may sit on the body of the faucet. The portion of the lever that pivots within the body may comprise at least the head section.

It may be that the control lever is connected to the outer ring for pivotal movement relative to the outer ring and body about the transverse axis. It may be that the control lever is connected to the outer ring for rotational movement with the outer ring relative to the body. For example, the head section of the lever may be connected to the outer ring for pivotal movement relative to the outer ring about the transverse axis and rotational movement with the outer ring about the longitudinal axis.

The head section and outer ring may be provided with co-operating formations allowing pivotal movement of the control lever relative to the outer ring about the transverse axis and transmitting rotational movement of the control lever about the longitudinal axis to the outer ring.
The co-operating formations may be of any suitable type and may comprise, for example, a pair of pins on one of the head section of the lever and the outer ring that are engageable with a pair of apertures in the other of the head section of the lever and the outer ring. In this arrangement the engagement of the pivot pins with the apertures defines the transverse axis for pivotal movement of the control lever and couples the control lever and outer ring for rotational movement.

The outer ring may have an upper surface configured to complement the lever. The upper surface of the outer ring may be configured to be flush with an upper surface of the head section when the lever is in a first position. The outer ring may be provided with an internal profile such that the head section of the lever can pivot about the transverse axis within the outer ring. It may be that at least part of the head section extends into the body when the lever is pivoted relative to the outer ring and body about the transverse axis to and from the first position. An abutment may be provided acting as a stop for the head section within the outer ring to control pivotal movement of the lever.

Where pivotal movement of the lever about the transverse axis controls flow of water, the first position may correspond to a closed position in which flow is prevented and the lever may be pivotal to and from the closed position to control flow. The control lever may be pivotal from the closed position to a second position corresponding to a full open position for maximum flow of water. The control lever may be pivotal to any intermediate position between the closed and full open positions for varying the flow of water.

Where rotational movement of the lever about the longitudinal axis controls the temperature of the water, a temperature position of the lever may be indicated by the outer ring. In this way a visual indication may be provided to a user of the temperature of water flowing from the discharge arm.

The head section of the control lever may include a coupling device for transmitting pivotal movement of the control lever about the transverse axis and, where provided, rotational movement of the control lever about the longitudinal axis to the valve mechanism for controlling flow of water and/or temperature of water to be discharged.
The coupling device may be of any suitable type and may include, for example, a coupling portion connectable to an actuator portion of the valve mechanism. The coupling portion may depend from the head section within the body of the faucet. The coupling portion may comprise a pair of arms arranged to depend on either side of the actuator portion of the valve mechanism. A bracket may be provided that is connectable to the actuator portion of the valve mechanism and to the arms. In one form, the bracket may be connectable to the arms and located therebetween and around the actuator portion of the valve mechanism.

The connection between the pair of arms and bracket may be configured to transmit pivotal movement of the head section of the control lever to the valve mechanism and, where provided rotational movement of the head section to the valve mechanism. For example, the arms and bracket may be provided with co-operating formations for transmitting pivotal movement of the lever to the valve mechanism and, where provided, for transmitting rotational movement of the lever to the valve mechanism.

The co-operating formations may be of any suitable type and may comprise, for example, a pair of pins on one of the arms and bracket and a pair of channels on the other of the arms and bracket in which the pins are received. In this arrangement the engagement of the pivot pins with the channels couples the control lever and actuator portion of the valve mechanism for controlling operation of the valve mechanism in response to pivotal and/or rotational movement of the lever.

The valve mechanism may be operable to control temperature of the water by rotation of the control lever about the longitudinal axis and to control flow of water by pivoting of the control lever about the transverse axis. The valve mechanism may be in the form of a valve cartridge. Such valve cartridges are commercially available and will be familiar to those skilled in the art without a detailed description.

It may be that the outer ring is restrained within the body of the faucet. The outer ring may be retained within the body by a clip ring. The clip ring may be provided with a clip retainer. The valve mechanism may be retained within the body of the faucet. The valve mechanism may be retained by a head nut. The head nut may have an external thread arranged to engage with an internal thread on the body.
According to a second aspect of the invention there is provided a method of connecting a control lever to a valve mechanism in a faucet body, the valve mechanism being operable to control a discharge flow of water and/or to control a temperature of the discharge water, wherein at least a portion of the control lever is arranged to pivot within the faucet body about a transverse axis relative to the faucet body and wherein the portion of the control lever is connected to the valve mechanism such that pivoting about the transverse axis is transmitted to the valve mechanism.

