(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 876 304 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.01.2008 Bulletin 2008/02

(51) Int Cl.:
E03C 1/04 *(2006.01)* ***E03C 1/05*** *(2006.01)*

(21) Application number: **07013156.0**

(22) Date of filing: **05.07.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **06.07.2006 EP 06014030**

(71) Applicant: **Nobili, Fabrizio**
6534 San Vittore (CH)

(72) Inventor: **Nobili, Fabrizio**
6534 San Vittore (CH)

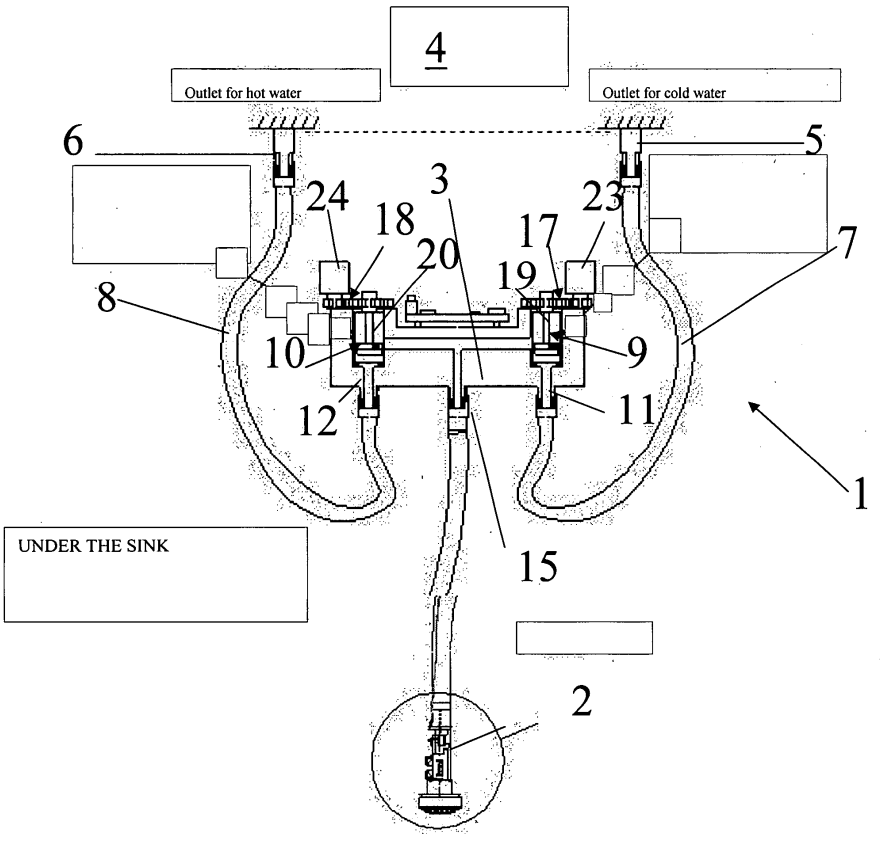
(74) Representative: **Zardi, Marco et al**
M. Zardi & Co. S.A.
Via Pioda 6
6900 Lugano (CH)

(54) **Showerhead with simplified actuator**

(57) The present invention relates to a pull-down showerhead of a type which is connected by a flexible conduit to a mixer tap assembly controlling the delivery of fluid, the showerhead including at least one electric control connected to a power drive means for controlling the fluid outflow, said power drive means being associated with the mixer tap assembly.

Advantageously, the electric control comprises an on/off control pushbutton for the fluid outflow. Also provided is at least a second electric control for controlling the fluid temperature.

FIG. 1



EP 1 876 304 A1

Description

Field of Application

[0001] The present invention relates to a showerhead with simplified actuator.

[0002] More particularly, the invention relates to a showerhead of a type which is connected by a flexible conduit to a mixer tap assembly controlling the delivery of fluid.

[0003] The invention relates, particularly but not solely, to a showerhead for use as a dispenser of fluid placed at the free end of a flexible conduit on a kitchen sink, and the following description will cover that specific field of application for convenience of illustration only.

Prior Art

[0004] As the skilled person in the art is well aware, there are currently available on the market a number of showerheads for sink installation, which vary from one another by their design, size, and mode of operation.

[0005] Such showerheads are piped, as by means of a flexible conduit, to a mixer tap assembly controlling the fluid outflow, i.e. operative to throttle the issuing jet of cold, warm, or mixed water. The mixer tap assembly is usually wall-mounted beneath the sink, although it may be found to jut out from the wall above the sink in some instances.

[0006] A user can grasp the showerhead with a hand and pull it out, from a holding fixture through which the flexible conduit used for piping the showerhead to the mixer tap assembly would then be slipped back to an out-of-sight storage position. These showerheads are also called pull-out spouts in the art.

[0007] The showerhead holding fixture is provided at a tap end overhanging the sink, and forms the dispensing end of the tap.

[0008] It should be noted that the tap may be a single-control mixer tap having a manually operated control handle, mounted atop or to one side, for discharging or shutting off a water outflow as well as adjusting the cold/warm water mixing.

[0009] However, the showerhead is more frequently provided with a manual control in the form of a mechanical pushbutton, whereby the water outflow can be switched between an undivided stream issuing through a central orifice and a spread shower pattern through a plurality of tiny peripheral orifices around the central one.

[0010] There are different ways of so switching the outflow from the showerhead, one of which is disclosed in European Patent Application No. 1 577 016 by this Applicant, for instance.

[0011] While being advantageous on several counts and substantially achieving their objectives, the above-mentioned prior designs have a limitation in that a user is to first actuate the control handle of the tap mounted fixedly at the sink before he/she can have water delivered through the showerhead, and is then to switch to a different delivery mode by actuating the control at the showerhead.

[0012] A different prior art solution is disclosed in the PCT application No. WO 00/32314 relating to a pull-out showerhead for a bathroom including some pushbuttons for regulating water outflow as well as for adjusting the cold/warm water mixing.

[0013] These pushbuttons are located on the handle of the pull out showerhead and seem to be connected to a controller device provided for receiving electric signal according to the user's selection and for driving corresponding valves

[0014] However, this prior document is missing many technical information about the real structure and functioning of the claimed device and is mainly silent about the manner how the valves are driven by the controller device and how is structured the electronic interface.

[0015] Another prior art document, the US patent No. 5,735,467 relating to a "Three way adjustable shower device", discloses a pull-out showerhead linked to a dual pipe elbow connecting with a hot and a cold water pipe for water inlet. The showerhead includes an adjustable valve manually turned by the user to various positions so that water with mixed flow rate and temperature may be selected to flow into the shower body.

[0016] Even this solution presents some drawbacks due to the fact that the user's selection is not progressive and does not guarantee a desired regulation of the water flow and temperature with a reduced effort.

[0017] The underlying technical problem of this invention is to provide a showerhead with such constructional and functional features as are effective to make its operation simpler by essentially disposing of the control handle for the showerhead-terminated tap, as well as to overcome the limitations on prior art designs.

[0018] Another object of this invention is to provide a showerhead, which incorporates all the control members required for both actuating it and adjusting the outflow rate.

[0019] A further aim of the invention is that of providing a control means of the water flow and temperature that are completely electronic.

Summary of the Invention

[0020] The solution idea on which the present invention stands is that of having at least one electric control incorporated in the showerhead, which control is coupled electrically to a low power drive means associated with the mixer tap assembly for shutting off and/or adjusting the fluid outflow.

[0021] In this manner, the control handle for the single-control mixer tap holding the showerhead and its flexible conduit becomes substantially unnecessary, such that the tap can serve essentially a mere supporting function for the showerhead pull-out fixture, and may even be removed altogether where the sink, or a sink-enclosing

cabinet, comes equipped with a fixture of its own for storing the showerhead and its flexible conduit out of sight.

[0022] It should be mentioned that in a preferred embodiment, the showerhead is provided with at least a pair of electric controls, one for discharging and shutting off the fluid outflow, and another for adjusting the temperature of the issuing flow by mixing streams of cold and warm water in various proportions together.

[0023] A first embodiment of the invention relates to a showerhead connected by a flexible conduit to a mixer tap assembly controlling the delivery of a fluid, and including at least one electric control connected to a power drive means for controlling the fluid outflow, said power drive means being associated with the mixer tap assembly.

[0024] Another embodiment of the invention relates to a fluid delivery control assembly, including a simplified actuation pull-out showerhead piped to the assembly by a flexible conduit, characterized in that it comprises a fluid control power drive means being associated with the mixer tap assembly and driving respective valves provided between said flexible conduit and a cold and/or warm fluid supply outlet; at least one electric control incorporated in said showerhead; and an electronic control unit connected to said electric control and power driven means..

[0025] The features and advantages of the showerhead and the mixer assembly according to the invention can be more clearly understood by having reference to the following description of an embodiment thereof, given herein by way of example and not of limitation, and to the accompanying drawings.

Brief Description of the Drawings

[0026]

Figure 1 shows schematically a mixer tap assembly for controlled delivery of fluid, which embodies this invention and is connected to a water system supply of cold/warm water.

Figure 2 shows schematically the control assembly of Figure 1 complete with electrical connections.

Figure 3 is a top plan view showing schematically the control assembly of Figure 1 isolated, with its water and/or electrical connections left out.

Figure 4 is a bottom plan view showing schematically the control assembly of Figure 3.

Figure 5 is a side view showing schematically the control assembly of Figure 3.

Figure 6 is a partial side view in section showing schematically the control assembly of Figure 3.

Figure 7 is a block diagram of an electronic unit associated with the control assembly of this invention.

Figure 8 shows schematically a modified embodiment of the fluid delivery control assembly according to this invention, in a configuration where it is connected to a cold/warm water supply.

Figure 9 shows schematically the control assembly of Figure 8 complete with electrical connections.

Figures 10, 10A and 11 are front, side and sectional views, respectively, showing schematically a detail of the control assembly of Figure 8.

Figure 12 is a top plan view showing schematically the control assembly of Figure 8 isolated, with its water and/or electrical connections omitted.

Figure 13 is a bottom plan view showing schematically the control assembly of Figure 12.

Figure 14 is a side view showing schematically the control assembly of Figure 12.

Figure 15 is a partial side view showing schematically in section the control assembly of Figure 12.

Figure 16 is a perspective view showing schematically the control assembly of Figure 13.

Figure 17 is a block diagram of an electronic unit associated with the control assembly in the modified embodiment shown in Figure 8.

Figure 18 is a block diagram of an electronic unit that may be associated with the control assembly in either the embodiment shown in Figure 1 or the modification shown in Figure 8.

Figure 19 is a perspective view of a showerhead associated with the control assembly according to the invention.

Detailed Description

[0027] With reference to the drawing figures, specifically to the example in Figure 1, generally and schematically shown at 1 is a fluid delivery control assembly according to this invention, the control assembly 1 comprising a showerhead 2 with a simplified actuation arrangement to be described. The showerhead is of the type generally know as pull-down.

[0028] The control assembly 1, also referred to as the mixer assembly, comprises a unitary body 3 mounted to a wall 4 proximate to water supply outlets 5 and 6 for cold and warm water, respectively.

[0029] The unitary body 3 may be mounted beneath a

sink of conventional design, not shown, which would usually be installed level with or above said outlets 5, 6.

[0030] It should be understood that the unitary body 3 could be located elsewhere, for instance above the sink, or be recessed in the wall 4, optionally behind a door.

[0031] Likewise, the fluid delivery control assembly 1 according to this invention could be installed in a bathroom, beneath a washbasin or close by a bathtub.

[0032] The unitary body 3 has respective fluid inlets 11, 12 connected to outlets 5, 6 of a cold/warm water supply by flexible conduits 7 and 8, respectively.

[0033] The inlets 11, 12 are in fluid communication with a delivery outlet 15 formed in the unitary body 3 at an intermediate position equidistantly from said inlets 11, 12.

