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(54) **Device for controlling and indicating room temperature with user-friendly reading**

(57) The present invention relates to a device for controlling and indicating room temperature with user-friendly reading comprising a temperature probe (11) for measuring an instantaneous room temperature (T_{room}), the temperature probe (11) being connected to signal processing means (12) capable of comparing the instantaneous room temperature (T_{room}) with a temperature value (T_0) set by a user and of providing a corresponding

activation or stop signal to a heating and/or cooling equipment (13), further comprising a screen (14) for displaying data of the heating and/or cooling equipment (13) and/or environment parameters, **characterized in that** the processing means (12) control the screen (14) so that the displayed background takes on a different colour depending on the value taken by the detected instantaneous room temperature (T_{room}).

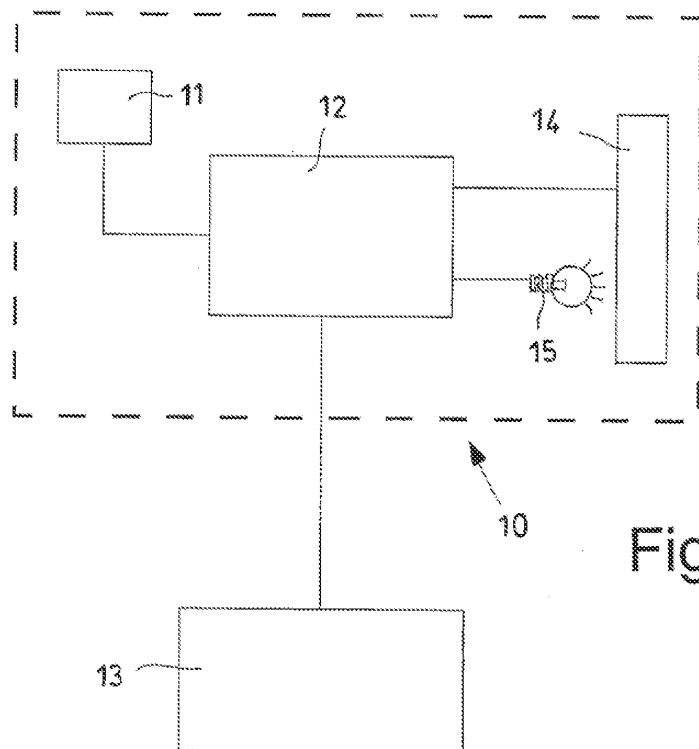


Fig.4

Description

[0001] The present invention relates to a device for controlling and indicating room temperature with user-friendly reading.

[0002] Nowadays there already exist devices for controlling room temperature, also called thermo-regulators, which based on a set temperature, send activation signals to a corresponding heating and/or cooling equipment in order to keep the instantaneous temperature of a room substantially equal to the set temperature.

[0003] To this end, such devices are provided with a probe for measuring the temperature and with means for comparing the detected temperature with the set temperature capable of generating corresponding activation signals.

[0004] The most up-to-date thermo-regulators are further provided with a screen whereon both the set temperature and the instantaneous room temperature are displayable upon a suitable query.

[0005] In this way, the thermo-regulator is capable of serving as a thermometer as well, additionally providing an approximate indication of the time required for reaching the temperature set given by the difference between the instantaneous temperature and the set one, which the user is capable of assessing.

[0006] However, in order to obtain such information from the thermo-regulator device, it is generally necessary to approach the same and suitably query it.

[0007] In fact, the screens of the common thermo-regulator devices are provided with are not usually large enough to concurrently display multiple information in characters large enough to be read from a distance.

[0008] In particular, this is related to market requirements that require both keeping low costs and providing a pleasant aesthetic appearance which should not be too evident once installed, for example on a wall.

[0009] Considering the small sizes of the screens of thermo-regulator devices known to date, the instantaneous temperature is generally displayed only when a suitable display control is actuated, for example pressing a dedicated button, replacing the information normally displayed, that is, usually, the temperature set.

[0010] The object of the present invention is to obviate the drawbacks mentioned above and in particular to devise a device for controlling and indicating room temperature whereby a user is capable of obtaining at least an approximate measurement of the instantaneous temperature also through a remote reading of the same.

[0011] Another object of the present invention is to provide a device for controlling and indicating room temperature which, although having small dimensions for the display screen used, is capable of concurrently providing an indication of the temperature set and of the instantaneous room temperature.

[0012] These and other objects according to the present invention are achieved by providing a device for controlling and indicating room temperature as illustrated

in claim 1. Further features of the device for controlling and indicating room temperature are defined in the dependent claims.