In one form, the lever controls flow of water discharged from the faucet. In another form, the lever controls temperature of water discharged from the faucet. In yet another form, the lever controls flow of water and temperature of water discharged from the faucet.

It may be that pivotal movement of the lever about the transverse axis controls flow of water and rotational movement of the lever about a longitudinal axis of the body controls temperature of the water. It will be appreciated however that pivotal movement of the lever may control temperature of the water and rotational movement of the lever may control flow of water.

It may be that the valve mechanism is arranged to control flow of water and temperature of water. The valve mechanism may have an actuator portion adapted to connect to the control lever.

The control lever may include a coupling portion for transmitting pivotal movement of the control lever about the transverse axis and, where provided, rotational movement of the control lever about the longitudinal axis to the valve mechanism for controlling flow of water and/or temperature of water to be discharged. It may be that the coupling portion depends from the lever within the faucet body.

It may be that the coupling portion comprises a pair of arms arranged to depend on either side of the actuator portion of the valve mechanism. A bracket may be provided that is connectable to the actuator portion of the valve mechanism and to the coupling portion. In one form in which the coupling comprises a pair of arms, the bracket is
connectable to the arms and located therebetween and around the actuator portion of
the valve mechanism.

The connection between the pair of arms and bracket may be configured to transmit
pivotal movement of the head section of the control lever to the valve mechanism and,
where provided rotational movement of the head section to the valve mechanism. For
example, the arms and bracket may be provided with co-operating formations for
transmitting pivotal movement of the lever to the valve mechanism and, where
provided, for transmitting rotational movement of the lever to the valve mechanism.

The co-operating formations may be of any suitable type and may comprise, for
example, a pair of pins on one of the arms and bracket and a pair of channels on the
other of the arms and bracket in which the pins are received. In this arrangement the
engagement of the pivot pins with the channels couples the control lever and actuator
portion of the valve mechanism for controlling operation of the valve mechanism in
response to pivotal and/or rotational movement of the lever.

The valve mechanism may be locked in position in the body and relative movement of
the actuator portion is transmitted to a stem of the valve mechanism and subsequent
movement is transmitted to control elements of the valve mechanism. The valve
mechanism may be in the form of a valve cartridge.

It may be that as the control lever pivots about the transverse axis, the arms move in
an arc from a vertical position. The pins on the arms slide within the channels on the
bracket and the actuator portion is moved from a vertical position to an angled
position relative to the longitudinal axis of the body. The movement of the actuator
portion may control the flow of water discharged from the faucet.

It may be that as the control lever rotates about the longitudinal axis of the body, the
arms rotate and the pins on the arms engage the channels in the bracket and transmit
the rotational movement directly to the actuator portion. The movement of the
actuator portion may control mixing of hot and cold water for controlling the
temperature of water discharged from the faucet.
An outer ring may be provided in the faucet body and a head section of the control lever may be located within the outer ring at an upper end, in use, of the faucet. The head section of the control lever may be connected to the outer ring for pivotal movement relative to the outer ring and body about the transverse axis and for rotational movement with the outer ring relative to the body about the longitudinal axis. Rotation of the outer ring may provide an indication of water temperature to be discharged from the faucet.

The head section and outer ring may be provided with co-operating formations allowing pivotal movement of the control lever relative to the outer ring about the transverse axis and transmitting rotational movement of the control lever about the longitudinal axis to the outer ring. The co-operating formations may comprise a pair of pins on one of the head section of the lever and the outer ring that are engageable with a pair of apertures in the other of the head section of the lever and the outer ring. In this arrangement the engagement of the pivot pins with the apertures defines the transverse axis for pivotal movement of the control lever and couples the control lever and outer ring for rotational movement.

According to a third aspect of the invention there is provided a kit of parts comprising one or more of:

- a faucet comprising a body;
- an outer ring arranged to be located in an upper portion of the body;
- a control lever including a head section adapted to fit within the outer ring and to pivot within the outer ring, the head section being configured to connect to a valve and to transmit movement of the control lever to the valve to control in use at least one of a flow of water from the valve and a temperature of water flowing from the valve,

wherein the parts when assembled form a faucet in accordance with the first aspect of the invention.

