(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 September 2015 (24.09.2015)

WIPO | PCT

(10) International Publication Number
WO 2015/140516 A1

(51) International Patent Classification:
G05D 23/19 (2006.01) *F24D 19/10* (2006.01)

(21) International Application Number:
PCT/GB2015/050733

(22) International Filing Date:
13 March 2015 (13.03.2015)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1405020.7 20 March 2014 (20.03.2014) GB

(71) Applicant: **NETTHINGS LIMITED** [GB/GB]; 14 New Mart Road, Edinburgh Lothian EH14 1RL (GB).

(72) Inventor: **BACH, Harry William**; 6 Saxe Coburg Street, Edinburgh Lothian EH3 5BN (GB).

(74) Agent: **IPENTUS LIMITED**; Dr Arlene Campbell, The Old Manse, Wilsontown by Forth, Lanark, Strathclyde ML11 8EP (GB).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

(54) Title: HEATING CONTROL SYSTEM

(57) Abstract: A central heating control system for controlling the central heating of a dwelling. A central heating system, adapted to be powered using a resource, is provided with a control module for switching the heating system between on and off modes in response to signals at a transceiver. A user selects a desired time, via an internet enabled device, at which they wish the dwelling to be heated. Using stored information the control module determines a time period for the central heating system to be on to have the dwelling heated by the desired time. An advanced time is then calculated to precede the desired time by the time period. The transceiver then turns the heating system on at the advanced time. The internet enabled device may be a smartphone, tablet or computer to allow remote control and thereby provide active management of resource usage.

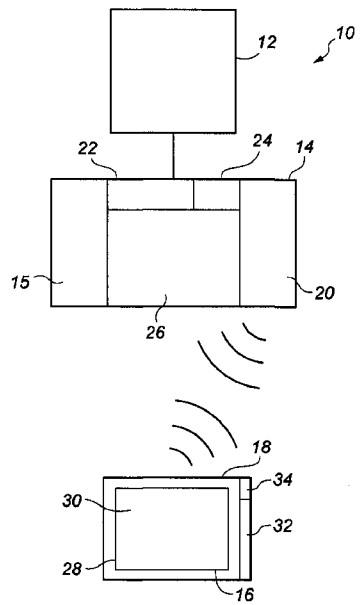

Fig. 1

WO 2015/140516 A1

HEATING CONTROL SYSTEM

The present invention relates to a central heating control system for controlling the central heating of a dwelling and in particular, though not exclusively, the invention relates to a central heating control system which offers a user the opportunity to set a desired time at which they wish the property to be heated and the system determines the most efficient usage of resource to achieve this.

Excessive consumption of natural resources is an increasing problem. Such consumption depletes natural resources and, in turn, this can cause environmental problems as well as causing an increase in the cost of these resources such as oil and gas. As a result, these rising costs can put significant strain on the budgets of users of the resources.

Awareness campaigns to try and encourage more careful use of natural resources on a personal basis has made knowledge of the issues mainstream, however, awareness raising has not been successful in seeing the changes in behaviour required for significant conservation of resources with increased utility use.

When managing use of these resources, for example, the use of electricity within a school building or office building or even within a home, the abstract measure of utility consumption based simply on the use of appliances means that it is difficult for individuals to correlate particular actions to, for example, have a reduced use of power or water. This is compounded by the utilities companies sending out monthly or quarterly bills, which means, that any specific action is lost within the context of utility consumption over a period of thirty days or more.

To overcome this disconnection between the actions which use the utilities and the overall resource consumption, a variety of different utility monitoring systems have been developed. These utility monitoring systems monitor the consumption of utilities such as gas, electricity, LPG, oil and water and provide an easy to interpret display which enables users to assess the current level of usage and compare this to an optimum or maximum desired level of usage. By having the connection between actual usage and optimal usage clearly visible and easy to interpret, users can, in real time, modify their behaviour and see the results in terms of utility consumption.

Such a utility monitoring system is disclosed in WO 2008/025939 to the present applicants wherein the energy monitoring system determines threshold and maximum consumption values then monitor's ongoing resource usage, providing a graphical display output which a user can easily interpret to understand how current resource consumption compares to the threshold and maximum consumption values.

However, these monitoring systems can only notify a person of their resource usage against a predetermined criterion and provide no direct control over the resource usage. Meter resources such as oil and bottled gas are not monitored due to their being pre-paid.