[0034] Advantageously in this invention, respective valves 9, 10 are provided in the fluid path from each fluid inlet 11 and 12 to the delivery outlet 15. The valves 9, 10 are fluid shut-off valves that also function to adjust the outflow rate according to the extent of an angular shift impressed on their stems.

[0035] More particularly, a first valve 9 is mounted in a respective seat formed in the body 3 aside the cold water outlet 5, and the second valve 10 is mounted in a respective seat formed in the body 3 aside the warm water outlet 6.

[0036] The valves 9, 10 are continual-action valves, and provided with respective actuating stems 19, 20 which extend from the valve seats and are made rigid with respective gears 29, 30, best shown in the example of Figure 3, for rotation therewith.

[0037] An electro-mechanic assembly is provided in the unitary block 3 for driving and mixing the fluid flow toward the showerhead. For instance a motor or power drive means is provided for electrically operating the valves 9, 10. This motor drive means comprises electric motors 23, 24 whose output shafts are rigidly coupled each to a respective one of the gears 33, 34 in mesh engagement with the gears 29, 30 of the valves 9, 10, respectively.

[0038] Each motor may be a DC gear motor connected to a low power output of an electronic control unit to be described.

[0039] Specifically, the motor 23 rotates the drive gear 29 meshing with the gear 33 attached to the stem of the valve 9.

[0040] The motor 24 likewise rotates the drive gear 30 in mesh engagement with the gear 34 attached to the stem of the valve 10. The gears 30 and 34 are a predetermined drive step-down ratio enabling each gear motor to drive a corresponding valve to open in a fine continual movement.

[0041] Thus, each motor 23, 24 will control its respective valve 9, 10 to open, and hence the outflow rates of cold and warm water, respectively.

[0042] Advantageously in this invention, the fluid delivery control assembly 1 includes a showerhead 2 which is piped to the outlet 15 of the body 3 by a flexible conduit 27, and includes at least one electric control or command 28 that is electrically coupled to the motor or power means 23, 24 driving the valves 9, 10 in the assembly 1.

[0043] The electric command 28 is preferably a pushbutton for controlling the fluid outflow on/off.

[0044] The electric signal generated by operating the control 28 is processed through the electronic unit 35, to be described in detail below, associated with the mixer tap assembly 1.

[0045] By providing the pushbutton 28 with a continual action feature, the fluid outflow rate can be controlled.

[0046] At least a second electric control or command 38 is mounted on the showerhead 2 for controlling the fluid temperature.

[0047] In a preferred embodiment, the first 28 and second 38 electric controls or commands are connected to the electronic control unit 35 through an electric line 39 run along the flexible conduit 27 inside a protective sheath 32 of the flexible conduit.

[0048] The Figure shows schematically the layout of the electric connections established between the electronic unit 35 and components of the fluid delivery control assembly 1.

[0049] Advantageously, the electronic unit 35 is mounted within a sealed portion 37 of a protective enclosure 26 of the mixer tap assembly 1, as shown in Figures 3 to 6.

[0050] The enclosure 26 is formed from a clear synthetic plastics material for convenient service inspection of the components of the mixer assembly 1. To one side of the enclosure 26 is the portion 37 housing the electronic unit 35 which is supplied a mains DC voltage via an external transformer 36 plugged in a wall-mounted socket 25 provided close by the water supply outlets 5, 6, as shown in Figure 2.

[0051] Advantageously, the electronic units of the present invention are supplied by a DC supply voltage having a relatively a low voltage value in the sense that such voltage has been transformed by a regular distribution network of electric energy available in a home or in a civil public environment.

[0052] The preferred voltage value of the DC supply is selected to 12 V, however other values may be suitable in the range from 3 to 24 V. Even the motor means 23, 24 are supplied by a low voltage.

[0053] The transformer 36 may be external with respect to the protective enclosure 26 or may be internal.

[0054] Respective electric connections 41,42 are established between the unit 35 and each motor 23, 24, as well as between the unit 35 and each pushbutton 28, 38 on the showerhead 2. The last-mentioned connections are shown schematically in Figures 2 and 7 as a single three-wire cable 39.

[0055] It is worth mentioning that the electric connection 39 is not strictly necessary to the invention, since the pushbuttons 28, 38 may be coupled electrically to the electronic unit 35 by a wireless link. For this purpose, the showerhead may be provided with an RF signal transmitting device, and the unit 35 may incorporate a suitable

receiver for such RF signals. This option is shown schematically in Figure 18 and discussed below.

[0056] With reference to the diagram of Figure 7, the electronic unit 35 comprises a control unit 40 powered through the external transformer 36 via a voltage regulator 43. The electronic unit 35 is carried on a card contained in the portion 37 of the enclosure 26.

[0057] A replaceable battery 47 is provided externally to also keep the electronic unit 35 operative on the occurrence of a mains power shortage. A circuit portion 49 on the card of the unit 35 is arranged to regulate the power supply from the battery 47.

[0058] The control unit 40 may be an IC microcontroller having a plurality of control outputs for enabling respective output stages 57, 58 of the power transistor bridge or half-bridge type arranged to control the motors 23, 24 of the valves 9, 10.

[0059] Furthermore, an interface 52 is connected bidirectionally to the control unit 40 and the controls 28, 38 of the showerhead 2 by the line 39.

[0060] Should the above description fall short of being exhaustive, it will be mentioned that the showerhead 2 can still be conventional as to its suitability for switching the water outflow between a solid stream mode through a central orifice and a spread stream mode through a plurality of tiny peripheral orifices around the central orifice.

[0061] This manual switching of the fluid outflow in no way affects the electric control arrangement described above and allowing the water outflow to be controlled on/off and adjusted for temperature and rate.

[0062] In a modified embodiment shown schematically in Figures 8 to 16, a fluid delivery control assembly 1 according to this invention, denoted 100, has an additional feature in that the water outflow can be switched between the central and spread stream modes using an electric type of control.

[0063] In this modification, cooperating parts having the same construction and function as in the previously described embodiment carry the same reference numerals.

[0064] As explained below, this electric form of outflow switching is implemented by a novel design providing enhanced functionality for the mixer assembly 1, rather than being a mere adaptation of a conventional mechanical control.

[0065] For the purpose, two shut-off solenoid valves 44, 46 are incorporated in the assembly 1 directly downstream of the delivery outlet 15.

[0066] Each solenoid valve 44, 46 is placed upstream of a respective flexible conduit 48, 50 conveying the fluid to the showerhead 2.

[0067] In particular, the two flexible conduits 48, 50 are paired longitudinally parallel to each other into a single, flexible water piping 56 to the showerhead 2.

[0068] More particularly, the flexible conduit 48 is in fluid communication with the central solid stream outflow orifice, while the other flexible conduit 50 is in fluid communication with the plurality of tiny orifices surrounding the central orifice in the showerhead 2.

[0069] In this modification, moreover, the electric line that runs under the protective sheath 32 along the flexible water conduit is led to a corresponding electrically operated outflow switching command or pushbutton 51 on the showerhead 2. In addition, the two shut-off solenoid valves 44, 46 are individually connected electrically to an electronic unit 55, as shown in Figure 17. This electronic unit 55 is an equivalent of the previously described unit 35 but for the inclusion of a circuit portion 53 special to control the solenoid valves 44, 46.

[0070] For this purpose, the electronic unit 55 comprises an additional output stage 53, e.g. of the open collector type, which is connected to respective control outputs of the control unit 40 and drives each solenoid valve 44, 46.

[0071] Both electronic units, namely the units denoted 55 in Figure 17 and 45 in Figure 18, have a connection to a temperature sensor which may be placed proximate either to the outlet 15 of the body 3 or to the solenoid valves 44, 46, for example. This temperature sensor is associated with a display 60, shown in Figure 19, allowing a user to also read the temperature of the water outflow.

[0072] The same consideration concerning the low voltage supply disclosed with reference to the electronic unit 35 applies also for the electronic units 45 and 55.

[0073] By just depressing the pushbutton 51 located on the showerhead 2, the user can switch between delivery through the central orifice or the peripheral ones by closing either one of the solenoid valves, 44 or 46, for example the valve associated with the conduit that is not to receive water from the outlet 15 of the body 3. In other words, by depressing the pushbutton 51, the two solenoid valves 44, 46 can be controlled to open or close such that one of them will close while the other is open.

[0074] Figure 18 shows an alternative arrangement of the electronic unit, generally denoted 45, which may also apply to the previously described embodiment of the invention.

[0075] This alternative embodiment of the electronic unit provides a wireless link between the controls on the showerhead 2 and the interface 52 to the control unit 40. The showerhead 2 is provided here with an RF signal transmitter, and the interface 52 includes a receiver for such RF signals. Additionally, a battery supply 62 is provided to the signal transmitter in the showerhead 2.

[0076] The above RF wireless link is generally shown at 54 in Figure 18.

[0077] It can be appreciated from the foregoing that the mixer assembly of this invention does solve the previously mentioned technical problem, and offers a number of advantages, foremost among which is the fact that the fluid outflow can be dispensed, at controlled temperature and rate, by just manipulating the pushbuttons on the showerhead 2.

[0078] The showerhead response to such a user's action is immediate, since the showerhead would be grasped in the user's hand anyhow, whenever there is a

demand for water to be dispensed through it.

[0079] The invention eliminates the need of a mechanical control handle on the faucet holding the pull-out showerhead.

[0080] Also, controlling the water outflow is a simple and effective operation, wherein the only manual action in order to have the fluid dispensed essentially narrows down to grasping the showerhead with one hand.

Claims

1. A showerhead (2) of a type connected by a flexible conduit (27) to a mixer tap assembly controlling the delivery of a fluid **characterized by** comprising at least one electric command (28) coupled to a motor drive means (23, 24) associated with the mixer tap assembly (1) for controlling the fluid outflow .

2. A showerhead according to Claim 1, wherein said at least one electric is an on/off control pushbutton (28) located on said showerhead (2) and linked to an electric control unit (35) active on said motor drive means (23, 24) for regulating the fluid outflow.

3. A showerhead according to Claim 2, wherein a second pushbutton (38) located on said showerhead is provided in connection with said electric control unit (35) for adjusting the fluid temperature.

4. A showerhead according to Claim 2, wherein said pushbutton is a continual action pushbutton for controlling or regulating the fluid outflow rate at any push of the user.

5. A showerhead according to Claim 1, wherein said motor drive means (23, 24) comprises an electric motor associated with a respective fluid shut-off valve element (9, 10) mounted to said mixer tap assembly (1) between said flexible conduit (27) and a cold and/or warm fluid supply outlet.

6. A showerhead according to Claim 1, wherein said electric motor is a DC gear motor supplied by a low voltage.

7. A showerhead according to Claim 2, wherein said electronic control unit (35) is supplied by an external low voltage source and has electric connections led to drive said said motor drive means (23, 24).

8. A showerhead according to Claim 7, wherein said electronic unit comprises a control unit having an input side connected to said at least one electric command (28) and an output side connected to said motor drive means (23, 24) via respective power stages.

9. A showerhead according to Claim 7, wherein said electric command (28) is coupled to said electronic unit (35) by a wireless link.

10. A showerhead according to Claim 1, including a double inlet receiving the corresponding ends of a couple of flexible conduits (7, 8) connected to the mixer tap assembly (1) and an additional electric command (51) or pushbutton for switching the fluid outflow through the central or peripheral portion of the showerhead.

11. A fluid delivery control assembly, including a simplified actuation pull-down showerhead (2) piped to the assembly by a flexible conduit (27), and comprising a fluid control motor drive means (23, 24) being associated with the mixer tap assembly and driving respective valves (9, 10) provided between said flexible conduit and a cold and/or warm fluid supply outlet; at least one electric command (28) incorporated in said showerhead (2); and an electronic control unit (35) connected to said electric command and to said motor drive means.

