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(54) CONTROL UNIT FOR A PUMP

(57) A control unit **(150)** for a pump **(100)** which includes a power button **(160)** to operate the pump **(100).** The control unit **(150)** includes a plurality of light emitting units **(L1, L2, L3)** provided with the control unit **(150).** The plurality of light emitting units **(L1, L2, L3)** indicate one or more operating parameters of the pump **(100).** The control unit **(150)** includes a control button **(170)** which is actuated based on a user action. The control unit **(150)** is characterized in that the control button **(170)** allows to switch between a plurality of operating modes of the pump **(100)** based on different user actions. And, the plurality of light emitting units **(L1, L2, L3)** indicate switching between the plurality of operating modes of the pump **(100)** by change in color corresponding to the plurality of operating modes of the pump **(100).**

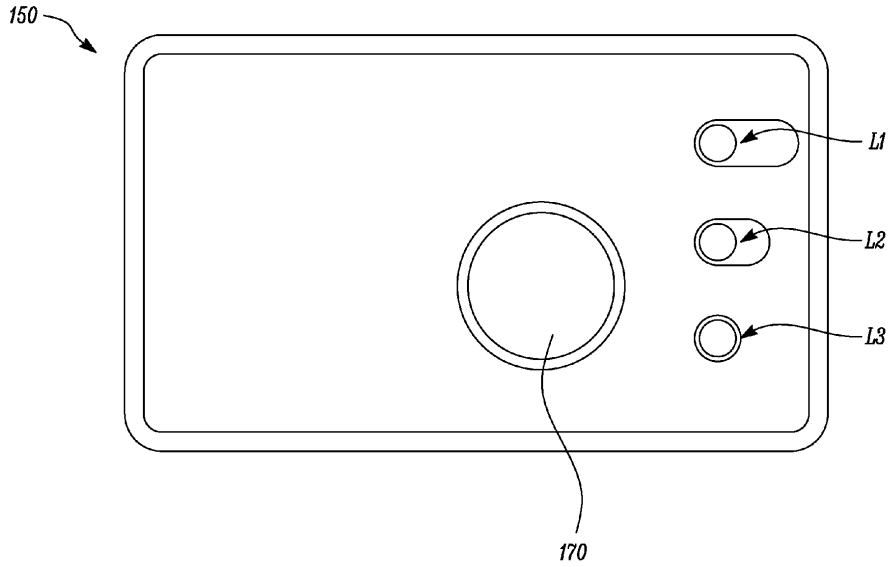

FIG. 3

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to pumps. More specifically, the present disclosure relates to a control unit which allows a user-friendly and convenient operation of a pump.

BACKGROUND

[0002] Pumps such as battery pumps may include a control unit to operate the pumps. In this case control unit may include one or more buttons, switches, and indicators to allow interaction of a user with different modes and functionalities of the pumps. With increasing features, and modes of the pumps, there have been concerns regarding spatial footprint, role and number of the buttons, switches, and indicators on the control unit of the pumps.

[0003] Further, there are constraints regarding space and aesthetics of the control unit based on the number of the buttons, switches, and indicators on the control unit. There are also increasing demands to have the control unit as compact and easy-to-use as possible. For similar reasons, there have been efforts in the art to provide buttons, switches, or indicators on the control unit which may serve multiple functions and allow better space utilization in a user-friendly manner.

[0004] An example of a signal indicator lamp is provided by EP2996442 (hereinafter referred to as '442 reference). The '442 reference provides a signal indicator lamp which includes a plurality of light emitting units each of which emit light in one light emission color selected among a plurality of light emission colors. A memory stores light emission color information of the plurality of light emitting units, and a light emission control section controls light emission states of the plurality of light emitting units according to light emission color information stored based on an input control signal. However, the '442 reference does not disclose a simple, user-friendly means (say switch) for allowing convenient switching between different parameters along with suitable indicators (i.e. the light emission states here) to highlight change in the different parameters.

[0005] Thus, there is a need for an improved control unit, in particular for a pump, which provides multi-functionality user interface with a compact and user-friendly application of buttons on the control unit.

SUMMARY

[0006] In view of the above, it is an objective of the present invention to solve or at least reduce the drawbacks discussed above. The objective is at least partially achieved by a control unit, in particular for a pump. The control unit includes a control button to operate the pump based on a user action. The control unit includes a plurality of light emitting units provided with the control unit. The plurality of light emitting units indicate one or more operating parameters of the pump. The control unit is characterized in that the control button allows to switch between a plurality of operating modes of the pump based on different user actions. Further, the plurality of light emitting units indicate switching between the plurality of operating modes of the pump by change in color corresponding to the plurality of operating modes of the pump. Thus, the present disclosure provides a simple, convenient, and efficient control unit for the pump which allows use of a single button (i.e. the control button) to switch between different modes of the pump.

[0007] According to an embodiment of the present invention, the plurality of operating modes include a battery mode having a battery status, a first mode having a first operating parameter, and a second mode having a second operating parameter. This allows operation of different operating modes. For example the first operating mode might be the battery mode, while the second operating mode might be a timer mode, whereby the use of a single button (i.e. the control button) allows to switch between the two modes.

[0008] According to an embodiment of the present invention, the different user actions includes a first user action and a second user action. The first operating mode is activated when the control button is actuated by the first user action, and the second operating mode is activated when the control button is actuated by the second user action. This allows ease of use of the single control button to switch between the first mode and the second mode by the different user actions.

[0009] According to an embodiment of the present invention, the first user action is pressing the control button for a first time period and the second user action is pressing the control button for a second time period. By this the selection of the different operating modes on the control panel is based on different time periods a user acts on the control button.

[0010] According to an embodiment of the present invention, the first mode and the second mode are a power mode and a timer mode, respectively, of the pump. It is obvious to the one skilled in the art that there could be a broad variety of operating modes and different combinations of the same. For example the different modes may a power mode, a timer mode, or a battery status mode, among others.

[0011] According to an embodiment of the present invention, the plurality of light emitting units are LEDs (light emitting diodes). Use of LEDs may allow easy and user-friendly visual indication along with other implementation benefits of LEDs.

