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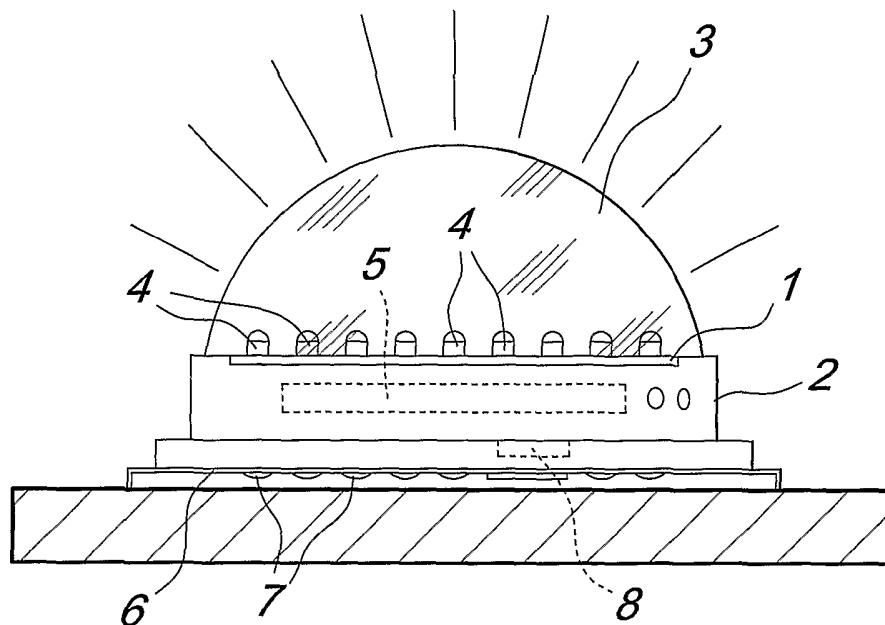
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(54) **Title:** DEVICE WITH COLORED LUMINOUS EMISSIONS



(57) **Abstract:** A device with colored luminous emissions, adapted to train the user from the physical and behavioral standpoint, the device being provided with a color diffuser and with a plate with controls for switching on and for selecting programs and colors and execution speed. The electronic system comprises an alphanumeric visual display, a color emission section, a microprocessor for processing, memories which contain programs for driving the color elements, and sockets for power supply and for loading other programs. The device is waterproof, battery-operated, and independent of the electrical mains.

WO 2006/094689 A1

DEVICE WITH COLORED LUMINOUS EMISSIONS

Technical Field

The present invention relates to a device with colored luminous emissions adapted to train the user from the physical and behavioral
5 viewpoint.

Phenomena linked to light and colors are the subject of increasing interest in all scientific sectors, particularly in neurosciences.

Several studies have found that the perception of color is an induced psychological activity, in that the color brings to mind certain unconscious
10 aspects and activates in each instance different areas of the brain.

Evolution has accustomed the human being to linking the psychological-perceptive aspect of color to other information or natural events, such as for example the color of dawn and sunset, the color of grass and of the sky. Countless examples could be made, such as milk or blood,
15 the sea, the sun, the moon, and so forth.

All this information has always accompanied mankind and therefore every color, for these reasons, evokes, by conditioned reflex, emotions which can be summarized as follows: (i) color perception is an induced psychological activity; (ii) color brings to mind unconscious sediments; and
20 (iii) the combination of these factors activates in each instance different areas of the brain.

These are the findings of the latest research by scientists, such as for example Eric Kandel, a neuroscientist of Columbia University, winner of the 2000 Nobel prize in medicine.

25 Many other scientists have conducted experiments with functional magnetic resonance imaging, demonstrating that the neuronal links affect extensive areas of the brain and external stimuli spread out and sensitize extensive layers of synaptic connections, following channels, blending and extracting sensations mixed with memories.

30 **Background Art**

Currently, colors in lighting systems are used for various purposes, for example in the field of art and interior decoration in order to obtain pleasant effects, in discotheques, in shows, and in the field of alternative medicine in the form of color therapy. The advent of television and of
5 multicolor printing makes human beings more sensitive to colors and to the effects of colored lights. Lights and colors, therefore, become increasingly important in everyday life.

Disclosure of the Invention

The aim of the present invention is to provide a device which helps
10 the user to perform with a sequential rhythm actions of everyday life, training him also physically to achieve physical and mental balances.

Within this aim, an object of the invention is to accompany the user in any place and/or action that he can perform.

Another object of the invention is to avoid limiting the device to a
15 particular application but allow its adaptation according to the circumstances.

Another object of the invention is to provide a device which is highly reliable, relatively easy to manufacture and at competitive costs.

This aim and these and other objects, which will become better
20 apparent hereinafter, are achieved by the device according to the invention, characterized in that it comprises a light diffuser, a plurality of lighting elements, contained within said diffuser and adapted to emit light according to a respective preset color, and a control means for controlling the mode, duration and sequence of the variation of intensity of the emission of said
25 lighting elements.

Brief description of the drawings

Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment thereof, illustrated by way of non-limiting example in the
30 accompanying drawings, wherein:

Figure 1 is a schematic general view of the device according to the invention;

Figure 2 is a view of the control plate of the device of Figure 1;

Figure 3 is a view of a particular embodiment of the device according to the invention, applied to a water container;

Figure 4 is a schematic view of the control circuit of the device according to the invention;

Figure 5 is a diagram of a first embodiment of the control circuit of the device according to the invention;

Figure 6 is a diagram of a second embodiment of the control circuit of the device according to the invention;

Figure 7 is a detailed view of the structure of the button pad provided on the control plate of Figure 2.