The kit of parts may include any of the features of a faucet in accordance with the first aspect of the invention.

According to a fourth aspect of the invention there is provided a faucet having a body and a control lever for operating a valve mechanism provided within the body, an
outer ring received in the upper end of the body, the control lever having a head section pivotally connected to the outer ring for pivotal movement within the outer ring in the upper end of the body about an axis extending transversely to the body.

The head section of the control lever may be flush with an upper surface of the outer ring in a closed position. The head section of the control lever may be arranged to pivot within the outer ring to control water flow rate and may be rotatable with the outer ring about a longitudinal axis of the body to control water temperature.

The faucet may include any of the features of a faucet in accordance with the first aspect of the invention.

The invention will now be described by way of example only with reference to the accompanying figures in which:

**Figure 1** is a perspective view of a faucet in accordance with the invention;

**Figure 2** is a top view of the faucet of Figure 1;

**Figure 3** is a top view similar to Figure 2 showing the control lever in a different position;

**Figure 4** is a side view of a section of the faucet of Figure 1 in a closed position;

**Figure 5** is a side view of the faucet similar to Figure 4 in an open position;

**Figure 6** is a rear view of a section of the faucet of Figure 1;

**Figure 7** is an exploded view of the faucet of Figures 1 to 6;

**Figure 8** is a perspective view of an outer ring; and

**Figure 9** is a side view of the outer ring of Figure 8:
Referring to the drawings, a faucet 1 in accordance with the invention includes a body 2, a discharge arm or spout 3 having an outlet 4 and a control lever 6. The faucet 1 is connected to supplies of hot and cold water (not shown) and a user can select and control the flow and temperature of water delivered to the outlet 4 of the discharge arm 3 by means of the control lever 6.

The control lever 6 is located at an upper end 8 of the faucet body 2 in use and is arranged to rotate relative to a longitudinal axis generally indicated at 10 of the body 2 to control temperature of water discharged from the outlet 4 of the discharge arm 3. The control lever 6 is shown in a central position in Figures 1 and 2 aligned with the discharge arm 3 for delivery of water to the outlet 4 of the discharge arm 3 having a temperature between full hot and full cold. The control lever 6 is rotatable from the central position to either side of the discharge arm 3 as indicated by the arrows in Figure 2 to end positions (one only shown in Figure 3) that correspond to selection of full hot or full cold, and can be adjusted to any intermediate positions to control the outlet water temperature. In a modification (not shown) the central position may correspond to selection of full cold and the control lever 6 is rotatable to one side of the central position to an end position that corresponds to selection of full hot.

The control lever 6 comprises an arm section 12 and a head section 14 wherein the head section 14 is located within the body 2 and is arranged to pivot within the body 2 relative to an axis generally indicated at 22 in Figures 6 and 8 extending transverse to the body to control a flow of water discharged from the outlet 4 of the discharge arm 3. The control lever 6 is shown in a closed position in Figures 1 and 4 preventing flow of water to the outlet 4 of the discharge arm 3 and in an open position in Figure 5.

The body 2 is a unitary element connected to the discharge arm 3. The upper end 8 of the body is provided with a support member for mounting the control lever 6. The support member may be configured to extend between the head section 14 of the control lever 6 and the upper end 8 of the body 2. The support member may be in the form of an outer ring 16, an upper surface 18 of which can be seen in Figures 1 to 3. The outer ring 16 receives the head section 14 of the control lever 6 and is connected thereto by pins 20 as can be seen in Figure 4 such that the head section 14 is pivotal.
about the transverse axis 22 relative to the outer ring 16 and body 2 and is rotatable with the outer ring 16 relative to the body 2 about the longitudinal axis 10 of the body.

Pivoting of the control lever 6 about the transverse axis 22 extending between the pins 20 controls the flow of water of water discharged from the outlet 4 of the discharge arm 3. As the control lever 6 pivots, the head section 14 pivots within the body 2 of the faucet. In this way, an aesthetically pleasing appearance of the faucet can be provided. Connection of the head section 14 of the control lever 6 to the outer ring 16 for pivotal movement relative to the outer ring 16 and for rotational movement with the outer ring 16 further enhances the clean lines and aesthetic appearance of the faucet. It is particularly desirable that no external cuts are made on the faucet 1 that may detract from the appearance of the faucet and may collect dirt or encourage the growth of mould.