[0012] According to an embodiment of the present invention, the plurality of light emitting units switch between a first color and a second color when the pump switches between the first mode and the second mode. Change in color of the plurality of light emitting units thus serves as a simple and easy to verify visual indicator for change

between the first mode and the second mode. There is a broad variety of multi-color LEDs known from the state of the art.

[0013] According to an embodiment of the present invention, the first color and second color are blue and green, respectively. Choice of the first color and the second color may be based on user-preference, or any implementation factor.

[0014] According to an embodiment of the present invention, the control unit further includes a power button to operate the pump. This way the control unit may be operated by either of the power button, or the control button, as per the need.

[0015] According to an embodiment of the present invention, the plurality of operating modes include a power ON/OFF mode of the pump. This may allow application of the control button to activate the power ON/OFF mode of the pump.

[0016] According to an embodiment of the present invention, the plurality of light emitting units are at least three in number. The number of the plurality of light emitting units may provide indication regarding state, stage or any other value related to the one or more operating parameters, and modes of the pump.

[0017] According to an embodiment of the present invention, the plurality of light emitting units selectively indicate the battery status of the pump both during the first operating mode and the second operating mode. This may allow dynamic indication to users of the battery status of the pump even during any activated state of the first operating mode and the second operating mode.

[0018] According to an embodiment of the present invention, the control unit is at least partially realized on a portable device such that the activation and/or the switching of at least part of the different operational modes are allowed on the portable device. This allows a remote control via a portable device, such as a smart phone or pad.

[0019] According to an embodiment of the present invention, the control unit is at least partially realized on a portable device such the operational parameters are at least in part visible on the user portable device. This allows the remote inspection of the operational parameters such that a user only needs to move close to the controlled device if the operational parameters are not as expected or desired. For example with malfunctioning or the run out of power.

[0020] According to an embodiment of the present invention, the control button may be integrated with a lighting element such that the control button changes color based on the plurality of operating modes. This way the control button may additionally or alternatively serve as an indicator of change between the first operating mode and the second operating mode based on the corresponding first user action or the second user action with the control button.

[0021] According to an embodiment of the present invention, a pump having the control unit is provided. The pump may be a battery pump, or any pump as used or known in the art, having application of the control unit.

[0022] Other features and aspects of this invention will be apparent from the following description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The invention will be described in more detail with reference to the enclosed drawings, wherein:

FIG. 1 shows a schematic view of a pump, in accordance with an embodiment of the present invention;

FIG. 2 shows a schematic view of a control unit of the pump, in accordance with an embodiment of the present invention;

FIG. 3 shows a schematic view of a control unit of the pump, in accordance with another embodiment of the present invention;

FIGS. 4A-4D show schematic views of state of light emitting units of the control unit for a battery status mode of the pump, in accordance with an embodiment of the present invention;

FIGS. 5A-5C show schematic views of state of light emitting units of the control unit for a power mode of the pump, in accordance with an embodiment of the present invention;

FIGS. 6A-6C show schematic views of state of light emitting units of the control unit for a timer mode of the pump, in accordance with an embodiment of the present invention; and

FIG. 7 shows a schematic view of various states of light emitting units of the control unit for a timer mode of the pump, in accordance with another embodiment of the present invention.

DESCRIPTION OF EMBODIMENTS

[0024] The present invention will be described more fully hereinafter with reference to the accompanying drawings, in which example embodiments of the invention incorporating one or more aspects of the present invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. For example, one or more aspects of the present invention can be utilized in other embodiments and even other types of structures and/or methods. In the drawings, like numbers refer to like elements.

[0025] Certain terminology is used herein for conven-

ience only and is not to be taken as a limitation on the invention. For example, "upper", "lower", "front", "rear", "side", "longitudinal", "lateral", "transverse", "upwards", "downwards", "forward", "backward", "sideward", "left," "right," "horizontal," "vertical," "upward", "inner", "outer", "inward", "outward", "top", "bottom", "higher", "above", "below", "central", "middle", "intermediate", "between", "end", "adjacent", "proximate", "near", "distal", "remote", "radial", "circumferential", or the like, merely describe the configuration shown in the Figures. Indeed, the components may be oriented in any direction and the terminology, therefore, should be understood as encompassing such variations unless specified otherwise.

[0026] **FIG. 1** illustrates a pump **100** having a control unit **150.** The present disclosure illustrates a battery pump. However, teachings of the present disclosure may be implemented with any other pump such as, but not limited to, impulse pumps, submersible pump, velocity pumps, gravity pumps since the present disclosure is not to be limited by the type/size/mechanism of the pump in any manner.

[0027] **FIG. 1** illustrates the pump **100** having a pump housing **110.** The pump **100** includes a control housing **120** which houses a control unit **150.** The control unit **150** and the pump **100** are powered by a battery (not shown) housed within the control housing **120.** The control unit **150** allows for different levels or modes of control of the pump **100.** The control unit **150** may allow to perform various levels of control of the pump **100** such as, for example but need not necessarily be limited to, total control of the pump **100** where the control unit **150** can be used to control any function of the pump **100** without any restriction. Further, there may be situations where the control unit **150** may be able to control the pump **110** with some restrictions, for whatsoever reason, such as only power control of the pump **100.**

[0028] Moreover, the control unit **150** includes a power button **160,** a control button **170** and a series of light emitting units **L1, L2, L3.** The present disclosure provides the control unit **150** with a compact and aesthetic arrangement without compromising with ease-of-use and convenience with application of the control unit **150.** The present disclosure further avoids need of multiple levers, buttons etc. to perform changes to the various modes, parameters operable by the control unit **150** of the pump **100.** This allows ease of operation of the pump **100** for a common operator while providing multiple functionality without a need to rely on multiple buttons of the control unit **150** to control the pump **100.**

[0029] In an embodiment, the pump housing **110** and the control housing **120** are made of any material such as a water proof material. From aesthetics and implementation benefits, the control housing **120** can be made of a transparent material. Further, the control housing **120,** the control unit **150** or any component of the pump **100** can be made of any or a combination of a metal, and a polymer or any other material as used or known in the relevant art.