For most households, the largest resource usage is needed to heat the home and provide hot water. In order to manage the resource usage, central heating systems in most dwellings typically have a programmable timer to set the times when the heating is desired to be on or off. They may also have a thermostat to allow for temperature control though it is more common for one merely to turn the boiler on and off to control the temperature.

It is recognized that a typical dwelling will take a certain amount of time to heat the property once the boiler has been switched on. There will be a number of variables which affect this timing such as the inside temperature of the dwelling, the outside temperature of the dwelling, the thermal mass of the dwelling and the power rating of the boiler in use. As these are variable, a user wishing to, for example, rise in the morning to a warm house, will typically set the timer on the boiler to come on one or even two hours ahead of when the property is desired to be heated. Equally, if a person has an expectation that they will arrive home from work say, at a predetermined time such as 5 p.m., they will again set the timer on the boiler to come on at 3 or 4 p.m. in the afternoon in an attempt to ensure that the property is warm for their arrival. For larger buildings such as offices and schools, the length of time required to heat the property is much more difficult to estimate.

As a result, it is common for users to leave heating permanently on and not use timer controls. It is clear that by not switching heating on and off, a considerable amount of resource wastage occurs. For those who estimate how long the heating should be on for before they return to the property or get up in the morning, a considerable amount of resource usage can be wasted if indeed the property takes less time to heat than has been estimated or in the reverse case where they have not set the timer to give sufficient time for the property to

heat, they will return to a cold property. There will then be a sufficient amount of resource wastage used in typically finding other sources of heat such as electric fires, fan heaters and the like which the user will switch on as they feel the property is cold. It is known that a user who heats a property in such a rapid fashion is unlikely to reduce the heating and resource usage at a later time when the desired temperature has been reached. Additionally a significant amount of resource usage is used to heat a property in such a rapid manner.

It is an object of the present invention to provide a central heating control system which obviates or mitigates at least some of the disadvantages of the prior art.

It is a further object of the present invention to provide a central heating control system which manages resource usage more effectively in heating a property.

According to a first aspect of the present invention there is provided a central heating control system, comprising:
a central heating system adapted to be powered using a resource;
a control module in contact with the central heating system, the control module including switching means to turn the central heating system between on and off modes, a control processor for operating the switching means, a storage means for storing information on the central heating system, a transmitter for transmitting signals relating to the mode, and a receiver for receiving signals relating to the mode; and
a graphical user interface adapted for display on a screen, the interface including an interface processor for operating on user inputs to the interface, a transmitter for transmitting signals relating to the mode, and a receiver for receiving signals relating to the mode and characterised in that:
a user input is made by selecting a desired time at which a user wishes a property to be heated by the central heating control system; and
the desired time is transmitted to the control module and acted on by the control processor to operate the switching means to thereby turn on the central heating system at an advanced time, the advanced time being calculated from a time period between the advanced time and the desired time, the time period being determined from the stored information as the time required to heat the property.

In this way, the central heating system will turn the boiler on for the required period of time to heat the property. This provides the most efficient resource usage.

Preferably, the central heating system includes at least one temperature sensor. In this way, the current temperature can be used in order to more accurately determine the time period. This increases the efficiency of resource usage.

Preferably, the stored information can be one or more indices selected from a group comprising: internal thermal mass of the property, inside temperature, outside temperature, efficiency of the boiler, rate of heating against time, rate of heating against time for varying background temperatures, and previous time periods. In this way, the time period can be more accurately determined for environmental conditions and more frequent use.

Preferably, the graphical user interface is displayed on an internet enabled device. Internet enabled devices may be mobile phones such as smart phones, tablets and computers. In this way, the user can be remote from the central heating system to operate it. Thus if, say, the user knows they will be late home from work they can access the graphical user interface as an App or on a web-site and change the desired time so that the property will not be heated unnecessarily. This saves on resource usage in not heating the property when it is not occupied.

Additionally, they may use an internet enabled device when in the property removing the requirement to go to the site of the heating control module to adjust the modes. As people now carry their mobile phones with them at all times, this further simplifies resource management and encourages the user to adjust the desired time whenever they receive information on when the property will be occupied and needing to be heated.

Preferably, the control module includes setting means to adjust a temperature of the central heating system and signals relating to the temperature are transmitted and received between the control module and the graphical user interface. More preferably, the display shows the temperature of the heating system. In this way, a user can determine what temperature has been set for the heating system.