12. A fluid delivery control assembly according to Claim 11, wherein said at least one electric is an on/off control pushbutton (28) located on said showerhead (2) and linked to an electric control unit (35) active on said motor drive means (23, 24) for regulating the fluid outflow.

13. A fluid delivery control assembly according to Claim 11, wherein a second pushbutton (38) located on said showerhead is provided in connection with said electric control unit for adjusting the temperature of the outflowing fluid.

14. A fluid delivery control assembly according to Claim 11, wherein said electric command (28) is connected to said electronic unit by a wireless link.

15. A fluid delivery control assembly according to Claim 11, wherein said electronic unit (35) comprises a control unit (40) having an input side connected to said at least one electric command (28) and an output side connected to said motor drive means via respective power stages.

16. A fluid delivery control assembly according to Claim 11, comprising a pair of solenoid valves placed downstream of said fluid supply outlet, and a pair of flexible conduits (7, 8) each associated with a respective one of the solenoid valves to divert the fluid outflow either to a central orifice or to a plurality of peripheral orifices in said showerhead (2).

17. A fluid delivery control assembly according to Claim 16, wherein said solenoid valve pair are operated by means of an additional electric command (51) being

located at said showerhead (2) and connected to said electronic unit (35, 45, 55).

18. A fluid delivery control assembly according to Claim 16, wherein said additional electric command (28) is connected to said electronic unit by a wireless link.

19. A fluid delivery control assembly according to Claim 11, wherein a temperature sensor and display arrangement is associated with said electronic unit to enable a user to read the temperature of the outflowing fluid.

20. A showerhead (2) connected by a flexible conduit (27) to a mixer tap assembly (1) controlling the delivery of a fluid and including:

- at least one electric command (28);
- motor drive means (23, 24) for associated with the mixer tap assembly (1);
- said at least one electric command (28) being electrically coupled to said motor drive means through an electronic unit (35) for controlling the fluid outflow.

21. A showerhead according to Claim 20, wherein said electric command (28) comprises an on/off control pushbutton for the fluid outflow.

22. A showerhead according to Claim 20, further comprising a second electric command (38) for adjusting the fluid temperature.

23. A showerhead according to Claim 21, wherein said pushbutton (28) is a continual action pushbutton for controlling the fluid outflow rate.

24. A showerhead according to Claim 20, wherein said motor drive means comprises an electric motor associated with a respective fluid shut-off valve element (9, 10) mounted to said mixer tap assembly (1) between said flexible conduit and a cold and/or warm fluid supply outlet.

25. A showerhead according to Claim 20, wherein said electric motor is a DC gear motor supplied by a low voltage source.

26. A showerhead according to Claim 20, including an electronic control unit having electric connections led thereto to serve said electric command and said motor drive means.

27. A showerhead according to Claim 26, wherein said electronic unit (35) comprises a control unit (40) having an input side connected to said at least one electric command (28) and an output side connected to said motor drive means via respective power stages.

28. A showerhead according to Claim 26, wherein said electric command is connected to said electronic unit (35, 45, 55) by a wireless link.

29. A showerhead according to Claim 20, including a double inlet receiving the corresponding ends of a couple of flexible conduits (7, 8) connected to the mixer tap assembly (1) and an additional electric command (51) or pushbutton for switching the fluid outflow through the central or peripheral portion of the showerhead.

FIG. 1

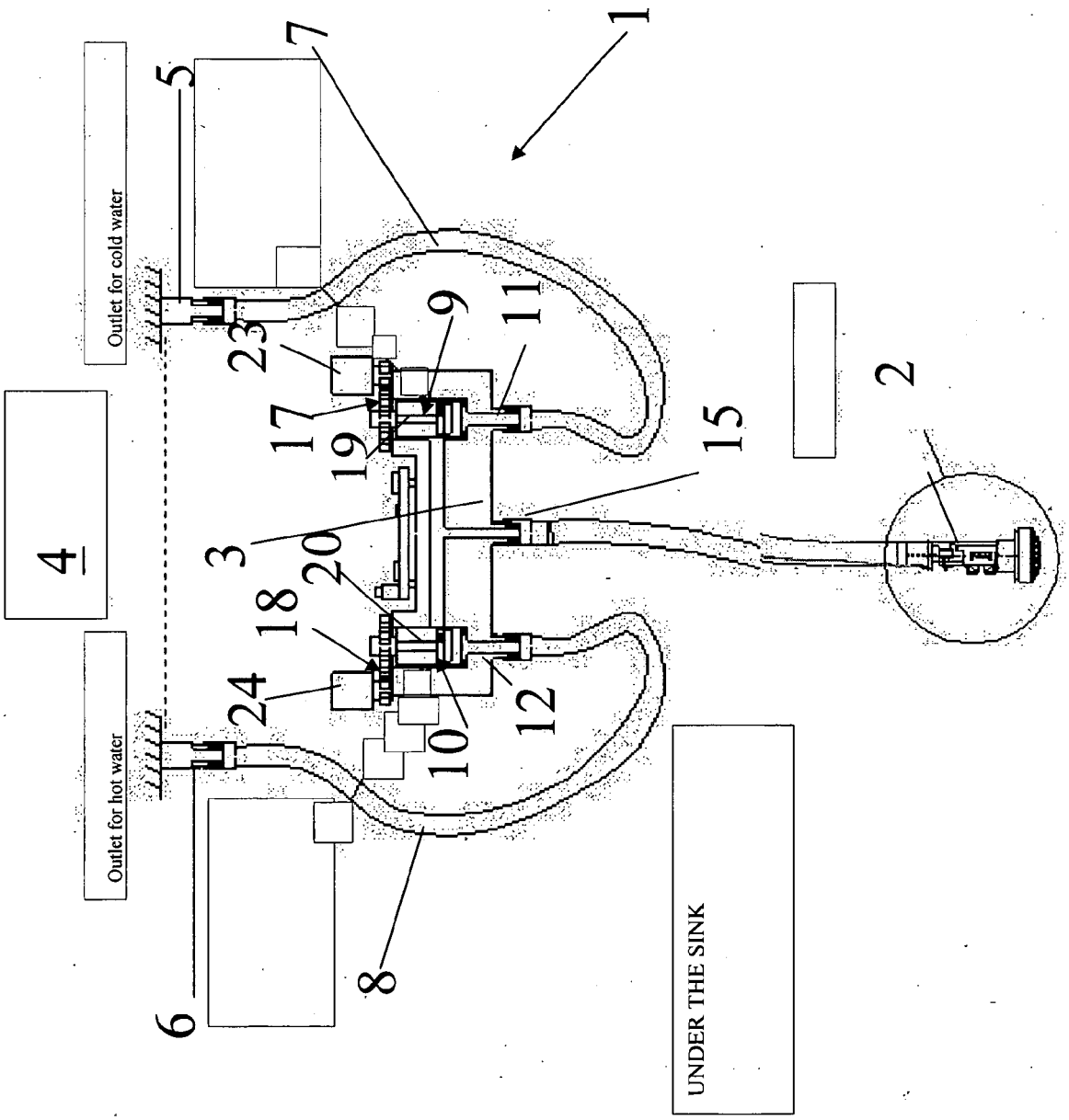
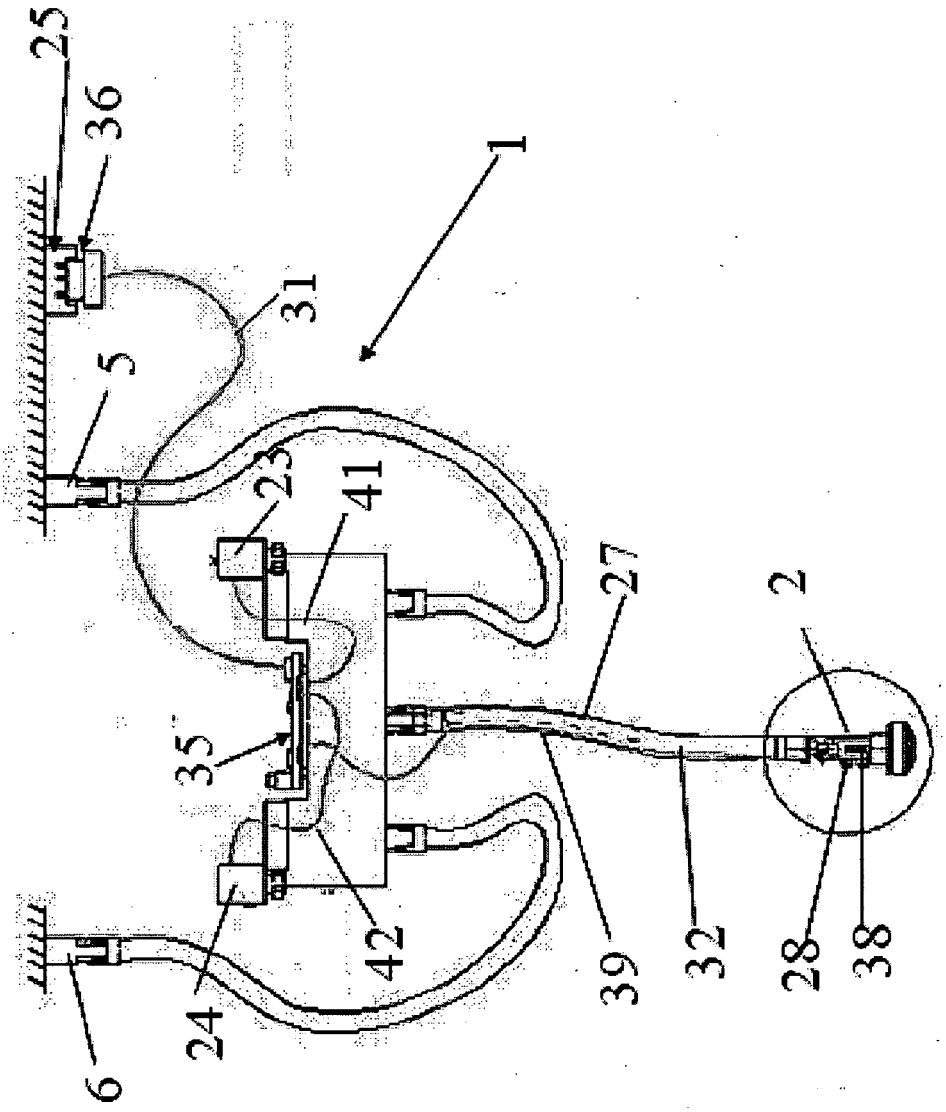

1
2
3
4
5
6
7
8
9
10
11
12
15
17
18
19
20
23
24
Outlet for cold water
Outlet for hot water
UNDER THE SINK

