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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) Home appliance with removable control panel and a system including the home appliance

(57) The present invention discloses a heating appliance including a housing having a front plate, a back plate, and a number of side plates disposed between the front and back plates; a controller, e.g. a Micro Controller Unit, operable for controlling general operations of the appliance; and a control panel connected with the controller via a wired or a wireless connection for activating the general operations and changing setting. An attaching means is disposed between the control panel and the housing for attaching the control panel to the housing, also for allowing the control panel to be detached from the housing. In this way, the installer or the user can remove the control panel and take the control panel with him to see all the time the impact of the setting change. In addition, when the controller needs programme updated, the updating can be done only to the detached control panel, and then, the controller is able to receive the updating instruction via the communication with the control panel.

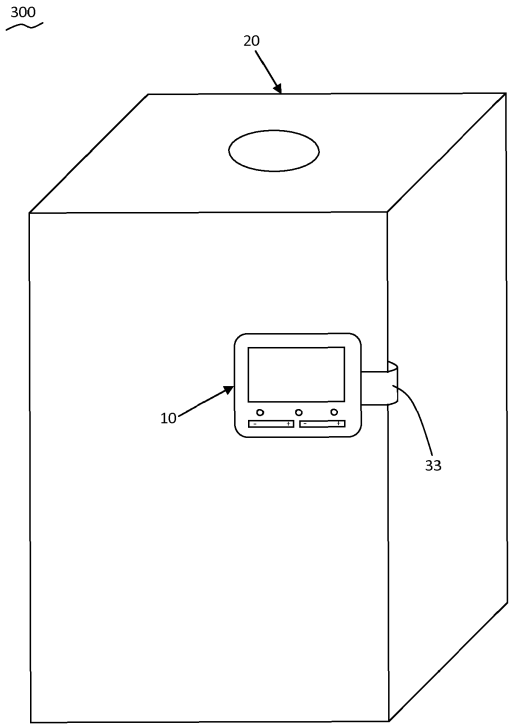

Fig. 6

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a home appliance, such as a heating appliance, and more particularly to a home appliance having a removable control panel and a system including the home appliance.

BACKGROUND OF THE INVENTION

[0002] Home appliances, such as domestic heating appliances generally include water heaters or boilers. A typical water heater is able to supply hot water for sanitary use, such as use in the kitchen, laundry, and bath. A typical boiler is able to supply hot water which is pumped around a water circuit. The water circuit is typically connected, via suitable valves to space heaters, such as radiators or under floor heating loop, through which the heat from the water is transferred into the room. The water is heated to a preset working temperature by heat generators like burners for fuel-burning type heating appliances, or electric tubes for storage type electric heating appliances. A controller contained in main body of the heating appliance can perform general operations of the appliance, such as starting up the burner, or activating water circulation pump. A control panel is generally fixed on outer surface of the appliance and electrically connected with the controller to offers an interface means through which users can activate general operations and/or change settings of the appliance.

[0003] However, the conventional fixed installation means may cause inconvenience for installers or users when in installation, maintaince, or use. For example, the appliance has to be deassembled as its controller needs programme upgraded; moreover, the installer or the user has to move to the place where the appliance was mounted to change the settings and see the impact of the setting changes.

SUMMARY OF THE INVENTION

[0004] It is an object of present invention to provide a home appliance with a removable control panel to facilitate the installation, maintaince, or use.

[0005] It is another object of present invention to provide a system including the home appliance with removable control panel.

[0006] According to one aspect of the present invention there is provided a home appliance including a housing having a front plate, a back plate, and a number of side plates disposed between the front and back plates; a controller, e.g. a Micro Controller Unit, operable for controlling general operations of the appliance; and a control panel connected with the controller via a wired or a wireless connection for activating the general operations and changing setting. An attaching means is disposed between the control panel and the housing for attaching the control panel to the housing, also for allowing the control panel to be detached from the housing. In this way, when the controller needs programme updated, the updating can be done only to the detached control panel, and then, the controller is able to receive the updating instruction via the communication with the control panel.

[0007] In one embodiment, the attaching means includes a clamp extending from main body of the control panel to be engaged with one edge of one of the front and side plates.

[0008] Preferably, the edge of one of the front and side plates is formed in beveled. By this configuration, the clamp can be engaged with the housing more readily.

[0009] In a variant embodiment, the attaching means includes a magnet incorporated with the control panel to secure the control panel onto the housing.

[0010] In an another variant embodiment, the attaching means includes a connector incorporated with the control panel, and a complementary connector incorporated with one of the front and side plates. By this means, the control panel can be plugged onto the housing and in the meantime establish an electrical connection therebetween.

[0011] According to another aspect of the present invention there is provided a system including a first home appliance as aforementioned and a second home appliance. Wherein the control panel is able to communicate with the second home appliance, thereby activating general operations and/or changing settings of the appliance. In this way, both of the first and the second home appliances can share the same control panel, which obviously results in a cost reduction.

[0012] Preferably, the control panel is able to be attached to and detached from a housing of the second home appliance via the attaching means thereof. By this configuration, for large multi-energy systems, this removable means allows the installer or the user to take the control panel with him and see all the time the impact of the setting changes.