[0013] The features and the advantages of a device for controlling and indicating room temperature according to the present invention will appear more clearly from the following description, made by way of an indicative and non-limiting example with reference to the annexed schematic drawings, wherein:

- figure 1 shows a schematic plan view of a device for controlling and indicating room temperature in a first display configuration;
- figure 2 shows a schematic plan view of a device for controlling and indicating room temperature in a second display configuration;
- figure 3 shows a schematic plan view of a device for controlling and indicating room temperature in a third display configuration;
- figure 4 shows a schematic block representation of the device for controlling and indicating room temperature according to the present invention;
- figure 5 shows a block diagram of the control logic used by the device for controlling and indicating room temperature according to the present invention.

[0014] With reference to the figures, there is shown a device for controlling and indicating room temperature globally indicated with reference numeral 10.

[0015] The device for controlling and indicating room temperature 10 comprises at least one temperature probe 11 capable of detecting the instantaneous room temperature T_{room} .

[0016] The temperature probe 11 is connected to signal processing means 12 capable of comparing the instantaneous room temperature T_{room} with a temperature value T_0 set by the user and of providing a corresponding activation or stop signal to a heating and/or cooling equipment 13 so as to keep the instantaneous temperature T_{room} substantially equal to the set temperature T_0 .

[0017] The device for controlling and indicating room temperature 10 further comprises, connected to the processing means 12, a screen 14 for displaying some data of the heating and/or cooling equipment, such as temperature set T_0 , operating mode 16 (heating/cooling), and so on, or some parameters of the thermo-regulated room such as for example the instantaneous temperature T_{room} .

[0018] Screen 14 may be made according to any technique, such as for example liquid crystals or LCD, plasma or PDP, OLED (*Organic Light Emitting Diode*), TFT (*Thin Film Transistor*) or SED (*Surface-conduction Electron-emitter Display*).

[0019] In the most widespread case where liquid crystal screens are used, screen 14 is associated to backlighting means 15 arranged behind screen 14.

[0020] In fact, liquid crystal screens consist of particular substances that change alignment according to the

electrical field applied thereto, in one case letting the backlighting light pass, or limiting or blocking the incoming light completely.

[0021] The backlighting means 15 may be of any type, such as for example:

- one or more electroluminescent panels, wherein one phosphorous layer is enclosed between two electrodes where to an alternating voltage is applied;
- a LED (*Light Emitting Diode*) backlighting, wherein at least one photo-diode is used, capable of emitting light at a particular frequency or colour;
- backlighting by neon lights or CCFL (Cold Cathode Fluorescent Lamp); or
- backlighting by incandescent lamps.

[0022] According to the present invention, the backlighting means 15 are provided with light sources capable of emitting a plurality of different colours or which are suitably coated, and are connected to the processing means 12 which control the lighting, in the backlighting means 15, of the light sources of a certain colour depending on the detected instantaneous room temperature T_{room} .

[0023] In this way, the LCD screen 14 has a background of a different colour depending on the light sources lighted by the processing means 12.

[0024] Likewise, if a screen 14 with a different technology is used which does not require the use of backlighting means 15, the processing means 12 directly control screen 14 so that the background displayed thereby takes on a different colour depending on the detected instantaneous room temperature T_{room} .

[0025] In particular, the operation of the device for controlling and indicating room temperature according to the present invention is as follows.

[0026] The processing means 12 periodically carry out a comparison of the instantaneous room temperature T_{room} with a reference value T_T consisting for example of a temperature value set by the user, or of a value preset during the step of production of the thermo-regulation device.

[0027] The reference value T_T may differ from the value T_0 used for controlling the heating and/or cooling equipment, irrespective of the technology used, such as for example radiant panels, radiators, air conditioners, fan-coil units and so on. Overall, two are the parameters used by the processing means 12, and namely:

- T_T is the reference value compared to the instantaneous room temperature T_{room} ;
- ΔT is the tolerance parameter that allows identifying a symmetric tolerance range around the reference value T_T . The tolerance parameter may at most be equal to zero.

[0028] At each predetermined time range, for example equal to 10 seconds, the instantaneous room tempera-

ture T_{room} is detected through probe 11.

[0029] At each measurement, the processing means 12 make a comparison of the value detected T_{room} with two temperature values, determined by the sum $(T_T + \Delta T)$ and the subtraction $(T_T - \Delta T)$ of the tolerance parameter ΔT from the reference value T_T .