FIG. 2



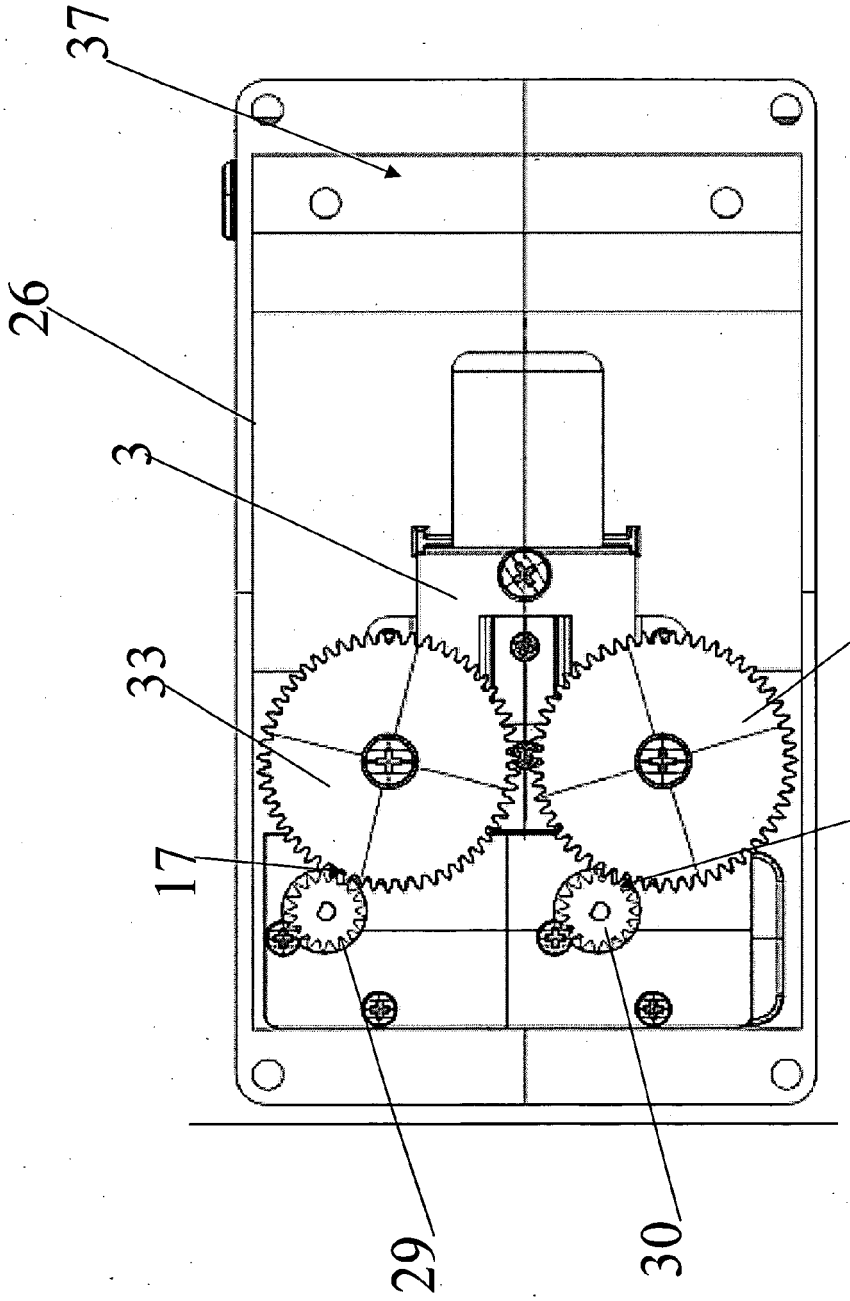


FIG. 3

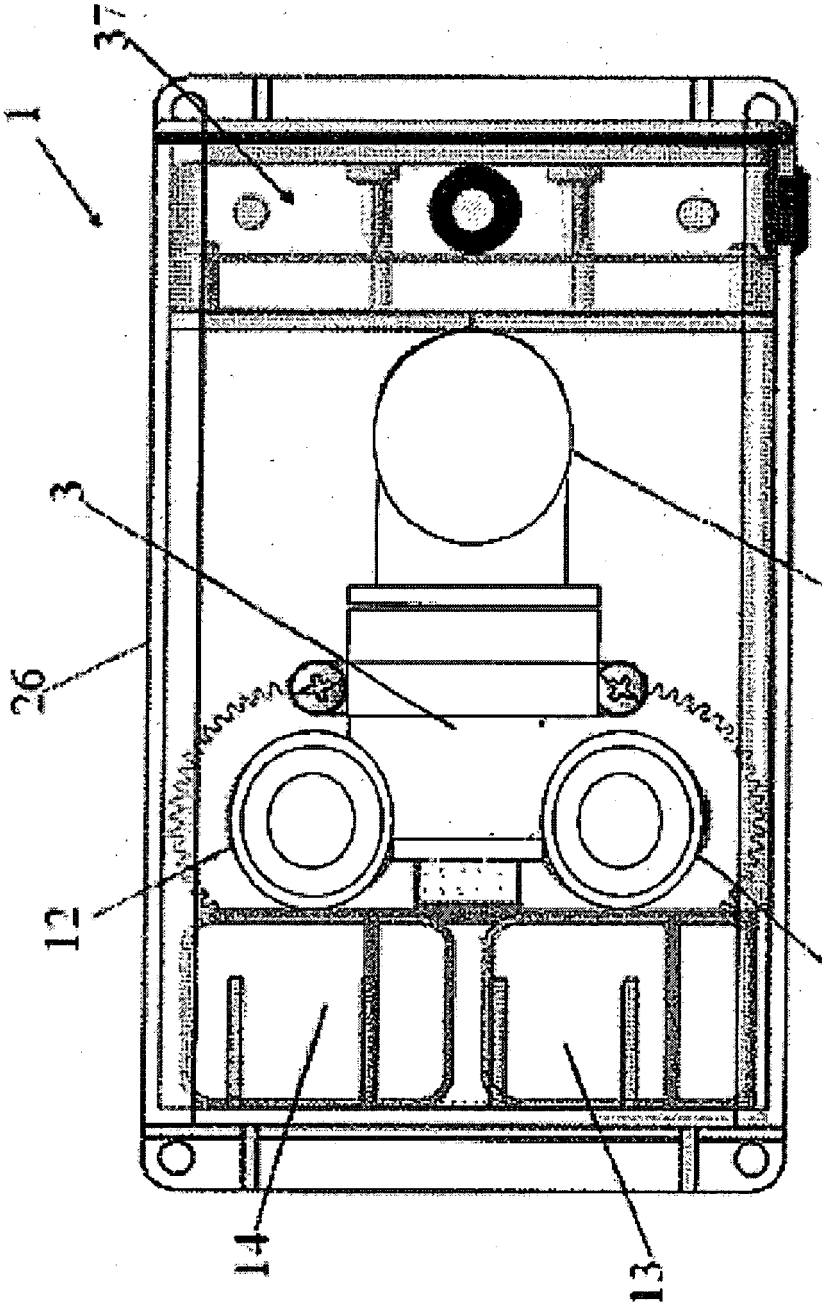


FIG. 4

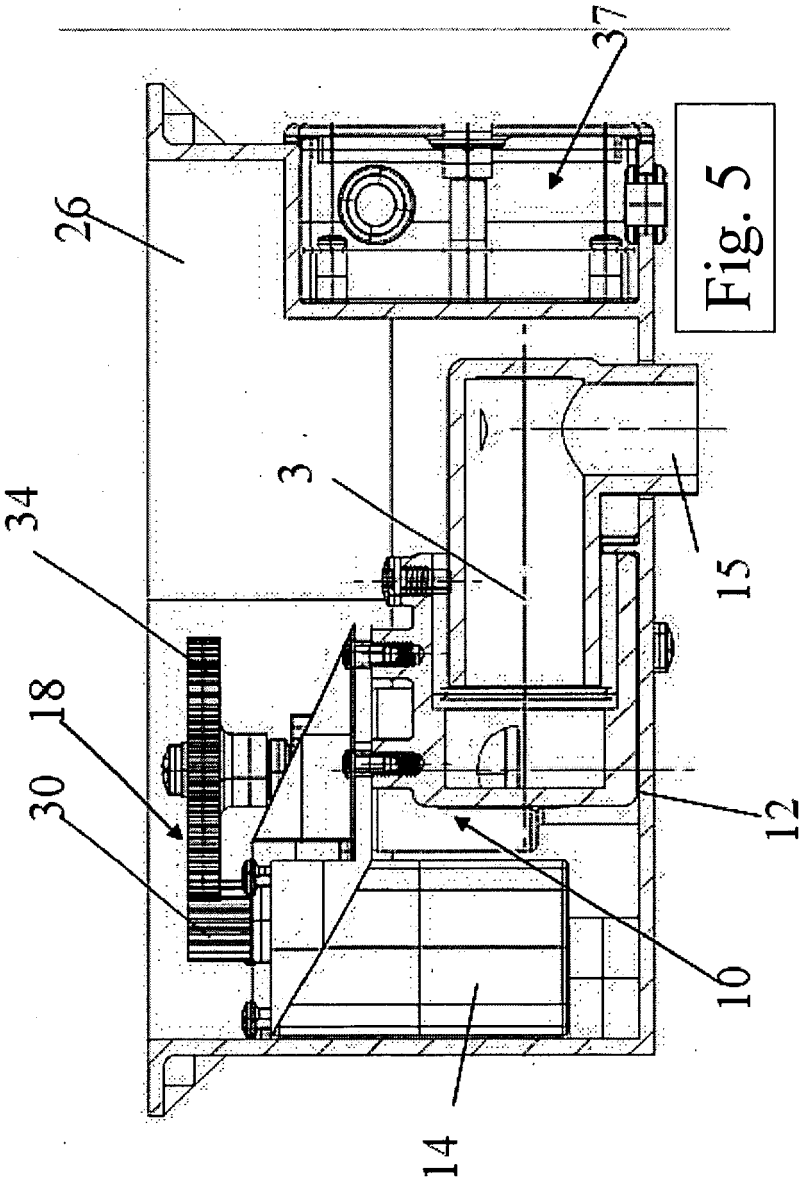


Fig. 5

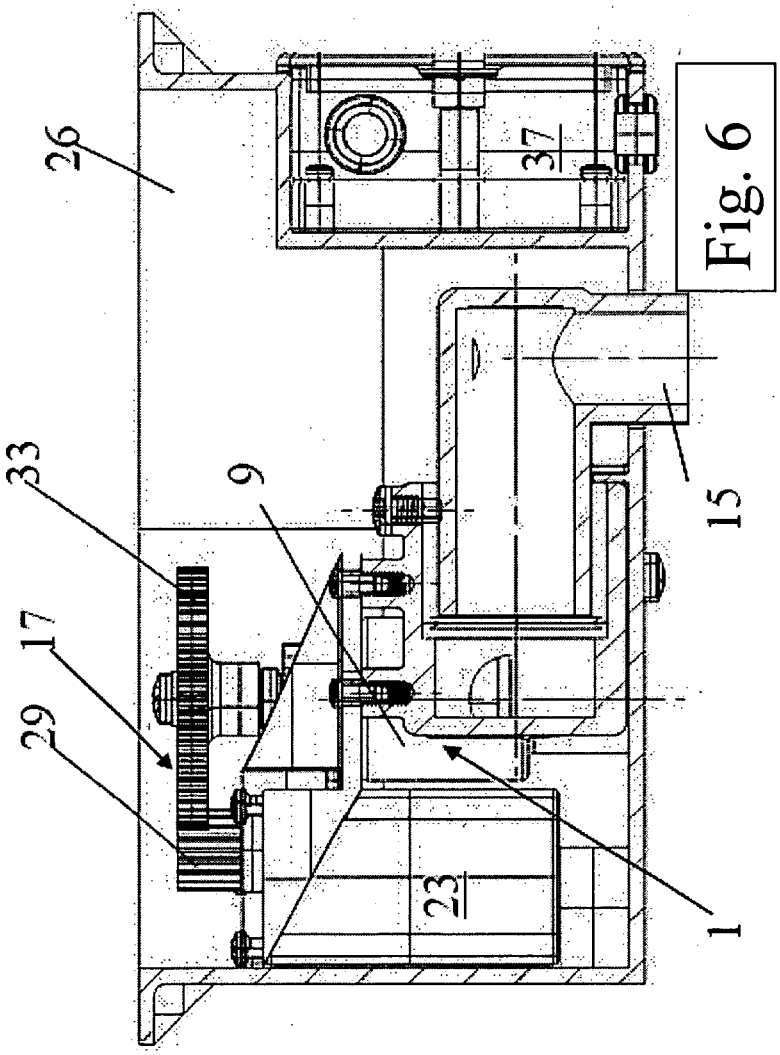


Fig. 6

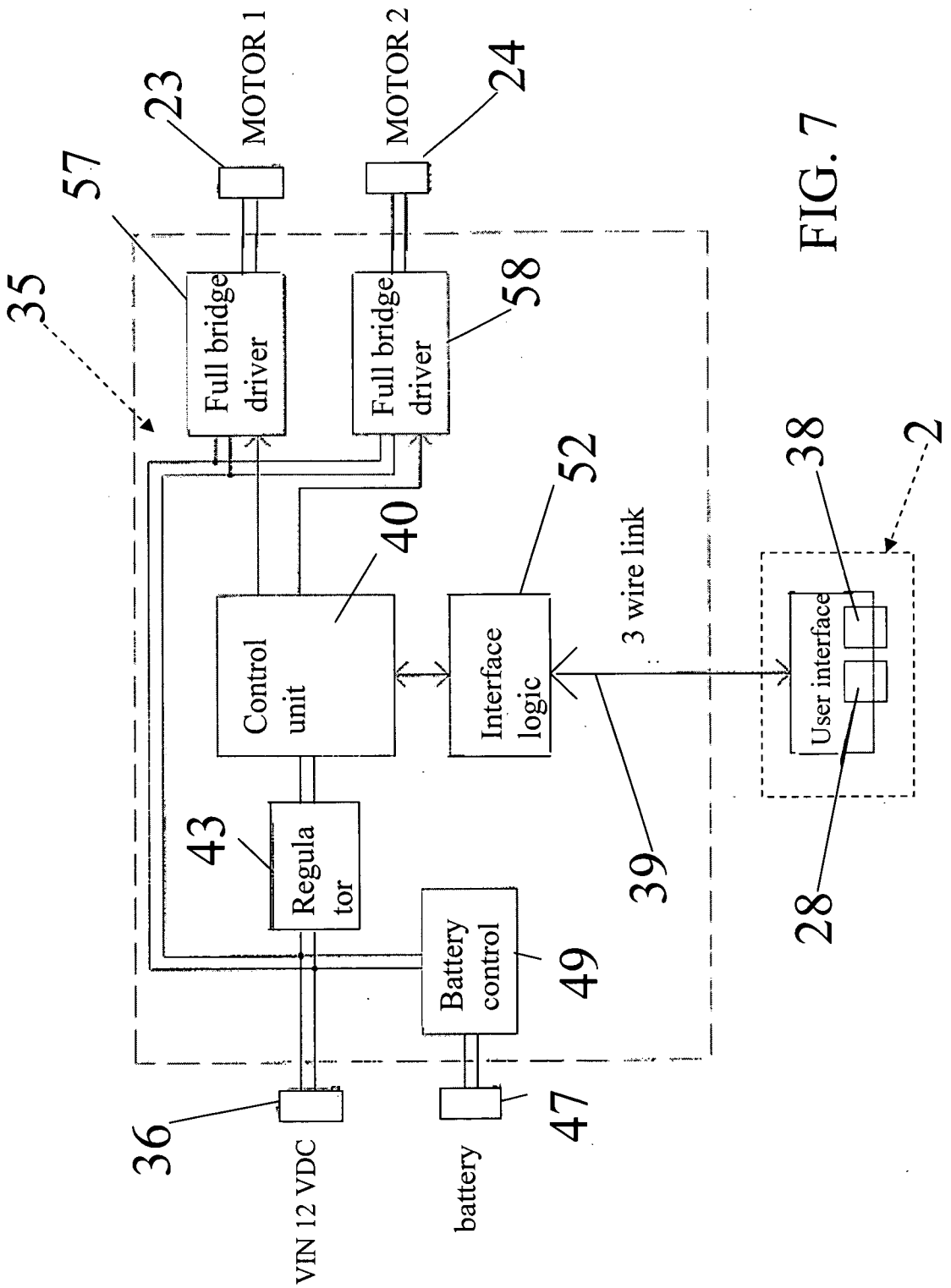

MOTOR 1
MOTOR 2
23
24
57
58
35
Full bridge driver
Full bridge driver
40
52
38
2
Control unit
Interface logic
3 wire link