[0013] The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter which form the subject of the claims of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] For a more complete understanding of the present invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view showing a home appliance with a control panel in accordance with a first embodiment of present invention;

FIG. 2 is a perspective view showing the main body

of the home appliance in Fig. 1, wherein the control panel has been removed;

FIG. 3 is a schematic diagram illustrates a wired connection between the main body of the appliance and the control panel shown in Fig. 1;

FIG. 4 is a schematic diagram showing a home appliance with a control panel in accordance with a second embodiment of present invention;

FIG. 5 is a schematic diagram illustrates a wireless connection between the main body of the appliance and the control panel shown in Fig. 4;

FIG. 6 is a perspective view showing a home appliance with a control panel in accordance with a third embodiment of present invention;

FIG. 7 is a top view schematically showing the control panel in Fig. 6;

FIG. 8 shows a schematic diagram of the housing of the home appliance in Fig. 6;

FIG. 9 shows a functional diagram of a system in accordance with one embodiment of present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] Reference will now be made to the drawing figures to describe the preferred embodiments of the present invention in detail. However, the embodiments can not be used to restrict the present invention. Changes such as structure, method and function obviously made to those of ordinary skill in the art are also protected by the present invention.

[0016] In accordance with the embodiments of the present invention, which will be described hereinafter, the home appliance takes the form of a wall-hung gas boiler, however, person skilled in the art will recognize that, the home appliance may take a variety of other forms such as an electric storage type water heater, a refrigerator, or an air conditioner etc.. Referring to Fig. 1, in conjunction with Figs. 3 and 5, the gas boiler typically includes a housing 20, a controller 40, a gas burner 50, a main heat exchanger 60, a second heat exchanger 70, and a gas exhaust device 80.

[0017] Also referring to Fig. 4, the housing 20 can take the form of a brick-like body. Generally, the housing 20 includes a number of metallic plates, such as a front plate 21, a back plate 22, and four side plates 23 connected between the front and the back plates. The housing 20 can be mounted to a wall (not shown) of a building with its back plate 22 facing the wall.

[0018] The controller 40 is capable of controlling general operations of the appliance, such as starting-up of the burner 50, running of an fan (not shown) to expel flue gas through the gas exhaust device 80, and performing a circulation pump to drive water to circulated in a water circuit, etc.. The controller 40 may incorporate a Micro Controller Unit (MCU) including a processing unit, and non volatile memory means such as ROM and/or EPROM and/or EEPROM or Flash. Of course, the controller 40 can also use other types of integrated circuits, such as Application Specific Integrated Circuit (ASIC) and Field Programmable Gate Array (FPGA) etc.. As controlling of electronic components of the gas boiler by means of the controller 40 is known in the art, a detailed description is omitted for purpose of brevity and simplicity.

[0019] The burner 30 may be constituted by a number of burner blades (not shown) arranged side by side. Each burner blade generally defines therein a gas-air mixture passage for mixing fuel gas and combustion air, and delivering the gas-air mixture to top thereof for being ignited and burning. The main heat exchanger 60 is placed above the burner 30. The main heat exchanger 60 may include multiple heat absorbing fins and a heat absorbing pipe passing through the multiple heat absorbing fins. The heat absorbing pipe is connected with an upstream water supply channel and a downstream water delivering channel. Water passing through the upstream water supply channel is then heated in the main heat exchanger 60 by heat interchanging with combustion exhaust gas of the burner 50. Heated hot water is then fed to the downstream water delivering channel and further delivered to external water circuit for space heating. The second heat exchanger 70 may be a conventional plate heat exchanger typically uses metal plates to transfer heat between water circulated in the internal water circuit and water to be delivered outside for sanitary purpose.

[0020] Referring to Figs. 1 through 3, which show a first embodiment of present invention. The gas boiler 100 further includes a control panel 10 capable of communicating with the controller 40 for signal or data transmission. The control panel 10 includes a display unit 11 and a switching means 12. The display unit 11 can be an LCD display. The switch means 12 may include a number of push buttons, which are able to be operated by users to activate certain operation of the appliance, change the settings like required temperature of water, or switch among a variety of working modes.

[0021] The control panel 10 is attached to the housing 20 via an attaching means. The attaching means is so configured that it can be used not only for attaching the control panel to the housing but also for allowing the control panel to be detached from the housing and moved to other places. In this embodiment, the attaching means includes a connector incorporated with the control panel 10 and a complementary connector incorporated with one of the front and side plates 21, 23 of the housing 20. For example, a male electric connector (not shown) is integrally formed at back of the control panel 10, and a

female electric connector 31 is integrally formed in the front plate 21 of the housing 20. By this means, the control panel 10 can be plugged onto and unplugged from the front plate 21 of the housing 20. As shown in Fig. 3, in the meantime, the control panel 10 and the controller 40 establish an electrical wired connection via engagement of the male and the female connectors.

[0022] Fig. 4 illustrates a second embodiment of the home appliance 200, and the modification of this embodiment with respect to the first embodiment is the attaching means, therefore, the description of other parts and components which are the same or alike as those of the first embodiment will be omitted for sake of brevity and clarity. In this embodiment, the attaching means 32 employs a magnet 32 incorporated with the control panel 10. For example, the magnet 32 may be integrally formed at back of the control panel 10, by this configuration, the control panel 10 can be removed easily from the housing 20 and attached to other home appliance close to the installer or the user, such as outer surface of a refrigerator or an air conditioner. Also referring to Fig. 5, in this case, the control panel 10 communicates with the controller via a wireless connection, e.g., via radios.