[0030] Three control ranges are thus defined as follows:

- the instantaneous room temperature T_{room} is higher than $(T_T + \Delta T)$;
- the instantaneous room temperature T_{room} is comprised between $(T_T + \Delta T)$ and $(T_T - \Delta T)$;
- the instantaneous room temperature T_{room} is lower than $(T_T - \Delta T)$.

[0031] For each identified range, the processing means 12 send an instruction to screen 14 or to the backlighting means 15 so that the background displayed by screen 14 takes on a different colour.

[0032] In the example shown in figure 5, the colours set by the processing means 12, and the respective associations to the ranges defined above, are as follows:

- if the instantaneous room temperature T_{room} is higher than $(T_T + \Delta T)$, as shown in figure 3, a first colour C_1 is displayed, preferably red;
- if the instantaneous room temperature T_{room} is comprised between $(T_T + \Delta T)$ and $(T_T - \Delta T)$, as shown in figure 2, a second colour C_2 is displayed, preferably amber;
- if the instantaneous room temperature T_{room} is lower than $(T_T - \Delta T)$, as shown in figure 1, a third colour C_3 is displayed, preferably blue.

[0033] The colours associated in the example to the three ranges are purely exemplary and any colour combinations may be selected in their place.

[0034] The features of the device for controlling and indicating room temperature object of the present invention as well as the relevant advantages are clear from the above description.

[0035] Thanks to the different background colour of the screen of the thermo-regulation device, depending on the instantaneous room temperature, a user is capable of obtaining at least an approximate measurement of such temperature also through a remote reading of the same.

[0036] In fact, it is possible to detect the current colour of the screen at a glance and understand whether the instantaneous temperature is higher than, lower than or equal to a reference value set by the user or preset.

[0037] Therefore, by a same small sized screen it is possible to concurrently display multiple information, wherein the information regarding the instantaneous temperature is also detectable through the colour of the screen background. Finally, it is clear that several changes and variations can be made to the device thus con-

ceived, all falling within the invention; moreover, all details can be replaced with technically equivalent elements. In the practice, the materials used as well as the sizes, can be whatever, according to the technical requirements.

Claims

1. Device for controlling and indicating room temperature comprising a temperature probe (11) for measuring an instantaneous room temperature (T_{room}), said temperature probe (11) being connected to signal processing means (12) capable of comparing said instantaneous room temperature (T_{room}) with a temperature value (T_0) set by a user and of providing a corresponding activation or stop signal to a heating and/or cooling equipment (13), further comprising a screen (14) for displaying data of said heating and/or cooling equipment (13) and/or environment parameters, **characterized in that** said processing means (12) control said screen (14) so that the displayed background takes on a different colour depending on the value of said detected instantaneous room temperature (T_{room}). 5
2. Device for controlling and indicating room temperature according to claim 1, **characterized in that** said screen (14) is a liquid crystal screen and it comprises backlighting means (15) located at the back of the screen (14). 10
3. Device for controlling and indicating room temperature according to claim 2, **characterized in that** said backlighting means (15) comprise a plurality of light sources capable of emitting light of at least two different colours, said processing means (12) being connected to said backlighting means (15) in order to control the lighting of light sources capable of emitting light of a certain colour depending on said detected instantaneous room temperature (T_{room}). 15
4. Device for controlling and indicating room temperature according to claim 2, **characterized in that** said backlighting means (15) comprise a plurality of light sources which are coated in such a manner to emit light of at least two different colours, said processing means (12) being connected to said backlighting means (15) in order to control the lighting of said coated light sources so as to emit a light of a certain colour depending on said detected instantaneous room temperature (T_{room}). 20
5. Device for controlling and indicating room temperature according to any one of the previous claims, **characterized in that** said processing means (12) control said screen so that said displayed background takes on a first colour (C_1), if the instantaneous room temperature (T_{room}) is higher than the sum of a reference value (T_T) and a tolerance parameter (ΔT), a third colour (C_3), if the instantaneous room temperature (T_{room}) is lower than the difference between said reference value (T_T) and said tolerance parameter (ΔT), and a second colour (C_2) in the remaining cases. 25
6. Device for controlling and indicating room temperature according to one of the claims 2-5, **characterized in that** said backlighting is achieved by means of one or more electroluminescent panels. 30
7. Device for controlling and indicating room temperature according to one of the claims 2-5, **characterized in that** said backlighting is a LED backlighting. 35
8. Device for controlling and indicating room temperature according to one of the claims 2-5, **characterized in that** said backlighting is achieved by means of neon lamps. 40
9. Device for controlling and indicating room temperature according to one of the claims 2-5, **characterized in that** said backlighting is achieved by means of incandescent lamps. 45
10. Device for controlling and indicating room temperature according to claim 1, **characterized in that** said screen (14) is made by means of one of the following techniques: 50
 - PDP,
 - OLED,
 - TFT, or
 - SED.