User interface
43
Regula tor
39
28
Battery control
49
36
47
VIN 12 VDC
battery

FIG. 7

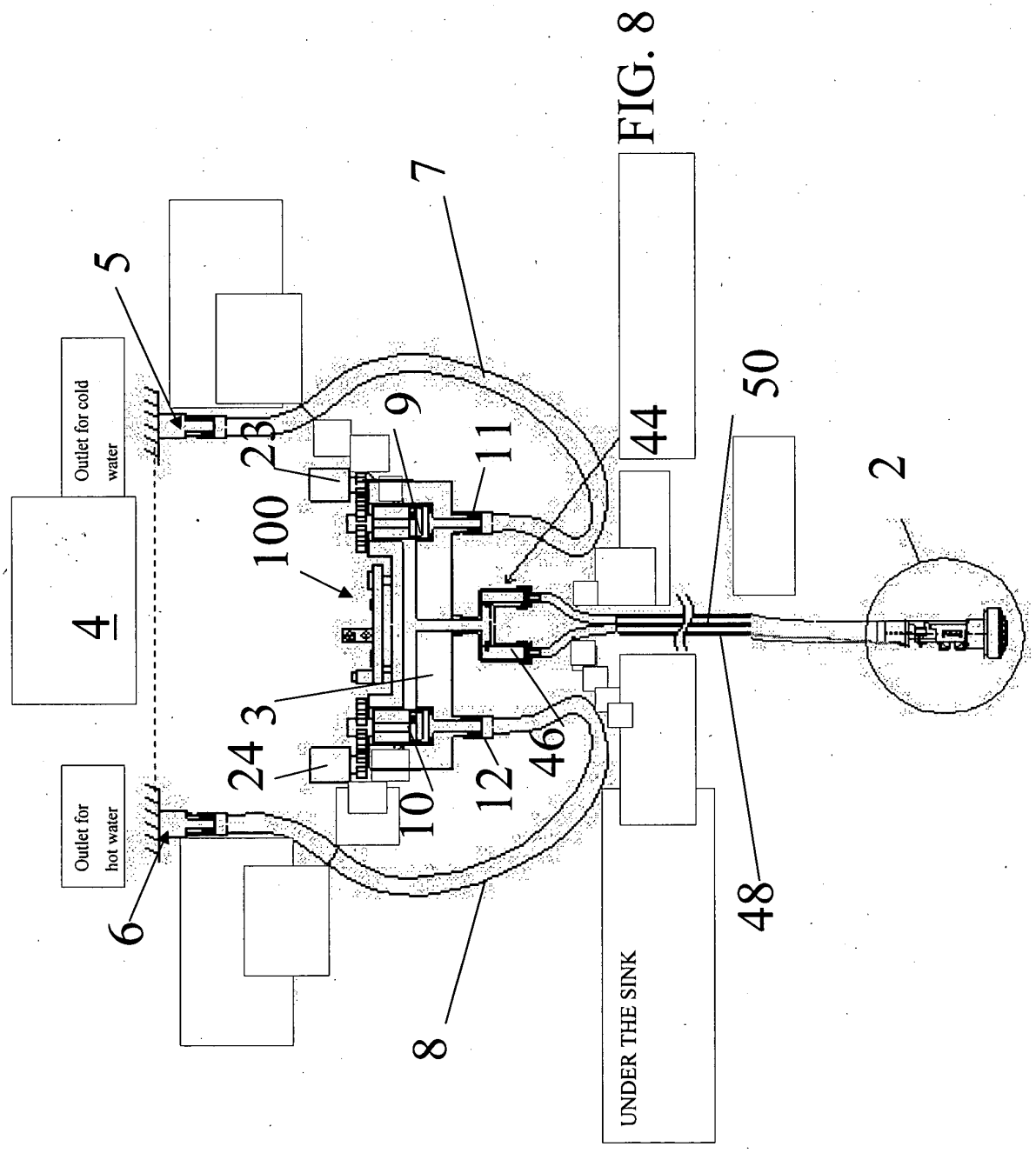

Outlet for cold water
Outlet for hot water
4
5
6
7
8
9
10
11
12
2
23
24
3
100
44
46
48
50
UNDER THE SINK

FIG. 8

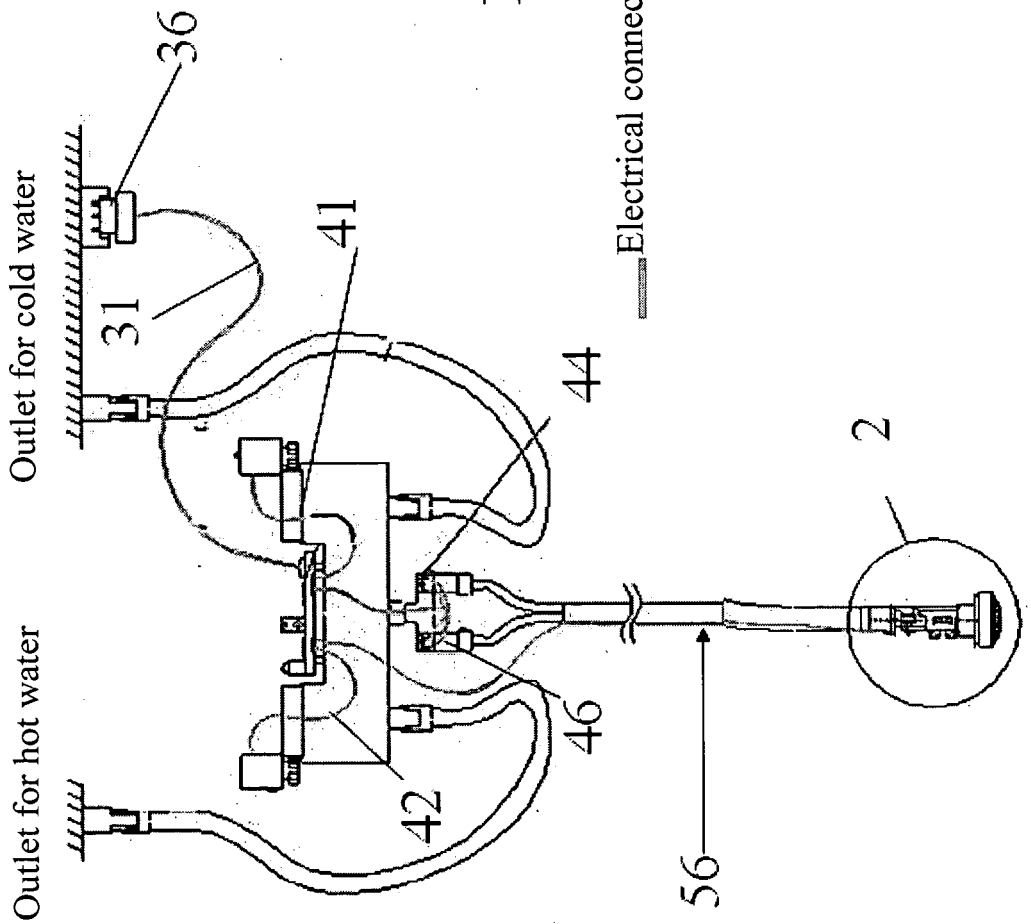

Outlet for cold water
Outlet for hot water
36
31
41
44
46
42
56
2
Electrical connections