Preferably, the graphical user interface includes adjustment means to provide a user input of a desired temperature for the heating system. In this way, the temperature can be set remotely by a user and thus further manage the resource usage.

Preferably, the graphical user interface displays one or more signals from other transmitters. In this way, data collected from other web-sites or other modules can be displayed. Preferably the signals display information selected from a group comprising: time of dawn, time of dusk, predicted outside temperature, current outside temperature, time period of lower tariff on the utility and public holidays. In this way, the additional information can assist a user in optimising the temperature and desired times to be set to optimise resource usage to save energy.

Preferably, the graphical user interface displays one or more signals from other stored information on the internet enabled device. In this way, information personal to the user can be displayed. Preferably the signals display information selected from a group comprising: users holidays, users appointments, current air temperature in property, predicted air temperature in property; and previously stored desired times. In this way, the additional information further assists a user in optimising the temperature and desired times to be set to optimise resource usage to save energy.

Preferably, the central heating system is divided into zones and wherein the control module and the graphical user interface are adapted to provide desired times with respective on and off modes to the zones individually. This allows a user to only heat areas of the property which will be occupied, thus providing an opportunity for further energy savings.

Resources will be understood to herein refer to any energy supply including utility services used by the public including, but not limited to, various types of energy supplies such as electricity and gas as well as renewable supplies. Oil tanks, gas tanks, bottled gas, coal and wood are also included.

An embodiment of the present invention will now be described, by way of example only, with reference to the accompanying figure.

Reference is initially made to Figure 1 of the drawings which illustrates a central heating control system, generally indicated by reference numeral 10, according to an embodiment of the present invention. The central heating control system 10 includes a central heating system 12, a control module 14 including a storage device 15 and a graphical user interface 16 located on an internet enabled device 18.

The central heating system 12 is any arrangement which provides heating by a resource to premises which is preferably a domestic property. As an example, we will consider a gas fired boiler being used to heat a series of radiators across a four bedroom property. Hot water can also be provided.

In a traditional central heating system the boiler will be set at a fixed temperature. A thermostat at a single location in the property allows a user to select a desired temperature for the property. If the heating is set to run constantly, the boiler will be switched on and left to run until such time as the thermostat reaches the desired temperature. Once at the desired temperature the boiler is switched off until the thermostat drops below the desired temperature whereupon it is switched on again. A separate thermostat located at the hot water tank will operate in the same manner. Typically there will also be a control module which includes a clock so that a user can set times for when the central heating system will be on and off. This timer control module is as described hereinbefore as the prior art.

In the present invention, the control module 14 includes the facility 22 to switch on and off the boiler and a facility 24 to adjust a temperature of the boiler via a control processor 26. It may also be connected, via hard wire or wireless, to one or more temperature sensors located around the property and in the hot water tank. There may also be a connection to a temperature sensor located outside the property. The control module 14 includes a transceiver 20, capable of sending and receiving signals. The control module 14 may be internet-enabled such that the signals are sent via the internet to a remote site for processing and onward transmission or reception. The control module 14 also includes a storage device 15 in the form of a computer memory. Data can be preloaded into the storage device 15 and/or continuously recorded as the system 10 is operated.

Control of the central heating system 12 is achieved from the internet enabled device 18. The device 18 will include a screen 28 providing a display 30 created by the graphical user

interface 16. The interface 16 will include an interface processor 32 coupled to a transceiver 34 for the transmission and reception of signals to and from the device 18 together with inputs made by a user on the device 18. Those skilled in the art will recognise that the internet enabled device 18 may be a mobile phone, such as smart phone, tablet, computer or the like.

A user will access a web-site via by it's internet address or directly as an App. The web-site, or App, will provide a display 30 on the graphical user interface 16. The display may indicate settings stored in the storage device 15, such as when the boiler is intended to be turned on and off or previously stored desired times for when the property should be heated. The display 30 will also provide an input for a user to select or change a desired time for the property to be heated. For example, if a user decides to come home from work early, he may change the desired time for that day from 6pm, say, to 2pm.

Changes to the desired time can be made by the user touching a screen 28 of the display 30 where the screen 28 is a touch screen as is known in the art. Alternatively, contact can be made by pointing and clicking at a position on the screen 28 using a mouse or touchpad as is also known in the art. Any form of known input can be used, including via a numerical keypad. The input transmitted from the internet-enabled device 18 to the control module 14 will signify a desired time at which the user wishes the central heating system 12 to have heated the property.