The outer ring 16 is shown in more detail in Figures 8 and 9. In the perspective view of Figure 8 it can be seen that a cut away section 26 is provided in the upper surface 18 arranged to receive the control lever 6. A lower surface of the control lever 6 abuts a base 28 of the cutaway section 26 when the control lever 6 is in the position shown in Figure 1 which, in this embodiment, corresponds to a closed position in which flow of water to the outlet 4 of the discharge arm 3 is prevented. The control lever 6 is pivotal about the transverse axis 22 to and from the closed position to control flow of water discharged from the outlet 4 of the discharge arm 3.

An internal profile of the outer ring 16 has two sections. A first section 30 adjacent the cutaway section 26 is smoothly curved as can be seen in part at 32 and can also be seen in Figure 4. A second section 34 opposed to the cut away section 26 is provided with a curved part 36 and an inwardly extending ridge providing a stop 38 for the control lever 6 in the full open position. The outer ring 16 is provided with two opposing apertures 40 arranged to receive corresponding pins 20 in the head section 14 of the control lever 6. The pins 20 may be received in holes in the head section 14 or may be integral with the head section 14. The control lever 6 pivots about the transverse axis 22 extending between the pins 20 received in the apertures 40.

Turning now to Figures 4 to 7, the internal arrangement of the faucet 1 showing the control lever 6 and connections to a valve mechanism 42 is illustrated in Figures 4 to
6 and the component parts are illustrated in Figure 7. Referring to these Figures, the control lever 6 comprises the arm section 12 and the head section 14. The head section 14 comprises a cap 44 and a body element 46 depending therefrom within the outer ring 16. The body element 46 is arranged to pivot within the outer ring 16 and to slide over the first curved section 32 of the outer ring 16 as the control lever 6 pivots about the transverse axis 22 to and from the closed position. The cap 44 further comprises an extending projection 48 opposed to the arm section 12 of the control lever 6. The extending projection 48 is arranged to slide over the second curved section 36 as the control lever 6 pivots about the transverse axis to and from the closed position. The projection 48 abuts the stop 38 provided in the second section 34 of the outer ring 16 when the control lever 6 has reached a fully open position. Inter-engagement of the projection 48 and stop 38 controls the range of pivotal movement of the control lever 6 from the closed position.

The body element 46 also comprises a pair of depending arms 50 (best seen in Figure 6) which are arranged to connect to an actuator portion 52 of the valve mechanism 42. The arms 50 depend on either side of the actuator portion 52 and are connected thereto by a bracket 54 located between the arms 50 and over the cartridge extension 52. The bracket 54 is fixedly connected to the actuator portion 52. The bracket 54 is provided with a pair of channels 56 arranged to receive pins or projections 57 on the arms 50 of the body element 46. The pins 57 may be integral with the arms 50 or received in holes in the arms 50.

Flow of water to the outlet 4 of the discharge arm 3 is controlled by the valve mechanism 42 in response to pivotal movement of the control lever 6 about the transverse axis 22 from the closed position shown in Figure 4 to the open position shown in Figure 5. As the control lever 6 pivots from the closed position, the arms 50 of the head section 14 swing through an arc within the body 2 of the faucet. The arms 50 are connected to the actuator portion 52 by the pins 57 that are received in the channels 56 of the bracket 54. The pins can slide within the channels 56 on the bracket 54 such that the bracket 54 and enclosed actuator portion 52 rotate from a vertical position in Figure 4 to an angled position in Figure 5. This movement of the actuator portion 52 is communicated to the valve mechanism 42 for controlling flow of water to the outlet 4 of the discharge arm 3.
Temperature of water delivered to the outlet 4 of the discharge arm 3 is controlled by the valve mechanism 42 in response to rotational movement of the control lever 6 about the longitudinal axis 10. As the control lever 6 rotates, the arms 50 of the head section 14 are rotationally rigidly connected to the actuator portion 52 with respect to rotational movement about the longitudinal axis 10 by the pins (not shown) that are received in the channels 56 of the bracket 54. Rotational movement of the control lever 6 is directly transmitted to the actuator portion 52. This movement of the actuator portion 52 is communicated to the valve mechanism 42 in the closed position of the control lever 6 (Figure 4), the fully open position of the control lever 6 (Figure 5) and in open positions intermediate the fully open position and closed position.