FIG. 9

FIG. 10

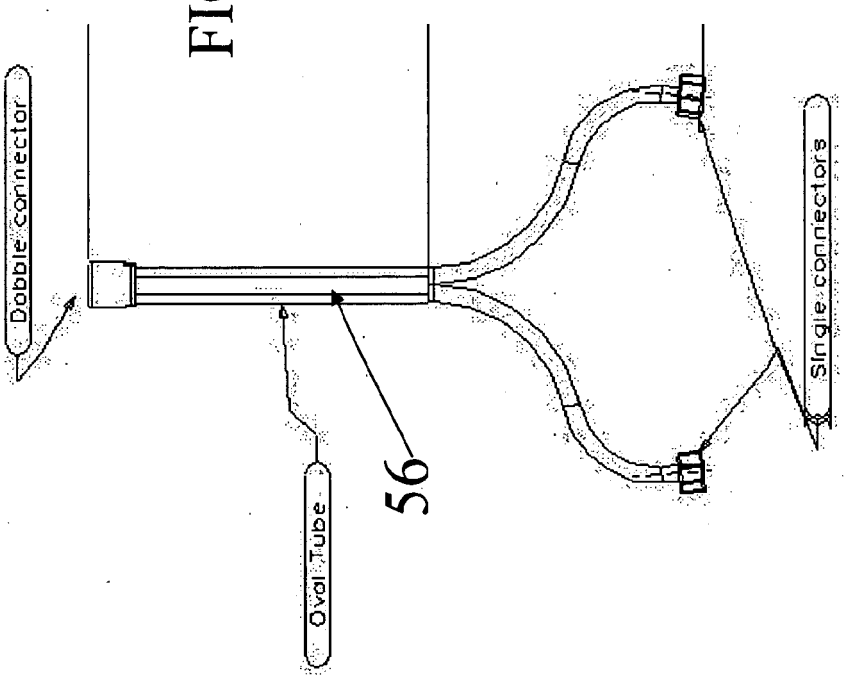


FIG. 10A

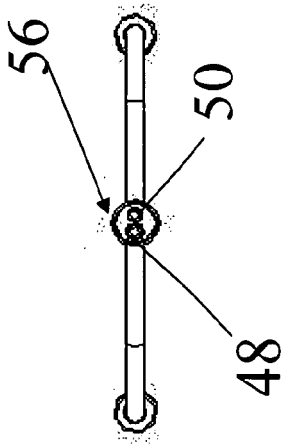


FIG. 11

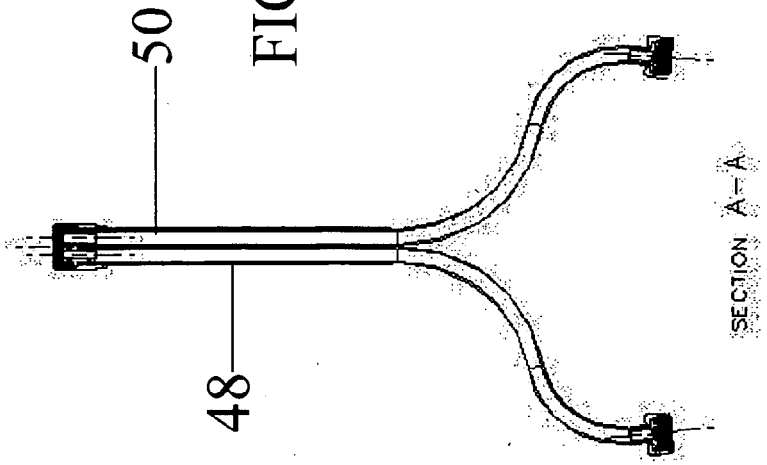


FIG. 12

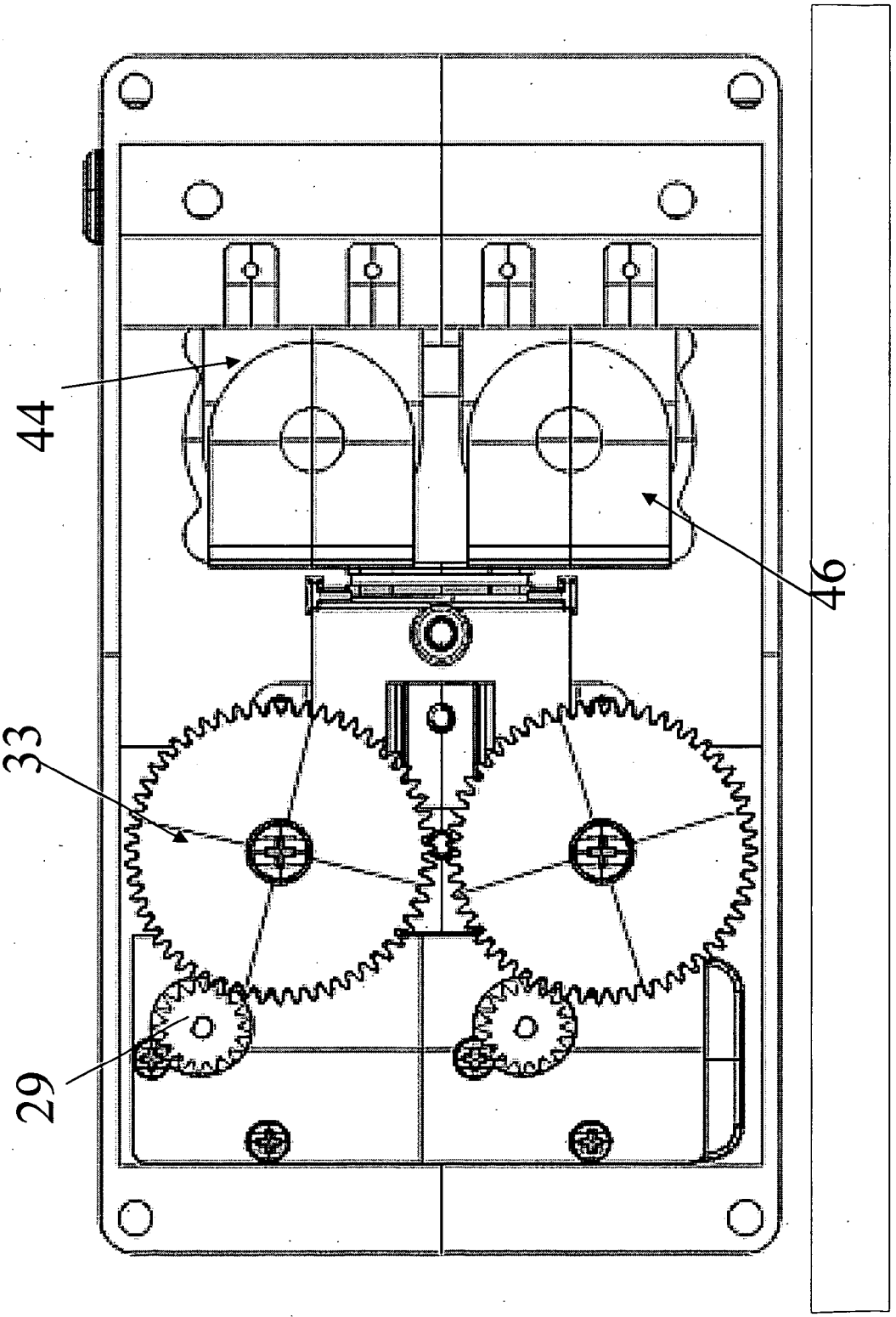
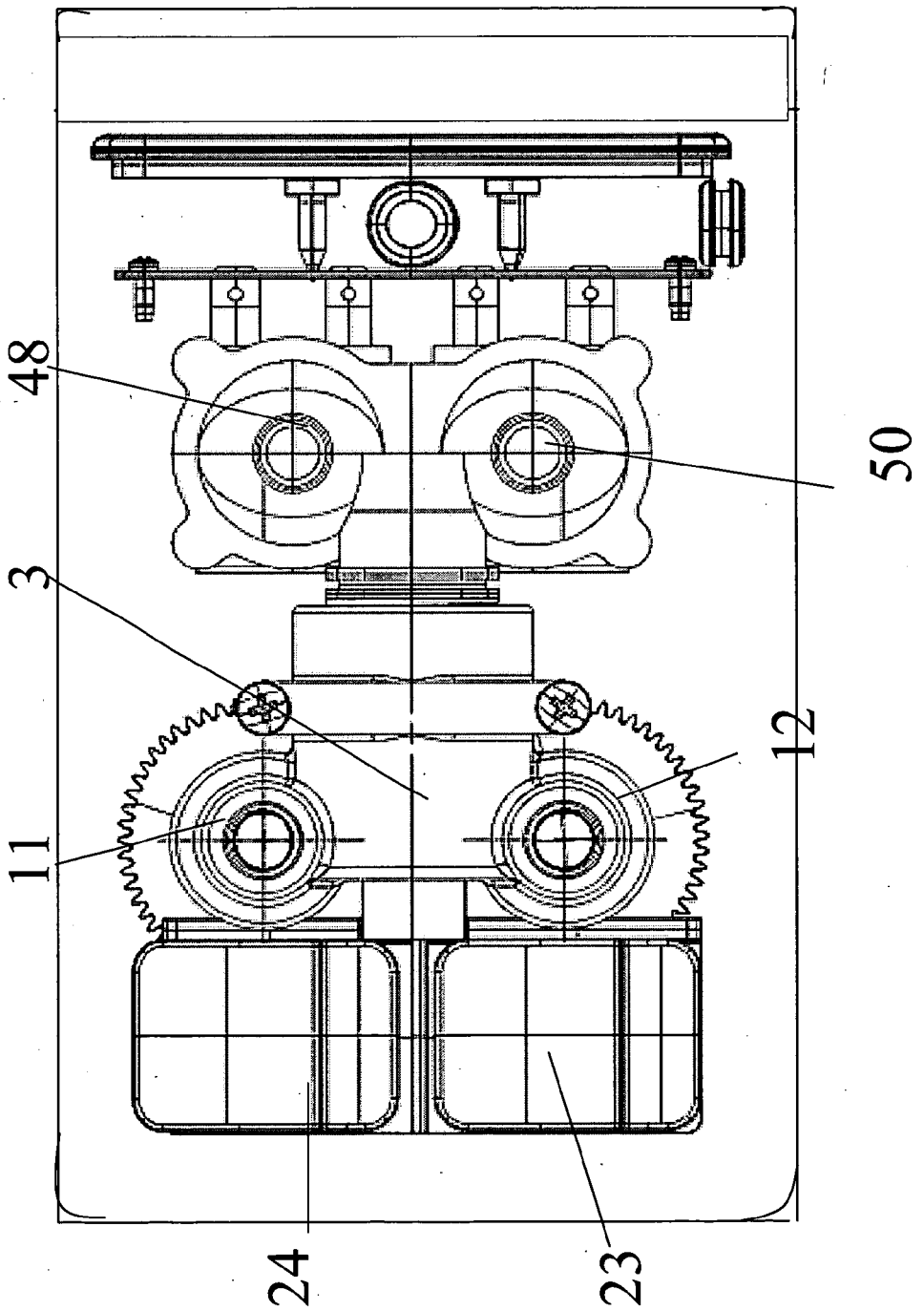