With the desired time known, the control processor 26 then calculates a time period. The time period is determined as the time required to bring the temperature of the property up to a required value by switching on the boiler. The required value may be that set on a thermostat within the property or it may be a value set by a user on the internet enabled device 18. The time period can be: obtained from a look-up table in the storage device 15; calculated from values stored in the storage device 15; calculated from values obtained from sensors around the property; or, preferentially, calculated from stored values and from values obtained from sensors around the property.

For instance, if the user inputs that they wish the property to be heated for a desired time of 6pm, the control processor can access the storage device and search for a previously stored desired time of 6pm. If the desired time is stored, the processor can use values stored with it

such as time period and temperature of the boiler, to determine values to be set to cause the processor to switch the boiler on at an advanced time. The advanced time will represent the desired time minus the time period stored in the storage device 15. Thus, say, the property took 47 minutes from switching on the boiler to recording a required temperature at the thermostat, the time period will be 47 minutes and the advance time will be 5.13pm. Accordingly at 5.13pm, the boiler will switch on and the property will be heated by 6pm, for the user returning home.

If the user sets a desired time at a present time, and the time period calculated requires an advanced time which is ahead of the present time, the processor 26 may either: send a signal to the internet enabled device 18 so that the display 30 indicates that there is insufficient time to heat the property and gives the user an indication of when the property can be heated i.e. the present time plus the time period; or, the processor calculates an available time period i.e. the desired time minus the present time and from this equates an increased boiler temperature required to achieve the required temperature of the property at the desired time. The control module then switches on the boiler and adjusts the temperature of the boiler to the calculated value.

The time period can also be calculated taking into effect the actual or predicted temperature inside the property and/or the actual or predicted outside temperature. These values can be recorded from sensors located at the property and the predictions stored in the device 15. Such values can assist in better determining the time period where, for example, the property has been empty while the occupants have been on holiday, and thus the temperature may be very low.

In a further embodiment, the property can be sectioned into zones and a desired time set for each zone. In this way, only parts of the property are heated as required which further improves the efficiency of and resource management in property.

Once a user selects one or more desired times on the display 30, the user can confirm the settings and the interface processor 32 will send signals representative of the data, via the internet from the transceiver 34. The signals can be routed through a remote server which can store data on behalf of the user and their premises. The data is then transmitted, via the internet, to the transceiver 20 of the control module 14. The control processor 26 interprets

the data and switches 22 on the central heating system 12 at the advanced time calculated from the time period.

By storing data during use, a user may be provided with an option to use a previously stored profile/desired time i.e. it prepopulates the system with data selected. For example, one profile may be used for Mondays to Fridays and a second profile used for Saturdays and Sundays. The display 30 will show each profile depending on the day of the week selected and a user can adjust these individually if required.

As the user can control the central heating system 12 from the device 18, the user has the freedom to change the settings of their central heating system 12 remotely from their property or from within the property but remote from the central heating control module 14. The central heating control module 14 can therefore be placed away from view within the property. Additionally if, say, the user knows they will be late home from work they can access the graphical user interface as an App or on a web-site and changed the desired time so that the heating is turned on later. This saves on resource usage in not heating the property when it is not occupied. Additionally, they may use an internet enabled device when in the property removing the requirement to go to the site of the heating control module to adjust the modes. As people now carry their mobile phones with them at all times, this further simplifies resource management and encourages the user to adjust the time period whenever they receive information on when the property will be occupied and needing to be heated.

In a further embodiment, not illustrated, the interface processor 32 includes logic controls. These can provide alerts to the graphical user interface if it considers an incorrect setting has been made, for example, all zones except one has been switched off over at a time during a predicted holiday. Additionally, emails or text messages could be sent to the device if there is a sudden change in circumstances such as a power cut or malfunction of the boiler.

The principle advantage of the present invention is that it provides a central heating control system in which a user can easily set time a desired time at which they require a property to be heated by. As the system then determines a time period and an advanced time to switch on the heating system, utility consumption management is made more efficient.

A further advantage of the present invention is that it provides a central heating control system which a user can adjust remotely from the property. By being able to adjust the system remotely, when a user discovers they will not be occupying the property they can turn set a later desired time so that the heating will come on later. This saves on resource usage in not heating the property when it is not occupied.

A yet further advantage of the present invention is that it provides a central heating control system which is controlled by an internet enabled device. This removes the requirement to go to the site of the heating control module to adjust the modes. As people now carry their mobile phones with them at all times, this further simplifies resource management and encourages the user to adjust the time period whenever they receive information on when the property will be occupied and needing to be heated.