The valve mechanism 42 may be of any suitable type for mixing supplies of hot and cold water. The valve mechanism 42 may be operable in response to pivotal movement of the control lever 6 to adjust flow rate without changing the relative proportions of hot and cold water so that a selected outlet water temperature is maintained. The valve mechanism 42 may also be operable in response to rotational movement of the control lever 6 to adjust the relative proportions of hot and cold water and thus the outlet water temperature without changing a selected flow rate. Valve mechanism 42's that can be employed will be familiar to those skilled in the art and are not described in detail.

The valve mechanism 42 may be in the form of a valve cartridge that is inserted into the body 2 of the faucet 1 from the upper end and is retained by a head nut 58 that is secured within the body 2, in this case by means of a screw thread. A clip retainer 60 locates on the head nut 58 and retains a clip ring 62. The outer ring 16 is held down by engagement of the clip ring 62 with a groove 64 (Figure 9) in the outer wall of the outer ring 16. The clip ring 62 can be released in a pre-determined position of the control lever, for example the full cold position, once a grub screw (not shown) has been removed. Rotation of the outer ring 16 may be assisted by a bearing ring (not shown). The bearing ring may provide additional support for the outer ring 16 as it rotates relative to the body 2 and as the control lever 6 pivots within the outer ring 16.

It will be appreciated that while the invention has been described in relation to a faucet for use with a washbasin or similar, the faucet could be used in a line for controlling flow and/or mixing of water to be discharged from an outlet such as a
shower outlet. The skilled man will also appreciate that pivoting of the control lever about a transverse axis may be used to control the flow of water or to control mixing of hot and cold water supplies in a valve. Rotation of the control lever about a longitudinal axis may alternatively be used to control the discharge flow of water.

Although the invention has been described in a faucet for controlling mixing of hot and cold water to adjust outlet water flow rate and temperature, it will be understood that the invention could have application to faucets where pivotal movement of the control lever is employed to control flow rate of hot water only or cold water only.

The above-described embodiments illustrate ways in which the invention can be put into practice and are not exhaustive of all possible ways of practicing the invention. Accordingly, the embodiments are not limiting on the scope of the invention and it will be understood that various modifications can be made without departing from the principles and concepts of the invention.

Any feature of the embodiments described herein may be employed separately or in combination with any other feature of the same or different embodiments and the invention extends to and includes claim to any individual feature and/or combinations of features described herein and is to be construed and to have affect accordingly.
CLAIMS
1. A faucet comprising a body and a control lever, a valve mechanism being provided within the body of the faucet and wherein at least a portion of the control lever is arranged to pivot within the body about an axis extending transversely to the body.

2. The faucet of claim 1 wherein the lever controls flow of water discharged from the faucet.

3. The faucet of claim 1 wherein the lever controls temperature of water discharged from the faucet.

4. The faucet of claim 1 wherein the lever controls flow of water and temperature of water discharged from the faucet.

5. The faucet of claim 4 wherein pivotal movement of the lever about the transverse axis controls flow of water and rotational movement of the lever about a longitudinal axis of the body controls temperature of the water.

6. The faucet of claim 4 wherein pivotal movement of the lever about the transverse axis controls temperature of the water and rotational movement of the lever about the longitudinal axis controls flow of water.

7. The faucet of any preceding claim wherein the control lever comprises an arm and a head section.

8. The faucet of claim 7 wherein the head section is at least partially circular.

9. The faucet of claim 7 or claim 8 wherein the head section is arranged to fit within an outer ring.

10. The faucet of claim 9 wherein the outer ring sits on the body of the faucet.

11. The faucet of claim 9 or claim 10 wherein the portion of the lever that pivots within the body comprises at least the head section.
12. The faucet of any of claims 9 to 11 wherein the control lever is connected to the outer ring for pivotal movement relative to the outer ring and body about the transverse axis.

13. The faucet of any of claims 9 to 12 wherein the control lever is connected to the outer ring for rotational movement with the outer ring relative to the body.

14. The faucet of any of claims 9 to 13 wherein the head section of the lever is connected to the outer ring for pivotal movement relative to the outer ring about the transverse axis and rotational movement with the outer ring about the longitudinal axis.