FIG. 13



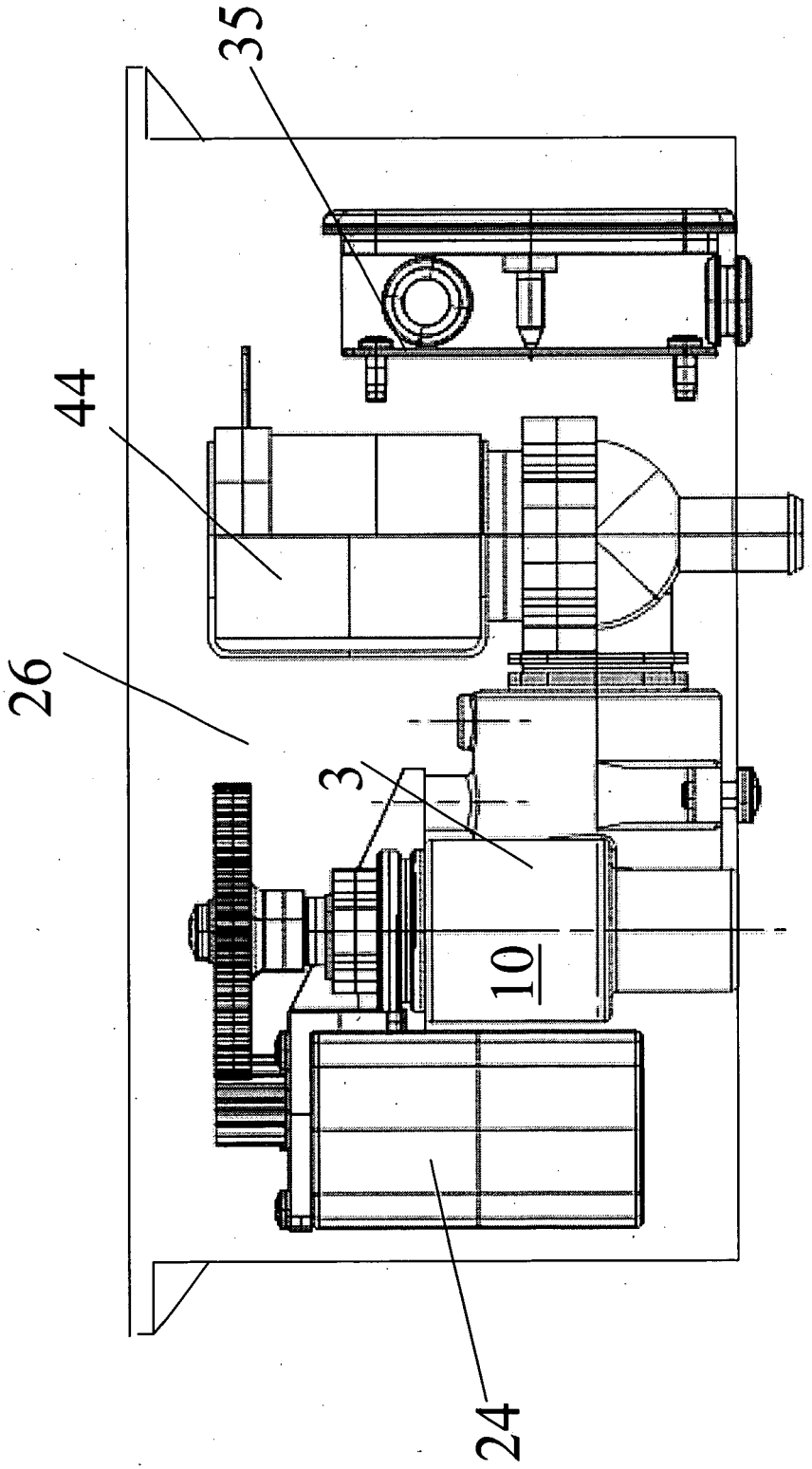


FIG. 14

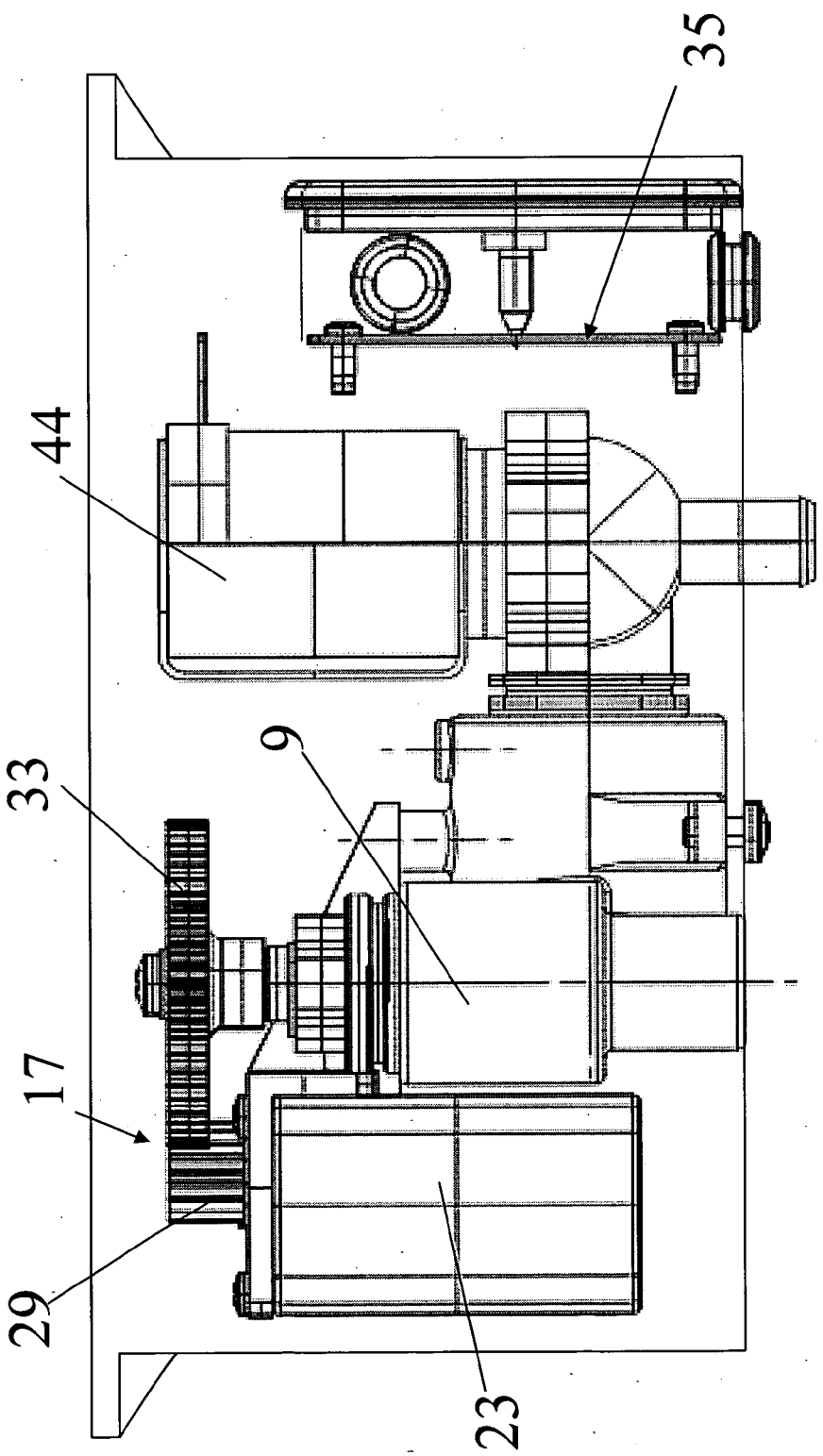


FIG. 15

FIG. 16

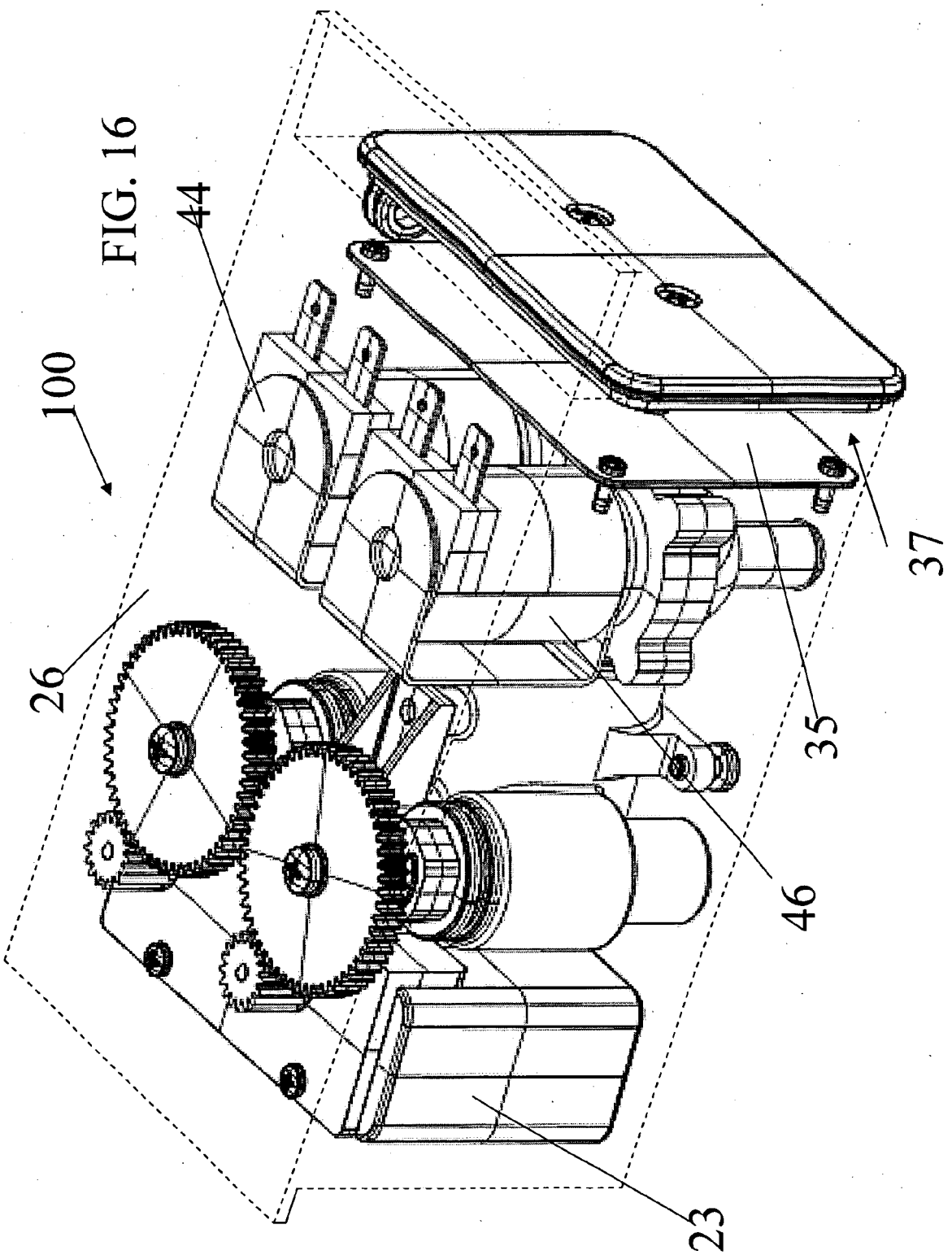


FIG. 17

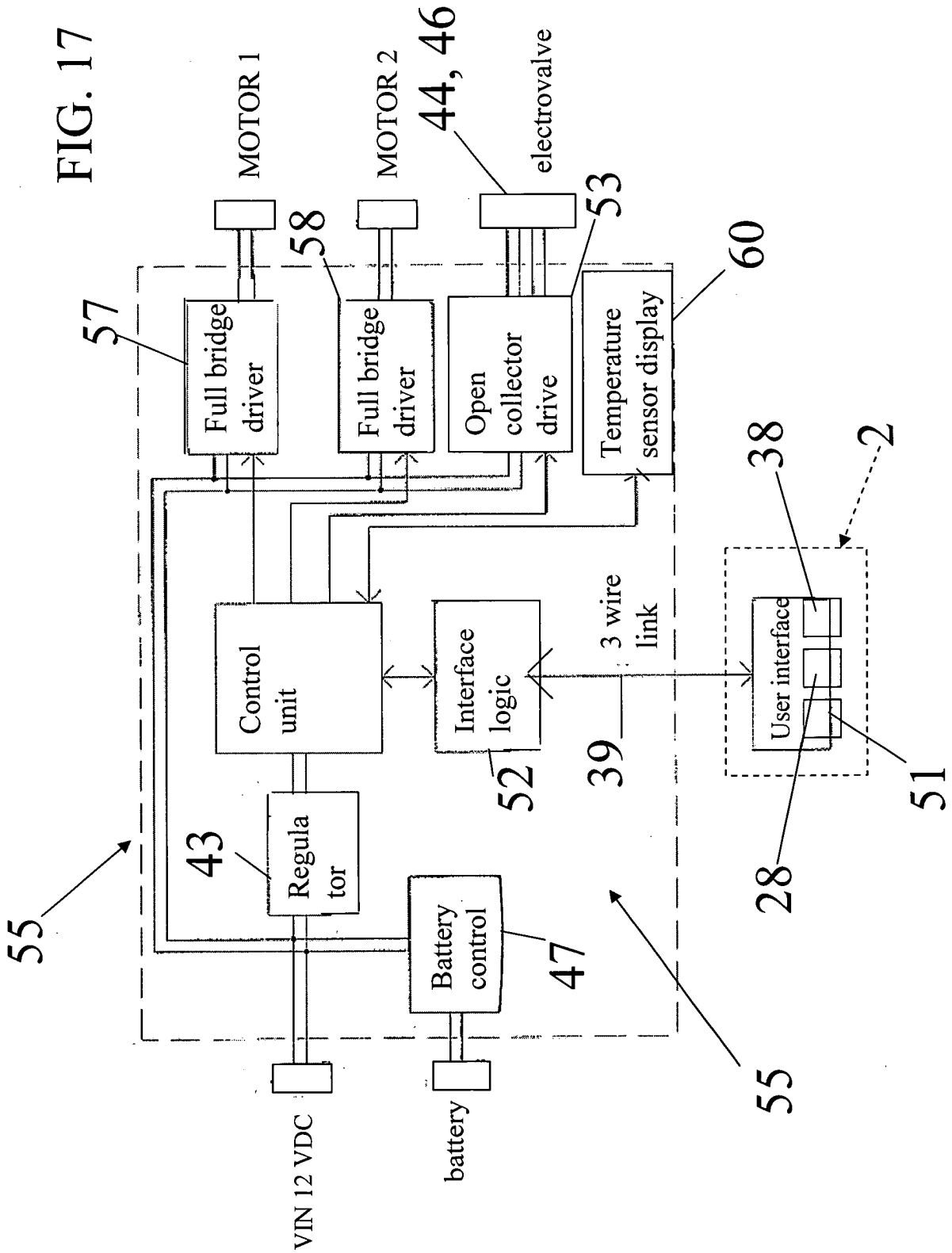

MOTOR 1
MOTOR 2
electrovalve
44, 46
53
58
60
57
Full bridge driver
Full bridge driver
Open collector drive
Temperature sensor display
38
2
Control unit
Interface logic
3 wire link
User interface
39
52
51
43
Regula tor
28
55
Battery control
47
55
VIN 12 VDC
battery

FIG. 18

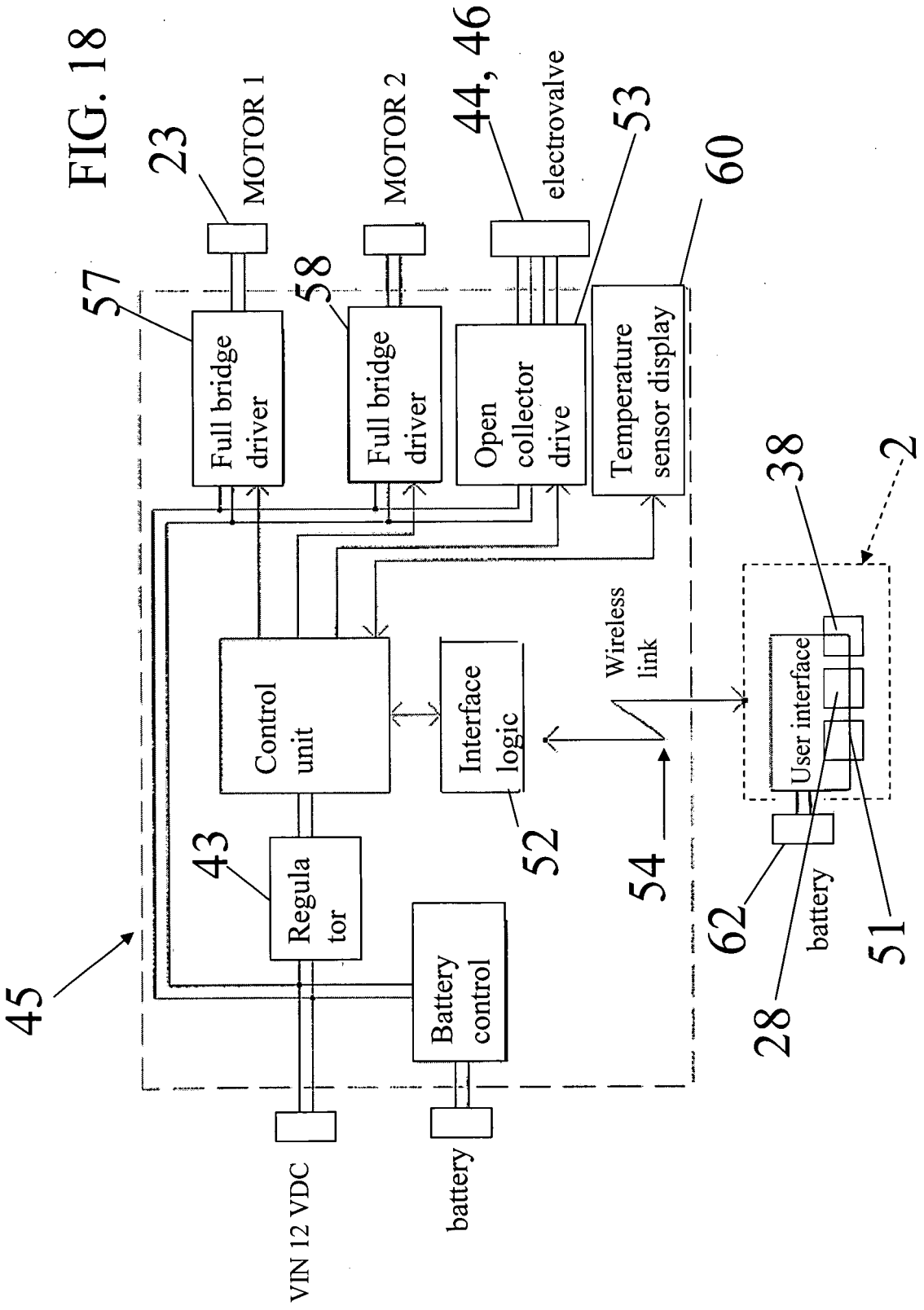
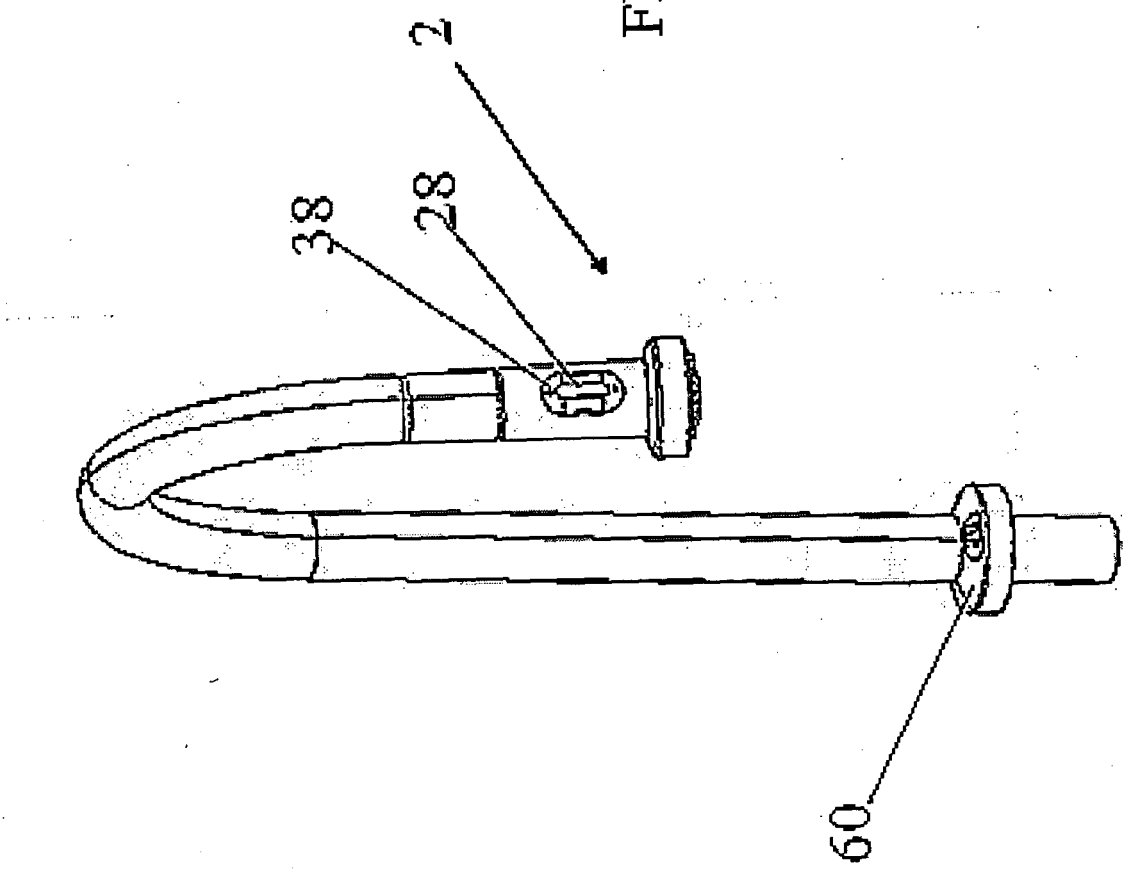

45
57
58
23
MOTOR 1
MOTOR 2
44, 46
electrovalve
53
60
Full bridge driver
Full bridge driver
Open collector drive
Temperature sensor display
Control unit
Interface logic
Wireless link
38
2
User interface
43
Regula tor
52
54
62
battery
51
28
Battery control
VIN 12 VDC
battery

FIG. 19



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 01 3156

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 33 38 064 A1 (KARRER WEBER & CIE AG [CH]) 3 May 1984 (1984-05-03) * page 4, last paragraph - page 7, last paragraph; figures *	1-4,7,8, 11-13, 15, 20-23, 26,27	INV. E03C1/04 E03C1/05