[0030] Referring to **FIGS. 1, 2,** the control unit **150** includes the power button **160** which allows to operate the pump **100.** The control unit **150** includes the plurality of light emitting units **L1, L2, L3** (alternatively, LEDs (light emitting diodes) **L1, L2, L3)** provided with the control unit **150.** The present disclosure illustrates three light emitting units **L1, L2, L3** on the control unit **150,** however actual implementation of the present disclosure may have any number of the light emitting units **L1, L2, L3** as per need of the pump **100,** or any other factor. The plurality of light emitting units **L1, L2, L3** indicate one or more operating parameters (such as a battery status, a power mode, or a timer mode) of the pump **100.**

[0031] In some embodiments, the power button **160** may be used to switch "OFF", "ON" the pump **100.** Further, any mode of the pump **100** such as the power mode, the timer mode may be interrupted or stopped by pressing the power button **160.** Further, the pump **100** may have safety features to continuously monitor the different modes and associated operating parameters of the pump **100.** In a non-limiting example, a low voltage level of the battery of the pump **100** may initially provide alerts to users and then automatically stop the power mode or the timer mode in absence of any user action.

[0032] **FIG. 3** illustrates the control unit **150** with the control button **170** and the plurality of light emitting units **L1, L2.** The control button **170** operates the pump **100** based on a user action. Further, the plurality of light emitting units **L1, L2, L3** are provided with the control unit **150.** The plurality of light emitting units **L1, L2, L3** indicate one or more operating parameters of the pump **100.** Such embodiments may have the control unit **150** make application of only the control button **170,** without any power button **160** as illustrated in the present figure. This arrangement of the control unit **150** with only the control button **170** and the light emitting units **L1, L2, L3** may further allow ease-of-operation and aesthetic benefits for application of the control unit **150.** In such cases, different operations such as switch "ON", "OFF", mode changes and the like may be undertaken by different user actions with the control button **170,** without a need of multiple buttons on the control unit **150.** In some embodiments, the plurality of operating modes include a power ON/OFF mode of the pump **100.** This may allow application of the control button **170** to activate the power ON/OFF mode of the pump **100.**

[0033] In some embodiments, the plurality of light emitting units **L1, L2, L3** are LEDs (light emitting diodes), however any other light emitting means may be readily implemented with the present disclosure. From application and efficiency considerations, use of LEDs may allow easy and user-friendly visual indication of the operating parameters, along with other benefits of LEDs.

[0034] In some embodiments, the plurality of LEDs **L1, L2, L3** are at least three in number. The number, type, size, and placement of the LEDs **L1, L2, L3** may primarily depend upon number of the modes, sub-modes, the operational parameters associated with the pump **100.** The

number of the LEDs **L1, L2, L3** may provide indication regarding state (such as active, error and the like), stage or any other value related to the one or more operating parameters.

[0035] The control unit **150** includes the control button **170** which is actuated based on the user action. The user action may be a short-press, long-press, or any other interaction of the control button **170** with the user (for example a double press with short interruption). The control button **170** allows the user to switch between a plurality of operating modes of the pump **100** based on different user actions. Further, the plurality of light emitting units **L1, L2, L3** indicate switching between the plurality of operating modes of the pump **100** by change in color corresponding to the plurality of operating modes (or the one or more operating parameters) of the pump **100.** Thus, the present disclosure provides the control unit **150** which allows use of a single button (i.e. the control button **170**) to switch between different operating modes of the pump **100,** as illustrated in different embodiments later.

[0036] In some embodiments, the control unit **150** may be adapted to interact with a user portable device (such as smartphone, tab and the like) to convey any message/notification/alert regarding mode change, operating parameters, time periods to the user portable device in real-time, or as per feature preference set by the user. The control unit **150** may also be at least partially realized on a portable device such that the activation and/or the switching of at least part of the different operational modes are allowed on the portable device. Alternative or in addition at least part of the operational parameters might be visible on the user portable device. Such arrangement is merely for exemplary purposes, and the present disclosure can be readily used with any wireless device to the convey a message/notification/alert, as known or used in the art.

[0037] Referring to **FIGS. 4A-4D,** the control unit **150** is illustrated for a battery mode of the plurality of operating modes of the pump **100.** The control unit **150** includes a series of three LEDs **L1, L2, L3** to indicate a battery status (in green **"G"** color herein) during the battery mode. As illustrated, illumination or "ON" state of different number of LEDs of the LEDs **L1, L2, L3** indicates different battery status of the battery mode. **FIG. 4A** illustrates only LED **L1** as "ON" with a flash which indicates the battery status as 0 to 10 percent, or battery near empty. Further, illumination of LED **L1** without any flash indicates the battery status as 11 percent to 33 percent, as illustrated in **FIG. 4B.** Further, when LEDs **L1, L2** are illuminating (or "ON") together the battery status is 34 percent to 66 percent, as illustrated in **FIG. 4C.** Moreover, illumination of all the LEDs **L1, L2, L3** indicates the battery status as 67 percent to 100 percent, as illustrated in **FIG. 4D.** The present disclosure indicates the LEDs **L1, L2, L3** of the control unit **150** in green **"G"** color to illustrate the battery status, however any other color may be used for such indication without any limitation. In some embodiments, the battery status may be indicated during whole running cycle of the pump **100,** while the battery status may be activated when the pump **100** is switched "ON", such as by use of the power button **160.** Additionally, or alternatively, the battery status may be activated by application of the control button **170** after switch "ON" of the pump **100** using the power button **160.**

[0038] Referring to **FIGS. 5A-5C,** and **6A-6C,** the control unit **150** is illustrated for a first mode and a second mode, respectively. The exemplary present disclosure illustrates the first mode and the second mode which are a power mode and a timer mode respectively of the pump **100.** The first mode and the second mode have been referred interchangeably as "the power mode" and "the timer mode" hereinafter. It is obvious to the one skilled in the art that the different modes of the present disclosure may be any modes such as the power mode, the timer mode, or a battery status, among various others.