15. The faucet of claim 14 wherein the head section and outer ring are provided with co-operating formations allowing pivotal movement of the control lever relative to the outer ring about the transverse axis and transmitting rotational movement of the control lever about the longitudinal axis to the outer ring.

16. The faucet of claim 15 wherein the co-operating formations comprise a pair of pins on one of the head section of the lever and the outer ring that are engageable with a pair of apertures in the other of the head section of the lever and the outer ring.

17. The faucet of claim 16 wherein the engagement of the pivot pins with the apertures defines the transverse axis for pivotal movement of the control lever and couples the control lever and outer ring for rotational movement.

18. The faucet of any of claims 9 to 17 wherein the outer ring has an upper surface configured to complement the lever.

19. The faucet of claim 18 wherein the upper surface of the outer ring is configured to be flush with an upper surface of the head section when the lever is in a first position.
20. The faucet of any of claims 9 to 17 wherein the outer ring is provided with an internal profile such that the head section of the lever can pivot about the transverse axis within the outer ring.

21. The faucet of claim 20 wherein at least part of the head section extends into the body when the lever is pivoted relative to the outer ring and body about the transverse axis to and from the first position.

22. The faucet of claim 20 or claim 21 wherein an abutment is provided acting as a stop for the head section within the outer ring to control pivotal movement of the lever.

23. The faucet of claim 19 wherein pivotal movement of the lever about the transverse axis controls flow of water and the first position corresponds to a closed position in which flow is prevented and the lever may be pivotal to and from the closed position to control flow.

24. The faucet of claim 23 wherein the control lever is pivotal from the closed position to a second position corresponding to a full open position for maximum flow of water.

25. The faucet of claim 24 wherein the control lever is pivotal to any intermediate position between the closed and full open positions for varying the flow of water.

26. The faucet of claim 19 wherein rotational movement of the lever about the longitudinal axis controls the temperature of the water and a temperature position of the lever may be indicated by the outer ring.

27. The faucet of any of claims 9 to 26 wherein the head section of the control lever includes a coupling device for transmitting pivotal movement of the control lever about the transverse axis and, where provided, rotational movement of the control lever about the longitudinal axis to the valve mechanism for controlling flow of water and/or temperature of water to be discharged.
28. The faucet of claim 27 wherein the coupling device includes a coupling portion connectable to an actuator portion of the valve mechanism.

29. The faucet of claim 28 wherein the coupling portion depends from the head section within the body of the faucet.

30. The faucet of claim 28 or claim 29 wherein the coupling portion comprises a pair of arms arranged to depend on either side of the actuator portion of the valve mechanism.

31. The faucet of claim 30 wherein a bracket is provided that is connectable to the actuator portion of the valve mechanism and to the arms.

32. The faucet of claim 31 wherein the bracket is connectable to the arms and located therebetween and around the actuator portion of the valve mechanism.

33. The faucet of claim 31 or claim 32 wherein the connection between the pair of arms and bracket is configured to transmit pivotal movement of the head section of the control lever to the valve mechanism.

34. The faucet of claim 33 wherein the connection between the pair of arms and the bracket is configured to transmit rotational movement of the head section to the valve mechanism.

35. The faucet of claim 33 or claim 34 wherein the arms and bracket are provided with co-operating formations for transmitting pivotal movement of the lever to the valve mechanism and, where provided, for transmitting rotational movement of the lever to the valve mechanism.

36. The faucet of claim 35 wherein the co-operating formations comprise a pair of pins on one of the arms and bracket and a pair of channels on the other of the arms and bracket in which the pins are received.

37. The faucet of any of claims 9 to 36 wherein the valve mechanism is operable to control temperature of the water by rotation of the control lever about the longitudinal
axis and to control flow of water by pivoting of the control lever about the transverse axis.

38. The faucet of claim 37 wherein the valve mechanism is in the form of a valve cartridge.

39. The faucet of any of claims 9 to 38 wherein the outer ring is restrained within the body of the valve.

40. The faucet of claim 39 wherein the outer ring is retained in position by a clip ring.

41. A method of connecting a control lever to a valve mechanism in a faucet body, the valve mechanism being operable to control a discharge flow of water and/or to control a temperature of the discharge water, wherein at least a portion of the control lever is arranged to pivot within the faucet body about a transverse axis relative to the faucet body and wherein the portion of the control lever is connected to the valve mechanism such that pivoting about the transverse axis is transmitted to the valve mechanism.