Y		5,6,9, 10,14, 16-19, 24,25, 28,29	
Y	US 5 853 130 A (ELLSWORTH ROBERT S [US]) 29 December 1998 (1998-12-29) * column 2, line 56 - line 67 * * column 3, line 25 - line 29; figures *	5,6,10, 16,17, 24,25,29	
Y	US 2003/125842 A1 (CHANG CHEE ANN [CN] ET AL) 3 July 2003 (2003-07-03) * paragraph [0028]; figures *	19	TECHNICAL FIELDS SEARCHED (IPC) E03C
D,Y	WO 00/32314 A (UNIQUE COMPANY LIMITED [NZ]; JEROMSON PETER JAMES [NZ]; WILKINSON JAMI) 8 June 2000 (2000-06-08) * abstract; figure 3 *	9,14,18, 28	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 October 2007	De Coene, Petrus

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 01 3156

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-10-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3338064 A1	03-05-1984	CH 658485 A5	14-11-1986
		FR 2535363 A1	04-05-1984
US 5853130 A	29-12-1998	NONE	
US 2003125842 A1	03-07-2003	NONE	
WO 0032314 A	08-06-2000	AU 1419300 A	19-06-2000

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1577016 A **[0010]**
- WO 0032314 A **[0012]**
- US 5735467 A **[0015]**