[0039] In some embodiments, the different user actions of the present disclosure include a first user action and a second user action. The first mode (or the power mode) is activated when the control button **170** is actuated by the first user action, and the second mode (or the timer mode) is activated when the control button **170** is actuated by the second user action. This allows ease of use of the control button **170** to switch between the first mode and the second mode by use of a single button i.e. the control button **170.** The first user action may be pressing the control button **170** for a first time period (such as pressing for 5 seconds) and the second user action may be pressing the control button **170** for a second time period (such as pressing for 3 seconds). This allows selection of different modes on the control panel by different user actions i.e. the first user action and the second user action with the control button **170.** In some embodiments, pressing of the control button **170** below a threshold time period may lead to the first user action, and pressing of the control button **170** above the threshold time period may lead to the second user action. In a non-limiting example, the threshold time period may be 4 seconds, or any other value as per user preference. The present disclosure refers exemplary types, values of first user action, the second user action, the first time period, the second time period for reference and explanatory purpose only. However, different types, values of such user actions, time periods have been contemplated and all such variations are well within the scope of the present disclosure.

[0040] In some embodiments, the control button **170** may be integrated with a lighting element (not shown) such that the control button **170** changes color based on the plurality of operating modes. This way the control button **170** may additionally or alternatively serve as an indicator of change between the first mode and the second mode based on the corresponding first user action or the second user action with the control button **170.** The present disclosure refers to the battery mode, the first mode/power mode, the second mode/timer mode for exemplary purposes, however the pump **100** may have

any number of modes to suit application needs.

[0041] The power mode (or the first mode) as illustrated in **FIG. 5A-5C** is activated by pressing the control button **170** for the first time period (5 seconds in some embodiments). During implementation, pressing of the control button **170** may initially activate mode light (i.e. of blue **"B"** color) for the power mode. Then, the control button **170** is pressed within **5** seconds to set any sub-mode (or levels) of the power mode as illustrated in **FIGS. 5A-5C. FIG. 5A** illustrates flashing of the LED **L1** with blue **"B"** light to indicate a first power level of the power mode. Similarly, **FIGS. 5B, 5C** illustrate flashing of LEDs **L1, L2** and LEDs **L1, L2, L3** respectively to indicate a second and third power level of the power mode.

[0042] The timer mode (or the second mode) as illustrated in **FIGS. 6A-6C** is activated by pressing the control button **170** for the second time period (3 seconds in some embodiments). During implementation, pressing of the control button **170** for the second time period activates mode light (i.e. green **"G"**) for the timer mode. This starts intermediate flashing of green **"G"** and blue **"B"** light on LED **L1** which signifies a first timer (say of 5 minutes), as illustrated in **FIG. 6A.** Then, when the control button **170** is not pressed within 5 seconds the timer starts, otherwise pressing the control button **170** within 5 seconds allows to set the timer of the timer mode as illustrated in **FIGS. 6B, 6C. FIG. 6B** illustrates flashing of the LEDs **L1, L2** with green **"G"** to blue **"B"** light to indicate a second timer (say of 10 minutes) of the timer mode. Similarly, **FIG. 6C** illustrate flashing of LEDs **L1, L2, L3** to indicate a third timer (say of 15 minutes) of the timer mode. In an embodiment, the pump **100** may switch "OFF" automatically after finishing of the timer mode, such as for efficiency and safety considerations. The present embodiment mentions different exemplary values of the first timer, the second timer and the third timer as 5, 10, and 15 minutes respectively, however the timer mode may have any values of such timers without any limitation.

[0043] In some embodiments, the plurality of light emitting units **L1, L2, L3** switch between a first color and a second color when the pump **100** switches between the first mode (such as the power mode) and the second mode (such as the timer mode). Change in color of the plurality of light emitting units **L1, L2, L3** thus serves as a simple and easy to verify visual indicator for change between the first mode and the second mode. Further, the first color and second color are blue **B** and green **G,** respectively. Choice of the first color and the second color may be based on user-preference, ease of differentiation, background-light around the pump **100** or any implementation factor. Additionally, or alternatively, the control unit **150** may include one or more audio indicators, alerts, or signals to indicate change between the first mode and the second mode. The audio indicators, alerts, or signals may be integrated with the working of the control button **170** such as to indicate change between the first mode and the second mode of the pump **100.**

[0044] In some embodiments, the plurality of operating modes of the pump **100** include the battery mode, the first mode having a first operating parameter, and the second mode having a second operating parameter. More particularly, the first mode is the power mode having multiple power levels i.e. the first, second, and third power levels as the first operating parameter, as illustrated in **FIGS. 5A-5C,** respectively. The second mode is the timer mode having the first, second, and third time periods as the second operating parameter, as illustrated in **FIGS. 6A-6C,** respectively.

[0045] **FIG. 7** illustrates various states of LEDs **L1, L2, L3** of the control unit **150** during implementation of the timer mode of the pump **100,** in accordance with an embodiment of the present invention. During the timer mode, the LEDs **L1, L2, L3** show the battery status periodically after a fixed time period **T** and then once run a light (herein with blue **"B"** color) from LED **L3** to LED **L1.** As illustrated, the control panel **150** includes the LEDs **L1, L2, L3** in green **"G"** color at start and end of the fixed time period **T.** The fixed time period **T** can be any time period such as five seconds, as pre-set by the users of the pump **100.** This feature of the LEDs **L1, L2, L3** as illustrated in present figure may allow a visual check, among other implementation benefits, to users regarding working state of the LEDs **L1, L2, L3** for both the blue **"B"** color and the green **"G"** color after the fixed time period **T.**

[0046] In some embodiments, the plurality of LEDs **L1, L2, L3** may selectively indicate the battery status of the pump **100** both during the first mode and the second mode. This may allow dynamic indication to users of the battery status of the pump **100** during the first mode and the second mode.

[0047] The present disclosure allows the control unit **150** to have application with any pump **100.** The control unit **150** provides multiple use of the control button **170** to conveniently switch between different modes of the pump **100.** Further, the control unit **150** makes application of the LEDs **L1, L2, L3** to indicate a dynamic state, level, status of different operating parameters of the different modes during switching between the different modes by changing color of one or more of the LEDs **L1, L2, L3** of the control unit **150.** Thus, the control unit **150** of the present disclosure allows use of a single button (i. e. the control button **170**) for multiple-mode selection making the application of the control unit **150** convenient and user-friendly.