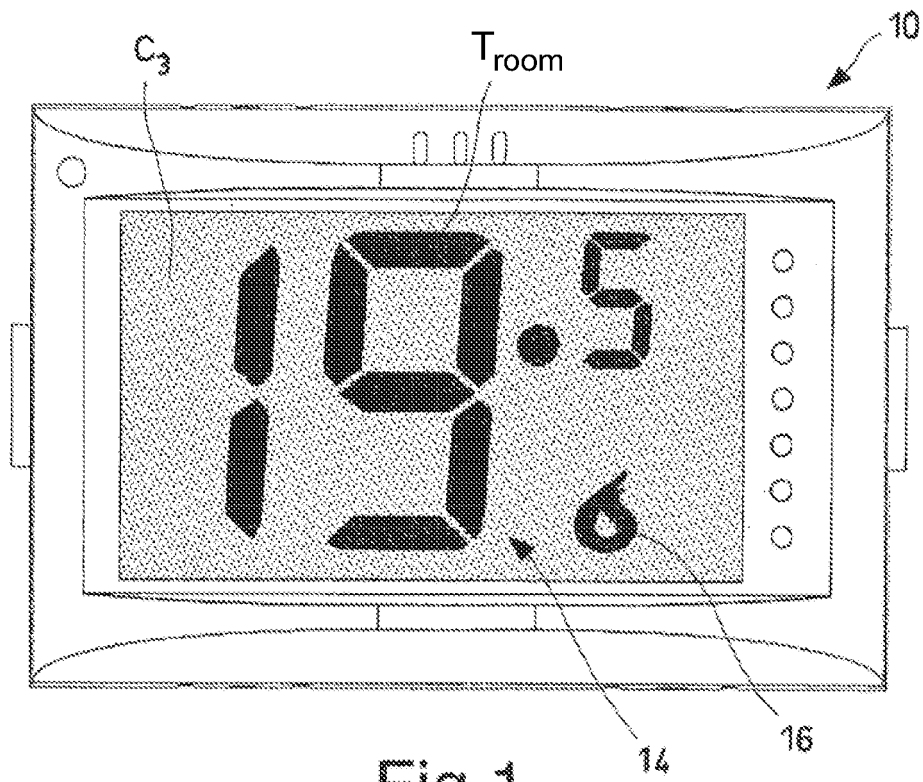


Fig.1

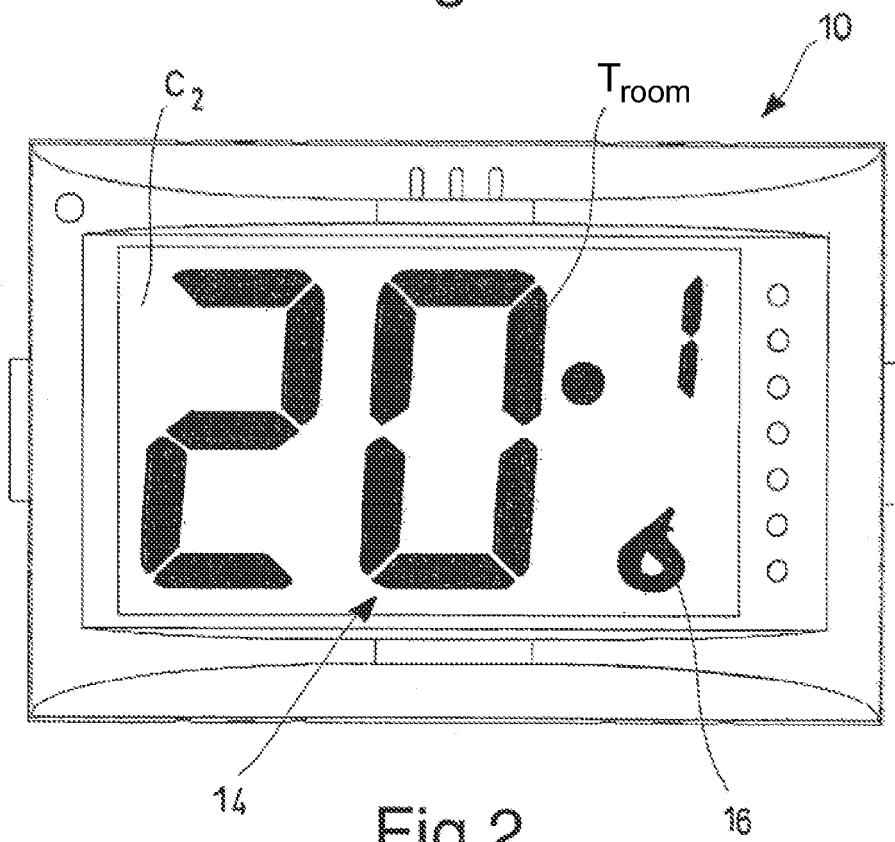


Fig.2

Fig.3

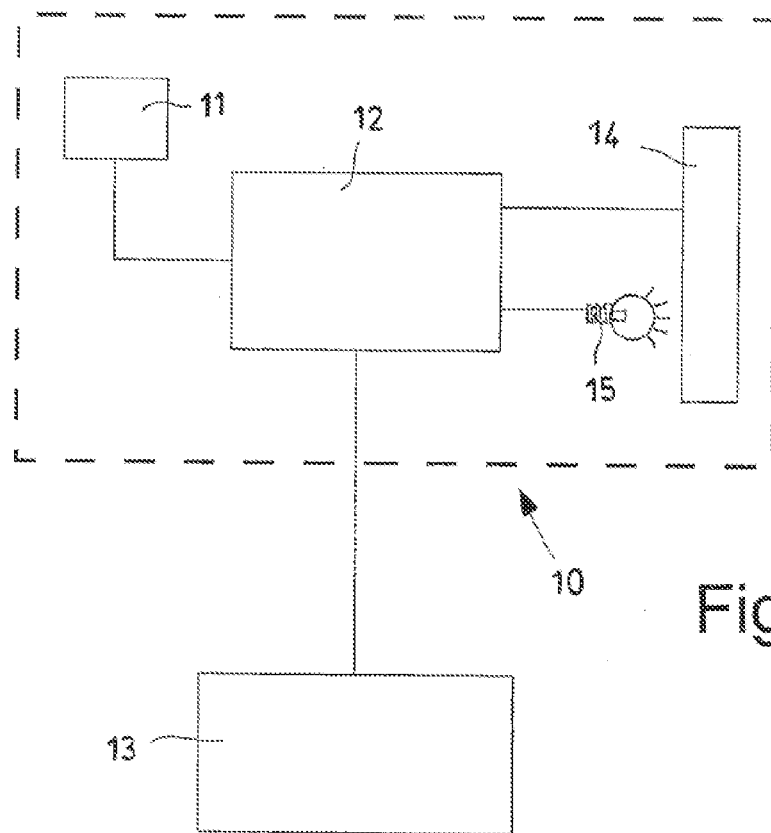
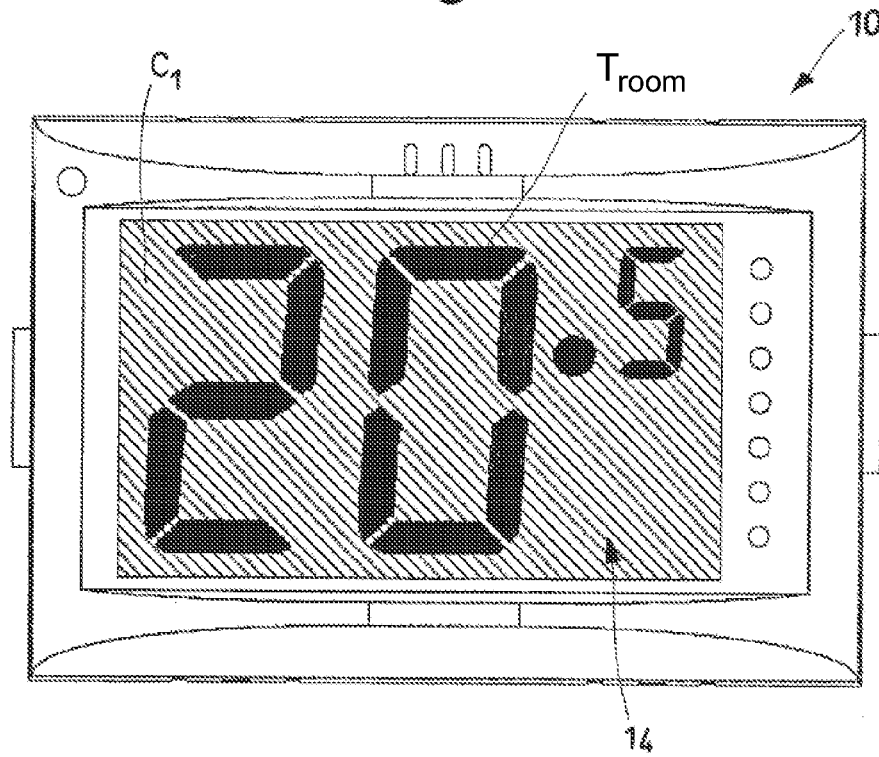
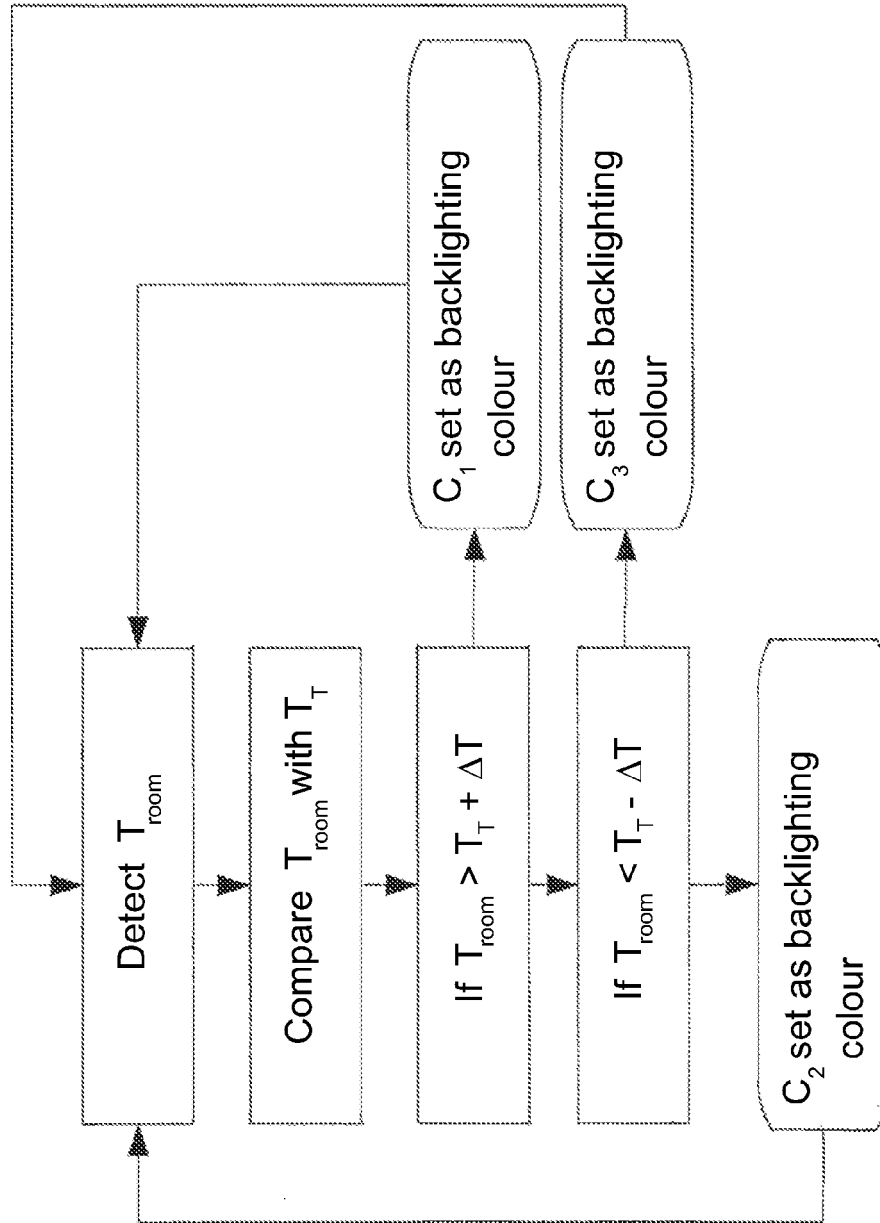


Fig.4

Fig.5





EUROPEAN SEARCH REPORT

Application Number
EP 10 15 0445

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			F24F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 March 2010	Examiner Groen, Fokke
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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The members are as contained in the European Patent Office EDP file on
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12-03-2010

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