[0023] Figs. 6 and 7 illustrate another variant embodiment of the attaching means of the home appliance 300. In this embodiment, the attaching means 33 is integrally extending from main body of the control panel 10 and further bending to form a clamp. The control panel 10 can be attached to the housing 20 by the clamp 33 clamping one edge of one of the front and side plates. With reference to Fig. 8, in a preferred embodiment, the front and side plates 21, 23 has beveled edge 211, 231 so as to facilitate the control panel 10 attaching to the housing 20 more easily. When the installer or the user would like to see the temperature all the time, the user can release the clamp 33 and take the control panel 10 with him or clamp it to other place within his visual range. Similar to the second embodiment, in this case, the control panel 10 communicates with the controller 40 via a wireless connection as shown in Fig. 5.

[0024] It would be apparent to those skilled in the art that, the variety of forms of the attaching means described in aforementioned embodiments can be combined with each other. For example, in a preferred alternative embodiment, the attaching means can include both connector assemblies and the magnet, or include both connector assemblies and the clamp, or include both the clamp and the magnet, or include all of the connector assemblies, the magnet, and the clamp.

[0025] Fig. 9 shows a system which employs the gas boiler 100 (namely a first home appliance) as described in previous embodiments. Besides the gas boiler 100, the system also includes other forms of home appliance (name a second home appliance), like a storage type water heater 400 and a refrigerator 500. In this embodiment, the water heater 400 and the refrigerator 500 share the control panel 10 of the gas boiler 100, in other words, the control panel 10 is able to communicate with internal controllers (not shown) of the water heater 400 and the refrigerator 500 via wired or wireless connections to set or monitor parameters and control general operations of the appliances.

[0026] The attaching means described in previous embodiments can also be applied to the water heater 400 and the refrigerator 500. In other words, the control panel 10 is able to be attached to or detached from a housing of the second home appliance via a clamp or a magnet or male and female connectors. By this configuration, for large multi-energy systems, this removable means allows the installer or the user to take the control panel with him and see all the time the impact of the setting changes. The system 1 further comprises an electronic device 600 communicating with the control panel 10. In this embodiment, the electronic device 600 can be a temperature sensor for detecting room temperature, and the control panel 10 can receive the signal representing the room temperature from the sensor and transmit it to the gas boiler 100 for the controlling accordingly.

[0027] It is to be understood, however, that even though numerous, characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosed is illustrative only, and changes may be made in detail, especially in matters of number, shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broadest general meaning of the terms in which the appended claims are expressed.

Claims

1. A home appliance (100, 200, 300) comprising:

   a housing (20);
   a controller (40) contained in the housing for controlling general operations of the home appliance;
   a control panel (10) in communication with the controller; and
   an attaching means (31, 32, 33) for attaching the control panel to the housing, also for allowing the control panel to be detached from the housing and moved to other places.

2. A home appliance according to claim 1, wherein said housing has a front plate (21), a back plate (22), and a plurality of side plates (23) disposed between the front and the back plates; and wherein said attaching means comprises a clamp (33) extending from main body of the control panel to be engaged with one edge (211, 231) of one of the front and side plates.

3. A home appliance according to claim 2, wherein said edge of one of the front and side plates is formed in beveled.

4. A home appliance according to any of preceding claims, wherein said housing is made of metallic materials, and said attaching means comprises a magnet (32) incorporated with the control panel to secure the control panel onto the housing.

5. A home appliance according to any of preceding claims, wherein said attaching means comprises a connector incorporated with said control panel, and a complementary connector (31) incorporated with one of said front and side plates.

6. A home appliance according to claim 1, wherein said control panel communicates with the controller through a wired or a wireless connection.

7. A home appliance according to claim 1, wherein said control panel comprises a display unit (11) and a switching means (12).

8. A system (1), comprising:

a first home appliance according to any of the claims 1-7;
a second home appliance, said second home appliance communicating with and being controlled by the control panel of the first home appliance.

9. A system according to claim 8, wherein the control panel is able to be attached to and detached from a housing of the second home appliance via the attaching means thereof.

10. A system according to claim 8, further comprising an electronic device communicating with the control panel.

11. A system according to claim 10, wherein said first home appliance is a boiler, and said electronic device is a temperature sensor for detecting the temperature of the room where the first home appliance is located.

Amended claims in accordance with Rule 137(2) EPC.

1. A system (1) comprising a first home appliance (100, 200, 300) comprising a housing (20); a controller (40) contained in the housing for controlling general operations of the home appliance; a control panel (10) in communication with the controller; and an attaching means (31, 32, 33) for attaching the control panel to the housing, also for allowing the control panel to be detached from the housing and moved to other places; **characterized in that** the system further comprises a second home appliance, said second home appliance communicating with and being controlled by the control panel of the first home appliance.

2. A system according to claim 1, wherein said housing has a front plate (21), a back plate (22), and a plurality of side plates (23) disposed between the front and the back plates; and wherein said attaching means comprises a clamp (33) extending from main body of the control panel to be engaged with one edge (211, 231) of one of the front and side plates.

3. A system according to claim 2, wherein said edge of one of the front and side plates is formed in beveled.

4. A system according to any of preceding claims, wherein said housing is made of metallic materials, and said attaching means comprises a magnet (32) incorporated with the control panel to secure the control panel onto the housing.

5. A system according to any of preceding claims, wherein said attaching means comprises a connector incorporated with said control panel, and a complementary connector (31) incorporated with one of said front and side plates.