[0048] In the drawings and specification, there have been disclosed preferred embodiments and examples of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for the purpose of limitation of the scope of the invention being set forth in the following claims.

LIST OF ELEMENTS

[0049]

100	Pump

110 Pump Housing
120 Control Housing
150 Control Unit
160 Power Button
170 Control Button
L1 Light Emitting Unit/LED
L2 Light Emitting Unit/LED
L3 Light Emitting Unit/LED
G Green
B Blue
T Fixed Time Period

Claims

1. A control unit (**150**) for a pump (**100**), the control unit (**150**) comprising:

a control button (**170**) adapted to operate the pump (**100**) based on a user action; and
a plurality of light emitting units **(L1, L2, L3**) configured with the control unit (**150**), wherein the plurality of light emitting units **(L1, L2, L3**) indicate one or more operating parameters of the pump (**100**);
characterized in that:

the control button (**170**) is configured to switch between a plurality of operating modes of the pump (**100**) based on different user actions, and
wherein the plurality of light emitting units **(L1, L2, L3**) indicate switching between the plurality of operating modes of the pump (**100**) by change in color corresponding to the plurality of operating modes of the pump (**100**).

2. The control unit (**150**) of claim **1,** wherein the plurality of operating modes include a battery mode having a battery status, a first mode having a first operating parameter, and a second mode having a second operating parameter.

3. The control unit (**150**) of claim **1,** wherein the different user actions includes a first user action and a second user action, wherein the first operating mode is activated when the control button (**170**) is actuated by the first user action, and the second operating mode is activated when the control button (**170**) is actuated by the second user action.

4. The control unit (**150**) of claim **3,** wherein the first user action is pressing the control button (**170**) for a first time period and the second user action is pressing the control button (**170**) for a second time period.

5. The control unit (**150**) of claim **1,** wherein the first mode and the second mode are a power mode and a timer mode respectively of the pump (**100**).

6. The control unit (**150**) of claim **1,** wherein the plurality of light emitting units **(L1, L2, L3**) are LEDs (light emitting diodes).

7. The control unit (**150**) of claim **2,** wherein the plurality of light emitting units **(L1, L2, L3**) switch between a first color and a second color when the pump (**100**) switches between the first mode and the second mode.

8. The control unit (**150**) of claim **7,** wherein the first color and second color are blue **"B"** and green **"G",** respectively.

9. The control unit (**150**) of claim **1,** wherein the control unit (**150**) further includes a power button (**160**) configured to operate the pump (**100**).

10. The control unit (**150**) of claim **9,** wherein the plurality of operating modes include a power ON/OFF mode of the pump (**100**).

11. The control unit (**150**) of claim **1,** wherein the plurality of light emitting units **(L1, L2, L3**) are at least three in number.

12. The control unit (**150**) of claim **2,** wherein the plurality of light emitting units **(L1, L2, L3**) are configured to selectively indicate the battery status of the battery mode of the pump (**100**) both during the first mode and the second mode.

13. The control unit (**150**) of claim **1,** wherein the control unit (**150**) is at least partially realized on a portable device such that the activation and/or the switching of at least part of the different operational modes are allowed on the portable device.

14. The control unit (**150**) of claim **1,** wherein the control unit (**150**) is at least partially realized on a portable device such the operational parameters are at least in part visible on the user portable device.

15. The control unit (**150**) of claim **1,** wherein the control button may be integrated with a lighting element such that the control button changes color based on the plurality of operating modes.