It will be appreciated to those skilled in the art that various modifications may be made to the invention herein described without departing from the scope thereof. For example, although the heating system has been described as controlled, the hot water could also be controlled in a similar manner. Additionally, while one internet enabled device is described, as the system operates from a web-site/App, any number of devices can be used allowing members of a family to individually set the controls and see what changes other members of the family have made.

CLAIMS

1. A central heating control system, comprising:
a central heating system adapted to be powered using a resource;
a control module in contact with the central heating system, the control module including switching means to turn the central heating system between on and off modes, a control processor for operating the switching means, a storage means for storing information on the central heating system, a transmitter for transmitting signals relating to the mode, and a receiver for receiving signals relating to the mode; and
a graphical user interface adapted for display on a screen, the interface including an interface processor for operating on user inputs to the interface, a transmitter for transmitting signals relating to the mode, and a receiver for receiving signals relating to the mode and characterised in that:
a user input is made by selecting a desired time at which a user wishes a property to be heated by the central heating control system; and
the desired time is transmitted to the control module and acted on by the control processor to operate the switching means to thereby turn on the central heating system at an advanced time, the advanced time being calculated from a time period between the advanced time and the desired time, the time period being determined from the stored information as the time required to heat the property.

2. A central heating control system according to claim 1 wherein the system includes at least one temperature sensor.

3. A central heating control system according to claim 1 or claim 2 wherein the stored information is one or more indices selected from a group comprising: internal thermal mass of the property, inside temperature, outside temperature, efficiency of the boiler, rate of heating against time, rate of heating against time for varying background temperatures, and previous time periods.

4. A central heating control system according to any preceding claim wherein the graphical user interface is displayed on an internet enabled device.

5. A central heating control system according to claim 4 wherein the internet enabled device is selected from a group comprising: a smart phone, a tablet and a computer.

6. A central heating control system according to claim 4 or claim 5 wherein access to the graphical user interface is via an App.

7. A central heating control system according to any one of claims 4 to 6 wherein access to the graphical user interface is via a web-site.

8. A central heating control system according to any preceding claim wherein the control module includes setting means to adjust a temperature of the central heating system and signals relating to the temperature are transmitted and received between the control module and the graphical user interface.

9. A central heating control system according to claim 8 wherein the display shows the temperature of the heating system.

10. A central heating control system according to claim 8 or claim 9 wherein the graphical user interface includes adjustment means to provide a user input of a desired temperature for the heating system.

11. A central heating control system according to any preceding claim wherein the graphical user interface displays one or more signals from other transmitters.

12. A central heating control system according to claim 11 wherein the one or more signals are data collected from other web-site(s).

13. A central heating control system according to claim 11 or claim 12 wherein the one or more signals are data collected from other modules.

14. A central heating control system according to claim 12 or claim 13 wherein the signals display information selected from a group comprising: time of dawn, time of dusk, predicted outside temperature, current outside temperature, time period of lower tariff on the utility and public holidays.

15. A central heating control system according to any one of claims 2 to 14 wherein the graphical user interface displays one or more signals from other stored information on the internet enabled device.

16. A central heating control system according to claim 15 wherein the signals display information selected from a group comprising: users holidays, users appointments, current air temperature in property, predicted air temperature in property; and previously stored time periods.

17. A central heating control system according to any preceding claim wherein the central heating system is divided into zones and wherein the control module and the graphical user interface are adapted to provide time periods with respective on and off modes to the zones individually.