6. A system according to claim 1, wherein said control panel communicates with the controller through a wired or a wireless connection.

7. A system according to claim 1, wherein said control panel comprises a display unit (11) and a switching means (12).

8. A system according to claim 1, wherein the control panel is able to be attached to and detached from a housing of the second home appliance via the attaching means thereof.

9. A system according to claim 1, further comprising an electronic device communicating with the control panel.

10. A system according to claim 9, wherein said first home appliance is a boiler, and said electronic device is a temperature sensor for detecting the temperature of the room where the first home appliance is located.

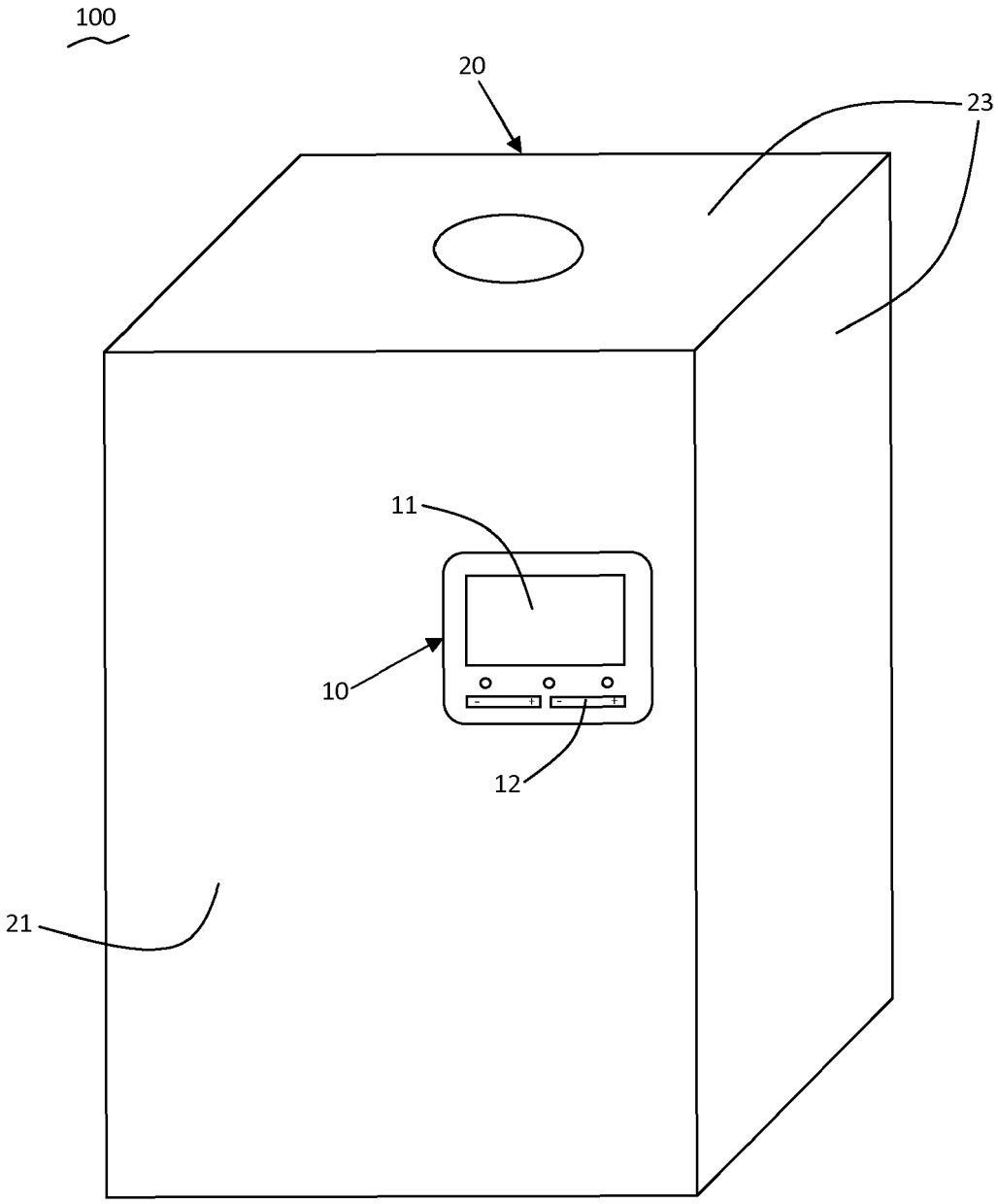

Fig. 1

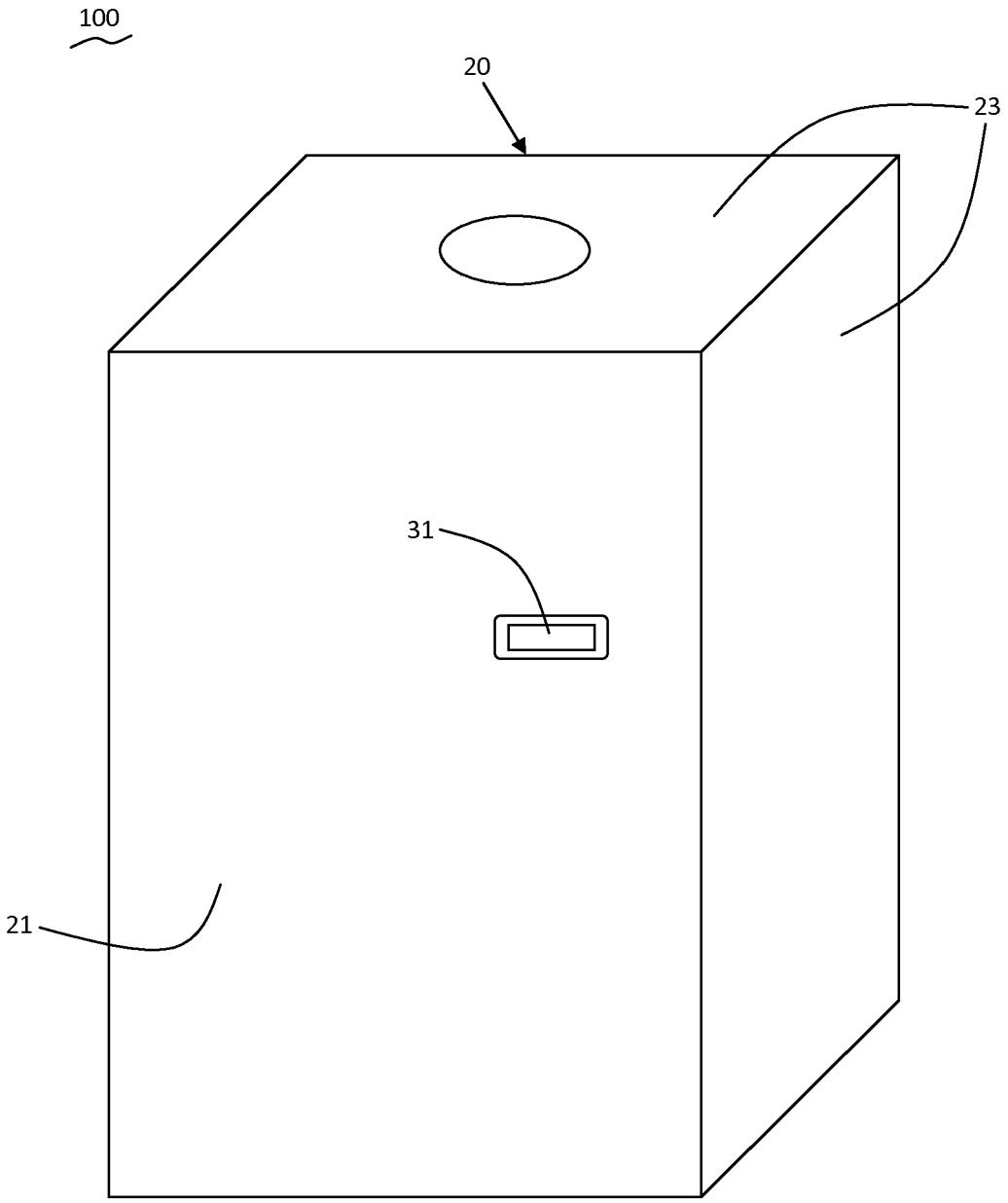

Fig. 2

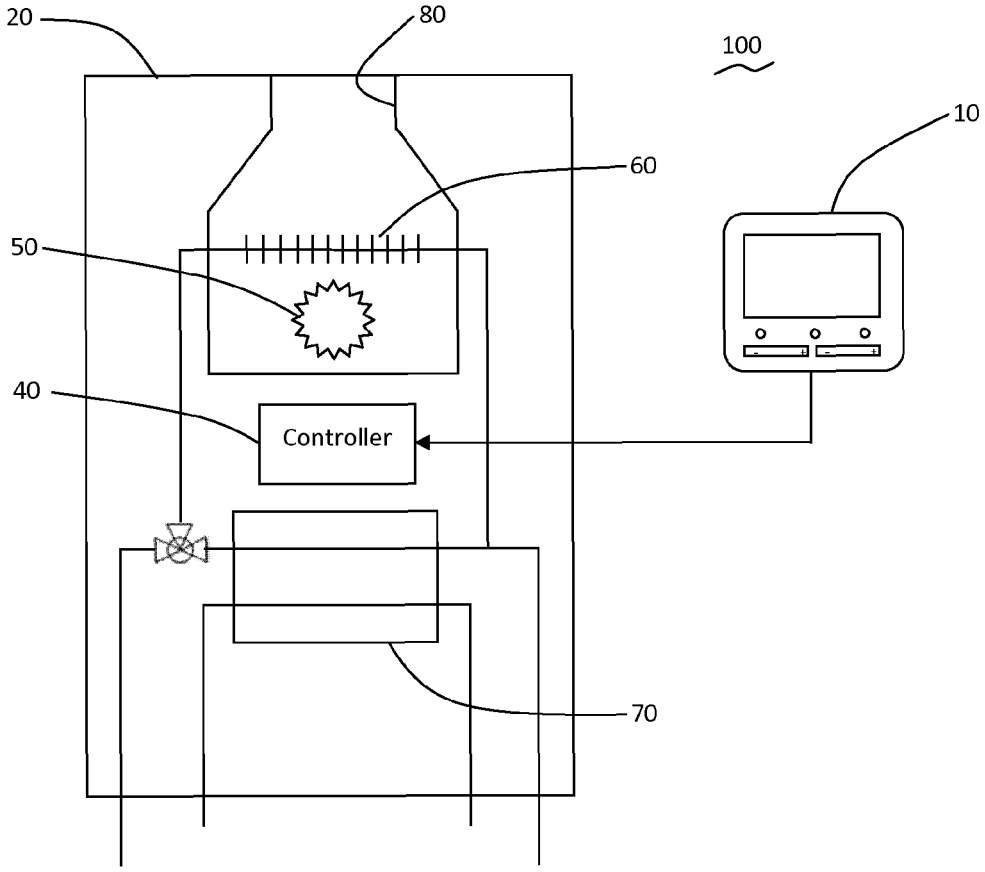

Fig. 3

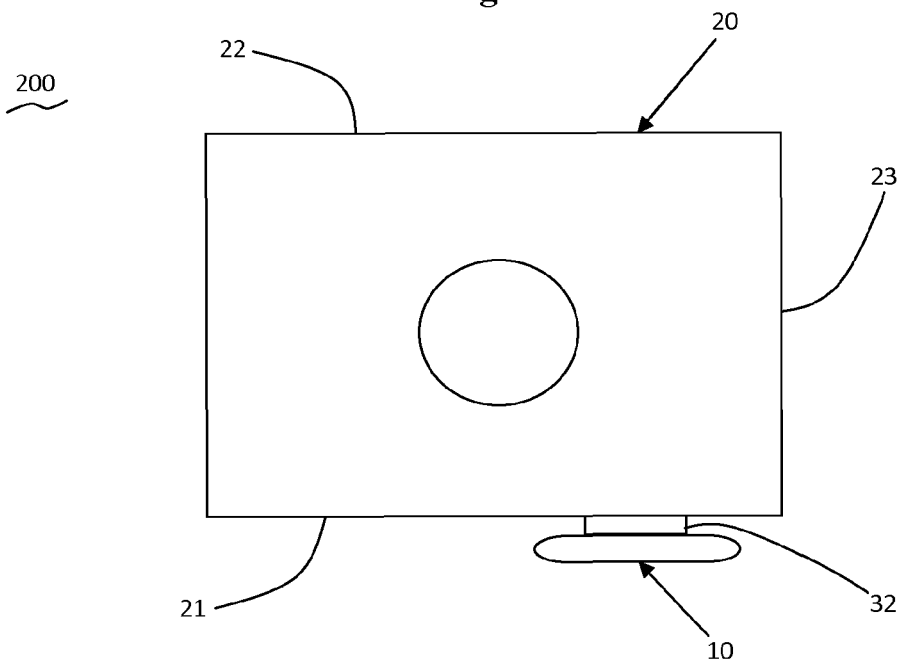

Fig. 4

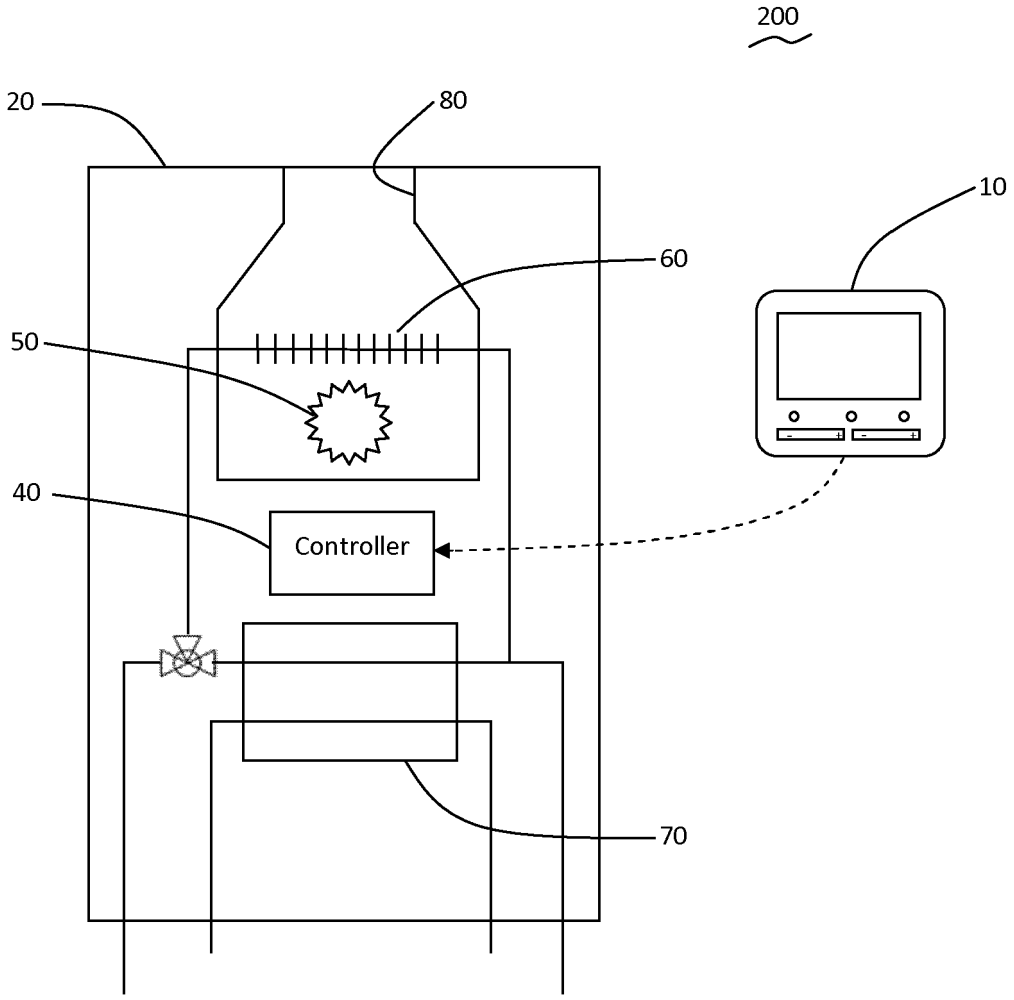

Fig. 5

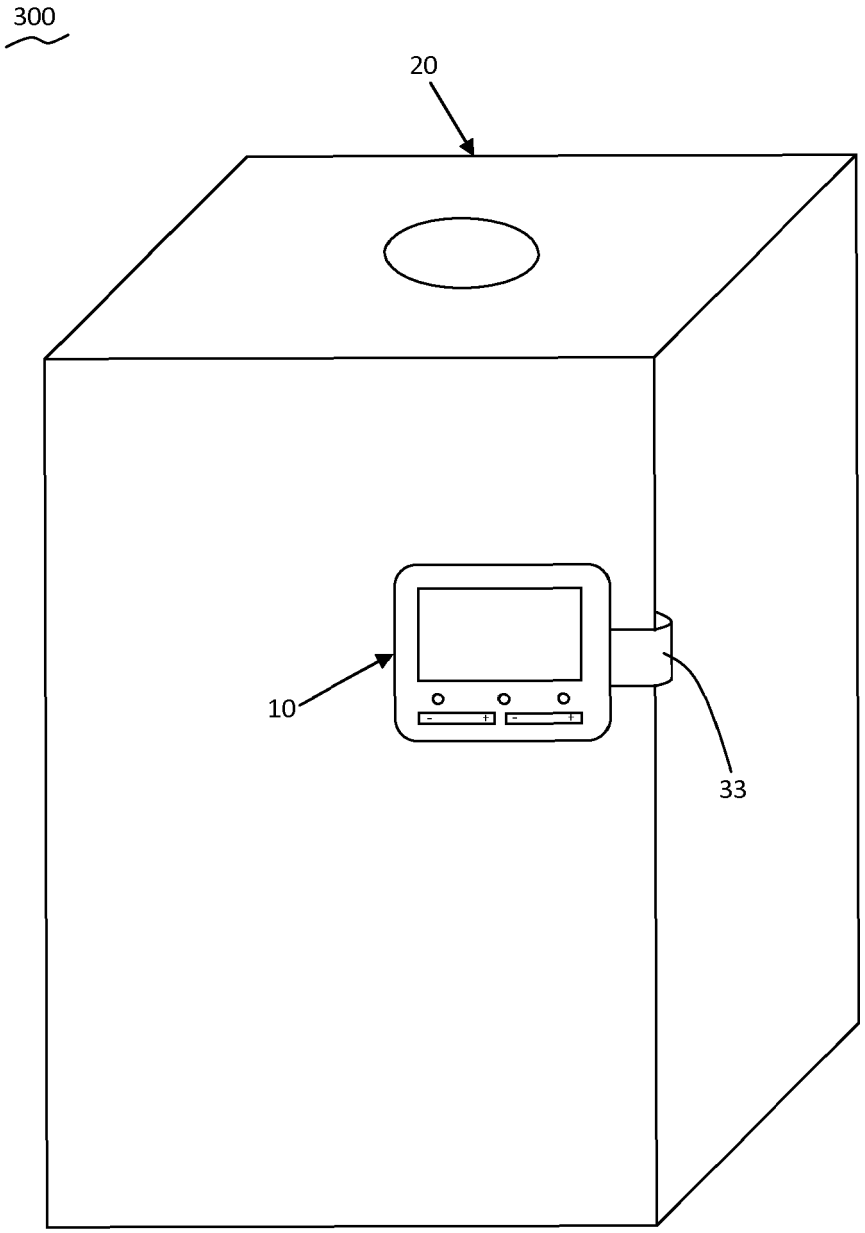

Fig. 6

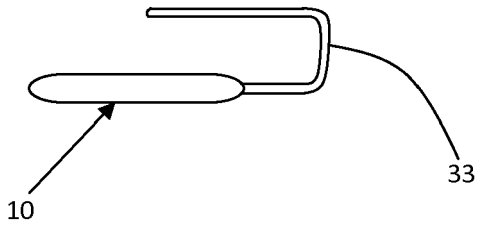

Fig. 7