16. A pump (**100**) having the control unit (**150**) of any of the claims **1** to **15.**

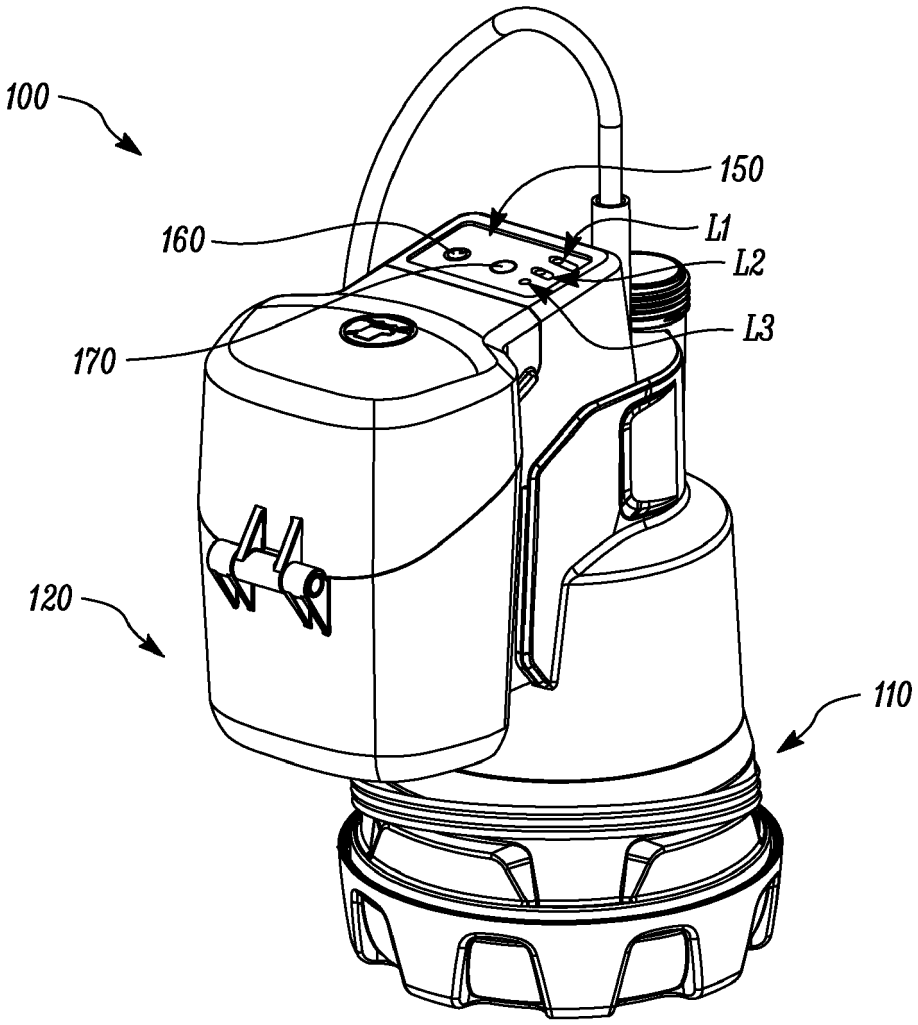

FIG. 1

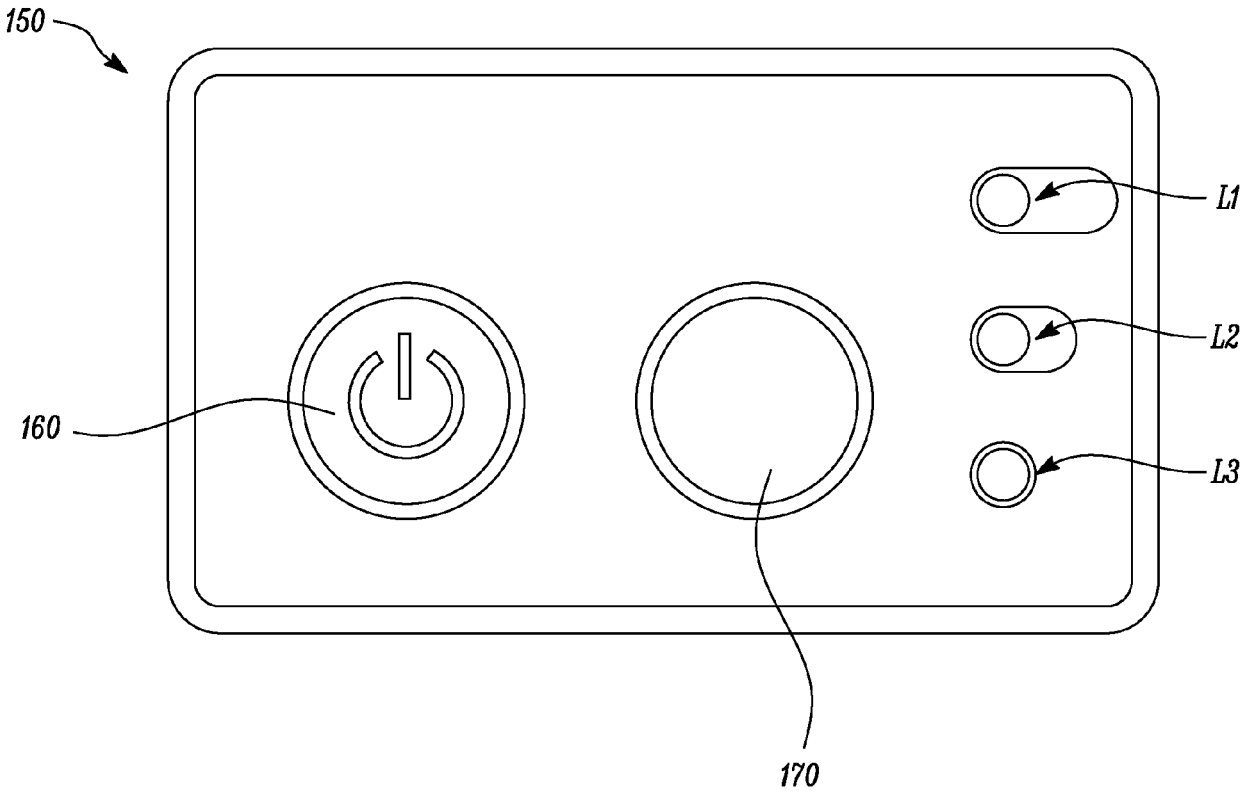

FIG. 2

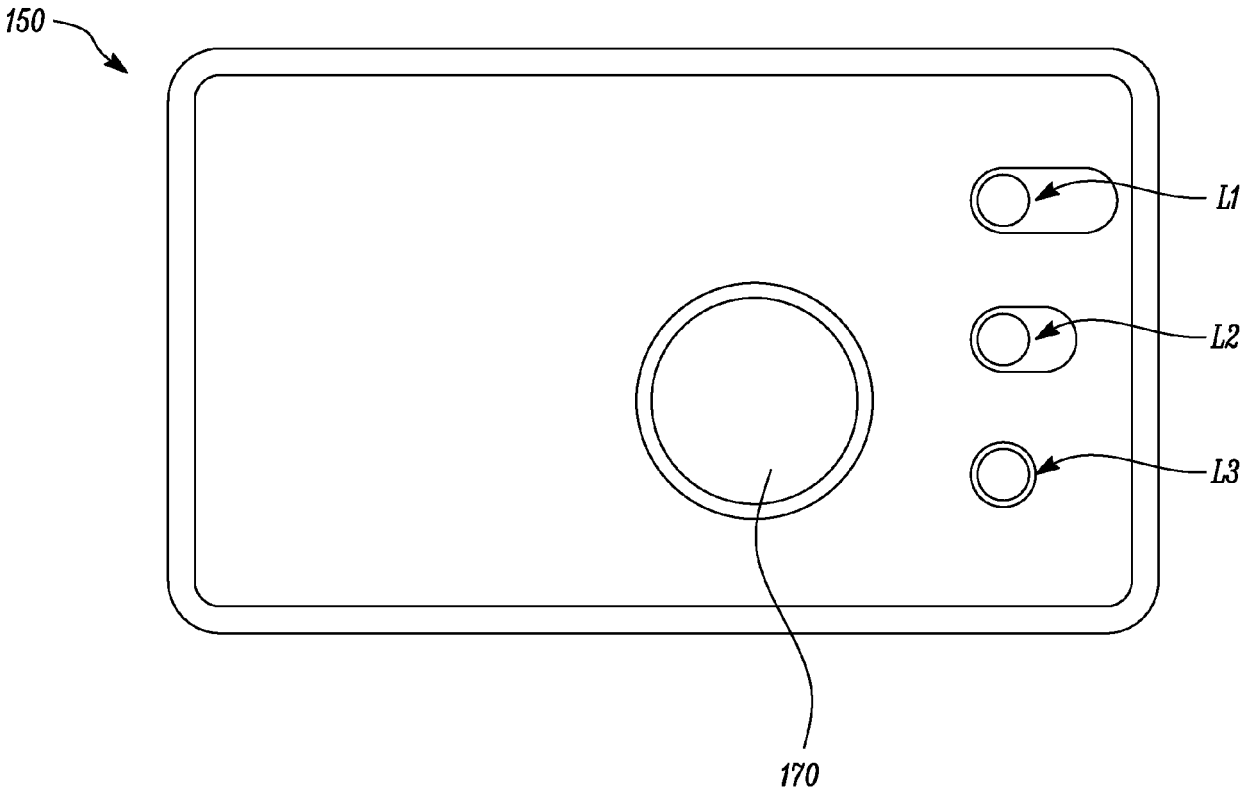

FIG. 3

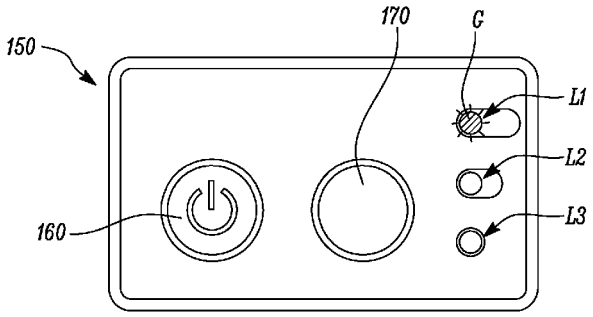

FIG. 4A

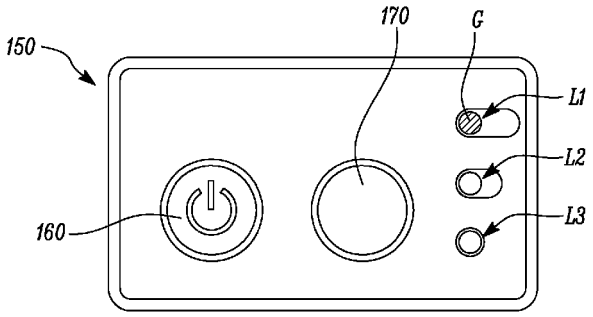

FIG. 4B

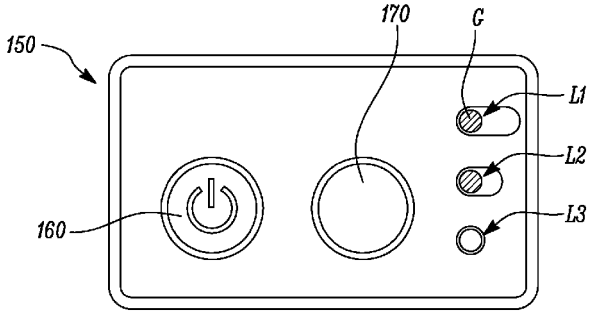

FIG. 4C

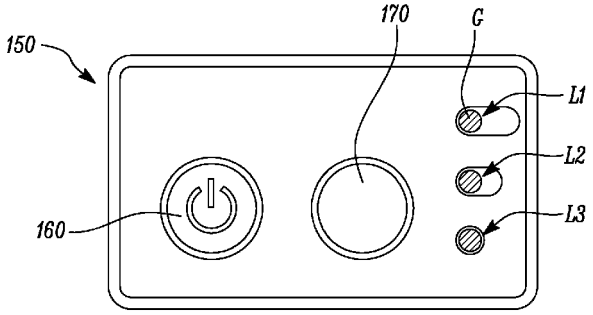

FIG. 4D

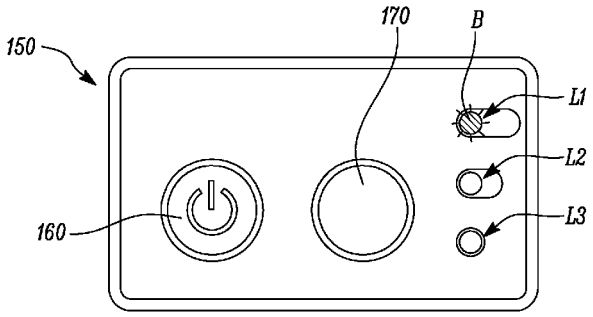

FIG. 5A

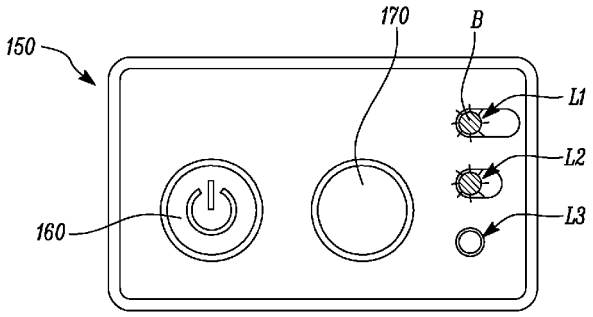

FIG. 5B