1/1

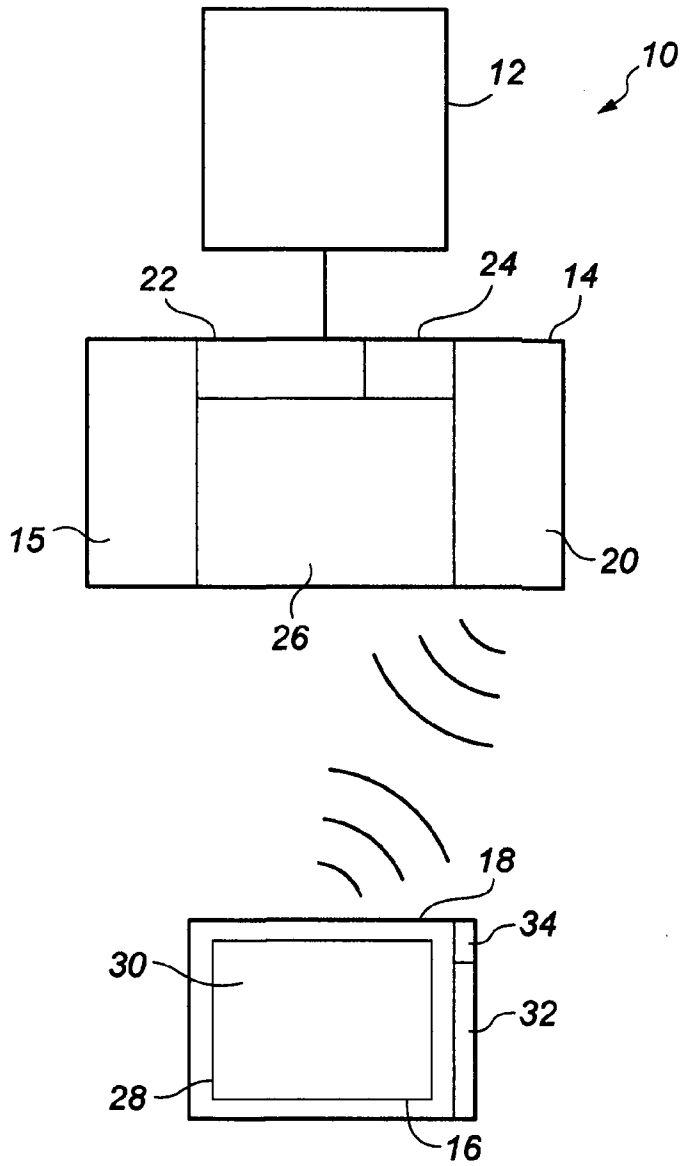

Fig. 1

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2015/050733

A. CLASSIFICATION OF SUBJECT MATTER
INV. G05D23/19 F24D19/10
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G05D F24D

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 98/37364 A1 (DUSHANE STEVEN D [US]; BOHM GRANT E [US]; STAPLES JOHN [US]) 27 August 1998 (1998-08-27) pages 4,5,6,11 - pages 12,14; figures 1,4,6	1-3, 8-10, 12-17
Y	US 2013/024799 A1 (FADELL ANTHONY MICHAEL [US] ET AL FADELL ANTHONY M [US] ET AL) 24 January 2013 (2013-01-24) paragraph [0045] - paragraphs [0053], [0065]; figures 1,2,3,11	1-17
Y	US 2011/113360 A1 (JOHNSON DEREK MALLOUGH [US] ET AL) 12 May 2011 (2011-05-12) abstract	1

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 May 2015	18/06/2015

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	García Moncayo, O

2

Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 2 465 629 A (MURPHY DARREN [GB] DARREN MURPHY [GB]) 2 June 2010 (2010-06-02) abstract; figures 1,2	1
Y	DE 42 41 858 A1 (BUDERUS HEIZTECHNIK GMBH [DE]) 16 June 1994 (1994-06-16) abstract	1-17
Y	DE 40 28 501 A1 (VAILLANT JOH GMBH & CO [DE]) 28 March 1991 (1991-03-28) abstract	1-17
Y	GB 2 245 994 A (SUNVIC CONTROLS LTD [GB]) 15 January 1992 (1992-01-15) page 2, line 13 - page 3, line 16 page 8	1-17
A	WO 2008/025939 A2 (EWING TANYA BARBARA [GB]; MCCORKINDALE KENNETH [GB]; SCUSE JEREMY [GB]) 6 March 2008 (2008-03-06) cited in the application the whole document	1-17

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2015/050733

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9837364 A1	27-08-1998	US 6116512 A	12-09-2000
		US 6196467 B1	06-03-2001
		WO 9837364 A1	27-08-1998
US 2013024799 A1	24-01-2013	US 2013024799 A1	24-01-2013
		US 2015025691 A1	22-01-2015
US 2011113360 A1	12-05-2011	NONE	
GB 2465629 A	02-06-2010	NONE	
DE 4241858 A1	16-06-1994	NONE	
DE 4028501 A1	28-03-1991	AT 399218 B	25-04-1995
		CH 682345 A5	31-08-1993
		DE 4028501 A1	28-03-1991
GB 2245994 A	15-01-1992	NONE	
WO 2008025939 A2	06-03-2008	EP 2059769 A2	20-05-2009
		WO 2008025939 A2	06-03-2008