42. The method of claim 41 wherein the lever controls flow of water discharged from the faucet.

43. The method of claim 41 wherein the lever controls temperature of water discharged from the faucet.

44. The method of claim 43 wherein the lever controls flow of water and temperature of water discharged from the faucet.

45. The method of claim 44 wherein pivotal movement of the lever about the transverse axis controls flow of water and rotational movement of the lever about a longitudinal axis of the body controls temperature of the water.
46. The method of claim 44 wherein pivotal movement of the lever about the transverse axis controls temperature of the water and rotational movement of the lever about a longitudinal axis controls flow of water.

47. The method of any of claims 41 to 46 wherein the valve mechanism has an actuator portion adapted to connect to the control lever.

48. The method of claim 47 wherein the control lever includes a coupling portion for transmitting pivotal movement of the control lever about the transverse axis and, where provided, rotational movement of the control lever about the longitudinal axis to the valve mechanism for controlling flow of water and/or temperature of water to be discharged.

49. The method of claim 48 wherein the coupling portion depends from the lever within the faucet body.

50. A kit of parts comprising one or more of:
   a faucet comprising a body;
   an outer ring arranged to be located in an upper portion of the body;
   a control lever including a head section adapted to fit within the outer ring and to pivot within the outer ring, the head section being configured to connect to a valve and to transmit movement of the control lever to the valve to control in use at least one of a flow of water from the valve and a temperature of water flowing from the valve,

   wherein the parts when assembled form a faucet in accordance with any of claims 1 to 40.
### A. CLASSIFICATION OF SUBJECT MATTER

**INV.** E03C1/04

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 F16K

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, WPI Data

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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<td>DE 10 2006 042626 AI (HANSGROHE AG [DE]) 13 March 2008 (2008-03-13)</td>
<td>1-5, 7-9, 18, 20-22, 39-41-44</td>
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<td>Y</td>
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<td>DE 201 03 640 UI (LINK MARTIN [DE]) 16 August 2001 (2001-08-16) sentence 1, paragraph 5</td>
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<td>DE 103 47 822 AI (GROHE WATER TECH AG &amp; CO [DE]) 4 May 2005 (2005-05-04)</td>
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</table>

**Further documents are listed in the continuation of Box C.**

**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

**A** document member of the same patent family

Date of the actual completion of the international search: 7 May 2013

Date of mailing of the international search report: 14/05/2013

Authorized officer: Išailovski, Marko
### International Search Report

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. □ Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:

2. □ Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. □ Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

> see additional sheet

1. □ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. □ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of additional fees.

3. □ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

   1-9, 18-26, 39, 41-44, 46

4. □ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

   □ The additional search fees were accompanied by the applicant’s protest and, where applicable, the payment of a protest fee.

   □ The additional search fees were accompanied by the applicant’s protest but the applicable protest fee was not paid within the time limit specified in the invitation.

   □ No protest accompanied the payment of additional search fees.

Form PCT/ISA/21 0 (continuation of first sheet (2)) (April 2005)
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4, 6, 41-44, 46

Faucet and method for connecting the control lever to the valve mechanism, wherein the control of the temperature is obtained by a rotational movement of the lever about the transverse axis (22) and the control of the flow of water is obtained by a rotational movement of the lever about the longitudinal axis (10).

2. claims: 1-5, 7-17, 37, 38

Faucet comprising pins for the connection of the head section of the lever to the outer ring.

3. claims: 1-5, 7-9, 18-26, 39

Faucet comprising an outer ring configured to be flush with an upper surface of the head section when the lever is in a first position.

4. claims: 1-5, 7-9, 27-36, 39-45, 47-50

Faucet and method for connecting the control lever to the valve mechanism: particular connection of the actuator port on of the valve mechanism with the head section of the lever.
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<td>EP 1 002 976 A2 (GROHE ARMATUREN FRIEDRICH [DE]) 24 May 2000 (2000-05-24) figures 1,2</td>
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<td>WO 2009/103596 A1 (LANG EDO [CH]; OBRIST ROLAND [CH]) 27 August 2009 (2009-08-27) page 7, lines 8-10</td>
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<td>DE 20 2008 014476 U1 (REICH KG REGEL &amp; SICHERHEITS [DE]) 12 February 2009 (2009-02-12) figures 1-4 paragraphs [0018], [0020], [0021]</td>
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