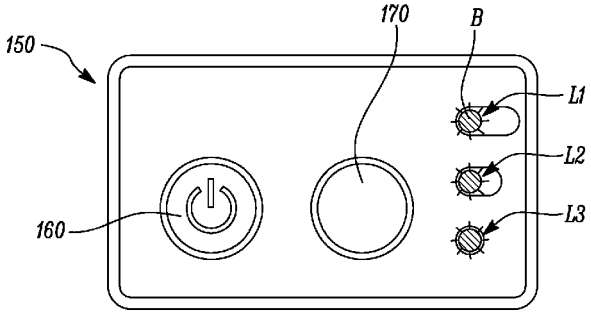

FIG. 5C

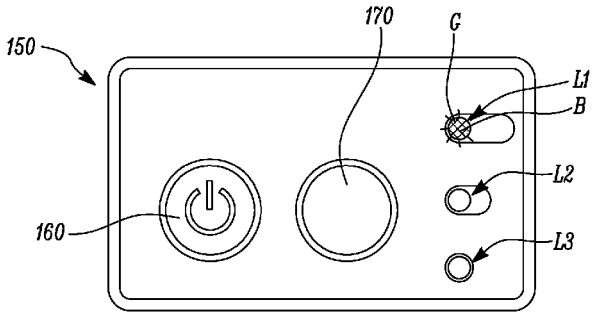

FIG. 6A

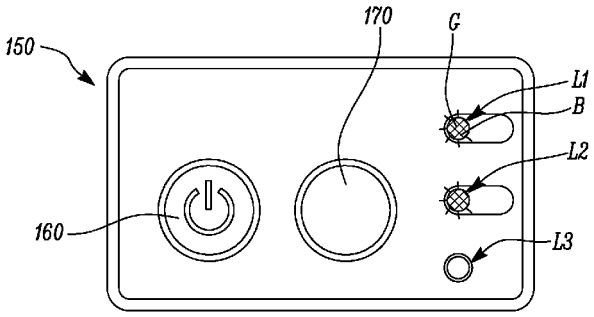

FIG. 6B

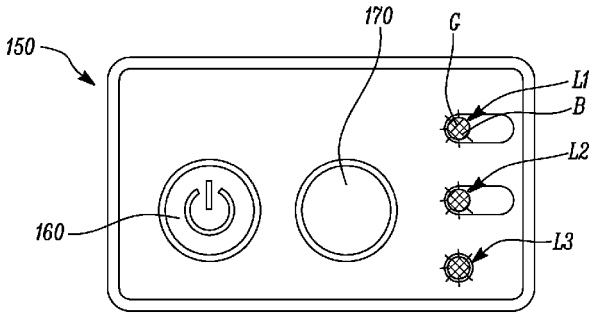

FIG. 6C

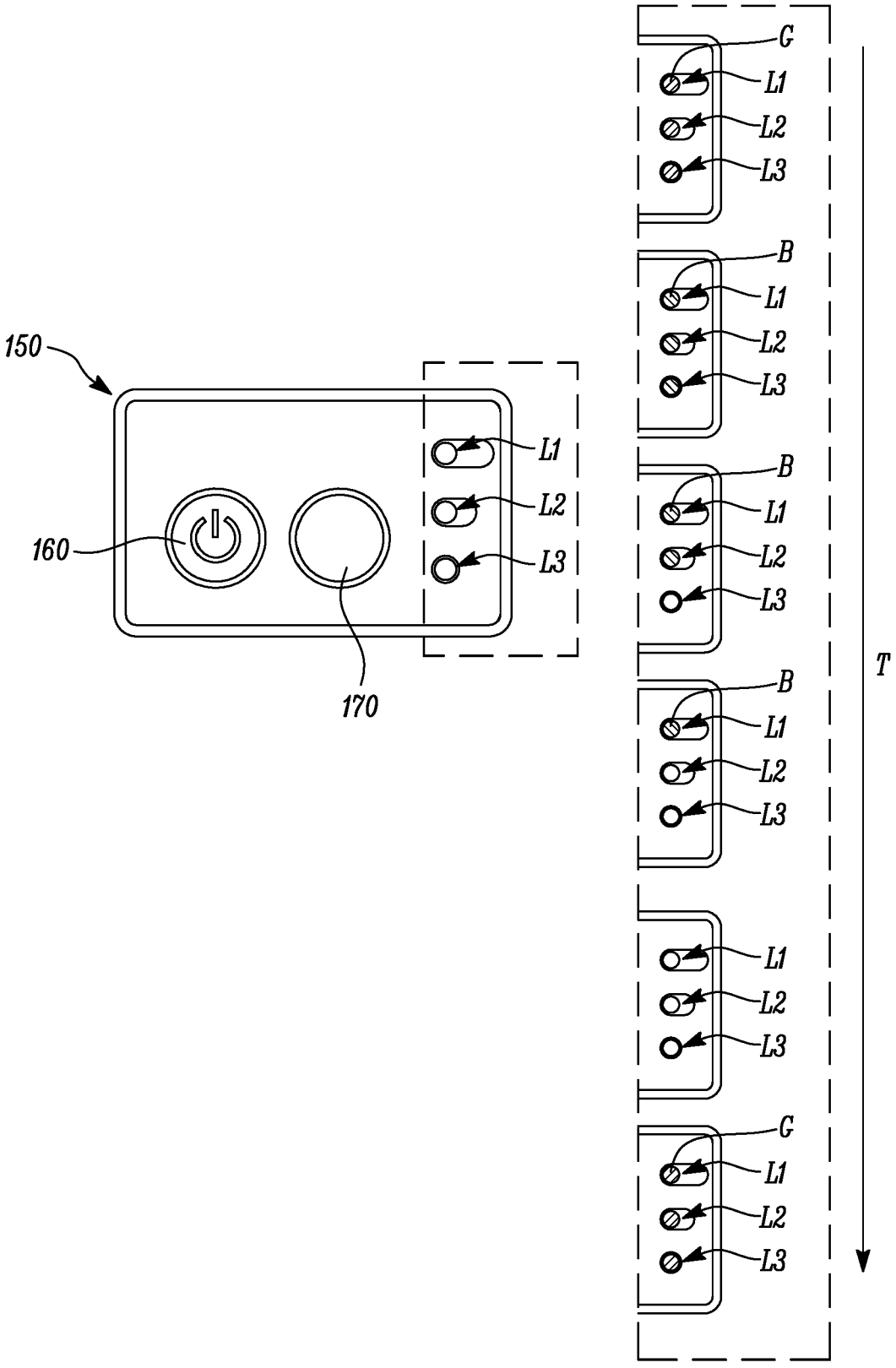

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 20 18 8099

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 10 2018 008389 A1 (WILO SE [DE]) 30 April 2020 (2020-04-30)	1-3, 5-11, 13-16	INV. F04D15/00
A	* paragraphs [0030], [0031], [0033], [0034], [0035], [0068] - [0075]; figures 1-5 * * the whole document *	4,12	

TECHNICAL FIELDS SEARCHED (IPC)

F04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 December 2020	Brouillet, Bernard

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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18-12-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102018008389 A1	30-04-2020	NONE	

EPO FORM P0459

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

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Patent documents cited in the description

- EP 2996442 A **[0004]**