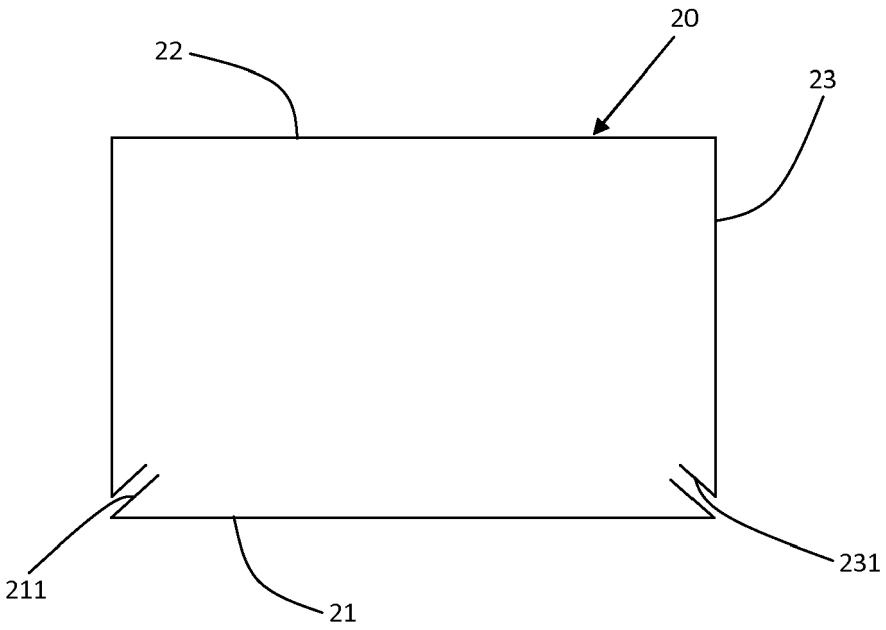

Fig. 8

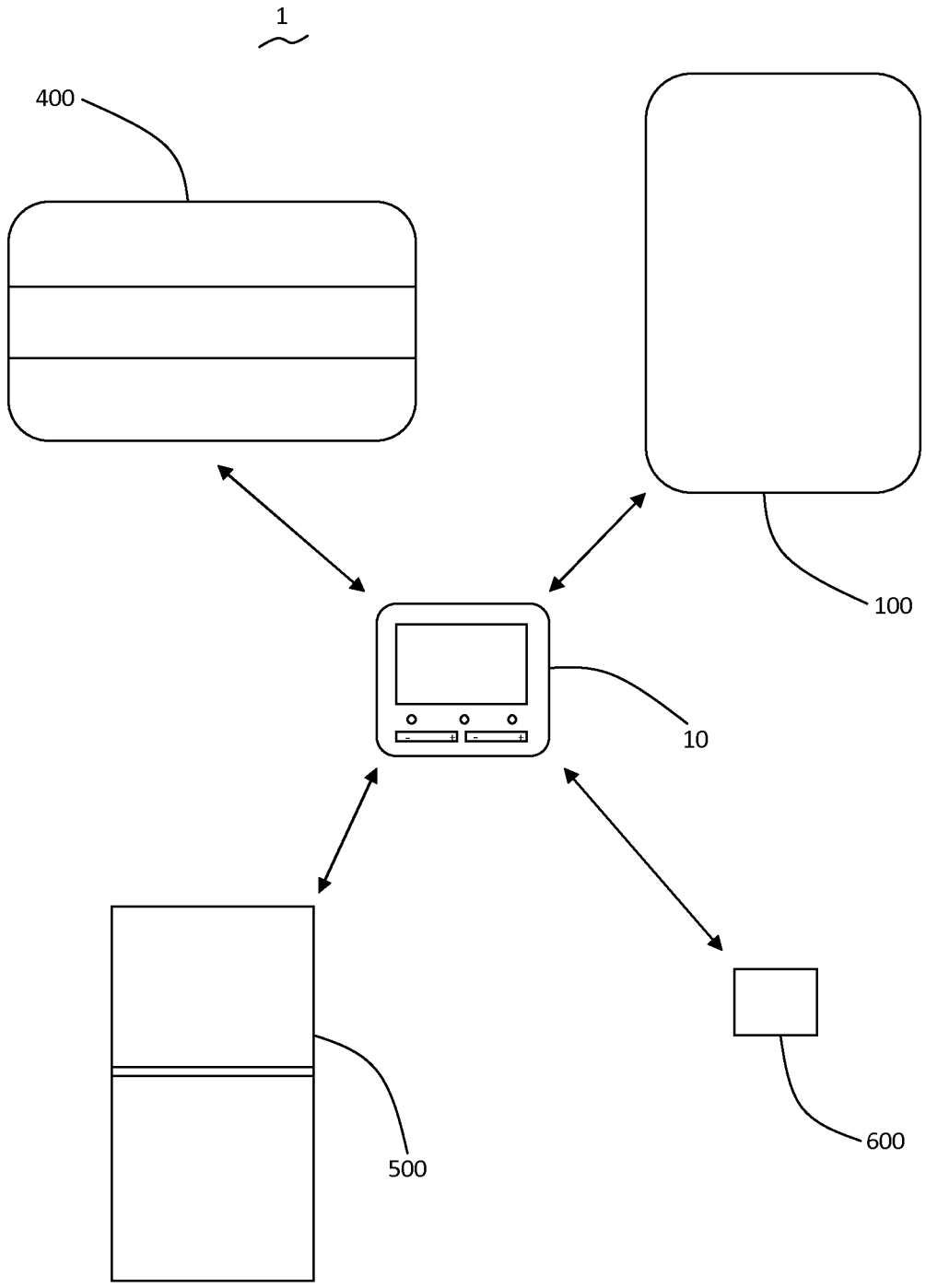

Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 14 16 6952

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	EP 0 971 181 A2 (SANCHEZ NAVARRO ALFREDO [ES]) 12 January 2000 (2000-01-12) * paragraphs [0006] - [0029]; figures 1-3c * -----	1-11	INV. F24H9/20
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			TECHNICAL FIELDS SEARCHED (IPC) F24H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 October 2014	Schwaiger, Bernd

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 16 6952

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
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09-10-2014

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