Ways of carrying out the Invention

With reference to the figures, the color device according to the invention, generally designated by the reference numeral 1, comprises a supporting structure 2, on which a light diffuser, shaped like a hemisphere 3, is arranged, its surface interacting with the light emitted by lighting elements 4, preferably LEDs, said elements being arranged inside said hemisphere and being each suitable to emit substantially monochrome light which corresponds to a respective primary color selected preferably among red, green and blue.

The lighting elements 4 are connected electrically to a control circuit 5, which is installed inside the supporting structure 2 and can be supplied both by means of batteries and by way of the electrical mains.

The control circuit 5 is also connected to a data input/output device, which comprises a control plate 6. In the embodiment of Figure 1, the plate 6 is arranged at the base of the structure, on the opposite side with respect to the hemisphere 3, so that the plate 6 is not visible when the device 1 rests on a surface.

The plate 6 comprises a series of buttons 7, by means of which it is possible to switch on and off the device 1, select operating programs, change the operating parameters, and optionally program the device. Moreover, an alphanumeric display 8 is provided in order to provide the user with feedback regarding the selection or programming operations performed by means of the buttons 7.

The type of structure described above, in which the control elements are arranged on the opposite side with respect to the light diffuser, is adapted to be used also in water, as shown in Figure 3. In this case, the diffuser, in the specific case the hemisphere 3, is turned upside down, so as to lie below the level of the water and radiate, transmitting its light to the entire body of water of a bathtub, a swimming pool or an ordinary sink.

All the elements of the device of Figure 3 are fitted in a watertight manner on the supporting structure 2, which contains an internal battery compartment, not shown.

The execution of the color device 1 must take into account the fact that light emissions must permeate the inside of the diffuser, which corresponds to a hemisphere 3 in the example. The diffuser might take on any shape, such as for example the shape of a cube, cylinder or pyramid, and perform the task of collecting the mixture of colors, returning them externally as a single tone of the spectrum in a uniform manner.

Therefore, the diffuser is preferably made of an opalescent or opaque material, so as to also conceal from sight from the outside the individual light emitters that are present in the diffuser. The countless diffractions produced by microelements of the material of the diffuser do not attenuate or absorb considerable amounts of internal light, but transfer it uniformly outside as a single tonality.

The device according to the invention can be preprogrammed or can be manually programmable. In the first case, the control circuit contains memory elements and a processor for sending current to the LEDs according

to programmed sequences, intensities and durations. The programs that reside in the memory means can be selected manually by means of the control plate 6 and optionally can be adjusted as to one or more operating parameters.

5 Optionally, the memory-resident programs can be updated by connecting an external computer to the device according to the invention, which comprises advantageously a suitable interface, such as a serial, USB or FireWire port for data updating. Suitable software, in this case, is provided on the computer to be connected to the device, and is capable of
10 sending suitable commands to the processor of the color device 1 in order to update or add programs in memory.

Figure 4 illustrates a possible structural embodiment of the electronic control circuit 5. A first printed circuit 51 comprises the LEDs 4 soldered thereon, their number depending on the size of the hemisphere 3. The LEDs
15 are organized into sets of three, which correspond to the three primary colors (red, green, blue). For example, for an hemisphere with a diameter of ten centimeters it is possible to use twelve LEDs and therefore four LEDs per color.

A second printed circuit 52 comprises the electronic components
20 required for the operation of the device and in particular the alphanumeric display 8, which is visible through a transparent window of the control plate 6, and the contacts for the buttons 7 of the plate 6. Sockets 9 and 10 are also provided respectively for connection to data input devices and to the mains.

The socket 9, as well as its interfacing with the processing part of the
25 circuit 52, is of a known type and is not described in detail. As anticipated, the data input socket 9 is of the USB, FireWire or serial type, depending on the dimensions and applications of the device.

A battery compartment 53 is provided between the two printed
circuits 51 and 52 and is arranged in the supporting structure in a
30 substantially central position, so as to allow the device to float on water

without tipping.

The circuit 52 is completed by a microprocessor 11, which is capable of controlling the data streams in input and in output, memory access and data processing.

5 The microprocessor 11 is connected to memory means 15, which comprise and store a library of programs related to operating modes of the device according to the invention. Some examples of programs are described hereinafter.

The processor 11 can access said library both in read mode and in
10 write mode, in the first case to load into a temporary memory of its own the program to be run and in the second case to update the programs of the library or add new programs, depending on the applications.

The reference numeral 12 designates the control of the alphanumeric display 8 of the selected programs. The interface 13 connects the button pad
15 7 to the microprocessor 11 and the interface 14 connects the external power supply to a battery 16. The interface 14 is adapted to perform charge completion monitoring if rechargeable batteries are used.

In a particular embodiment, shown in Figure 5, the control circuit 52 is adapted to the particular case in which the device is adjusted manually.

20 In the illustrated embodiment, the control circuit 52 comprises a power interface 20 for manually controlling the intensity of the individual colors. In particular, potentiometers 21, 22, 23 connected to a respective LED and controllable by means of a respective button 7 of the control plate are provided.

25 The points 17, 18 and 19 represent the points where the light emitters are connected to the circuit.

Figure 6 illustrates another application with an autonomous battery, which is capable of acting also as an emergency light. This feature can be integrated also in the preceding circuits of Figures 4 and 5. In this case, the
30 microprocessor is programmed so as to control all the lighting elements at

the maximum intensity, by sending suitable signals to the power interface 20. The three colors are thus mixed so as to create white light regardless of the position of the potentiometers 21-23.

Figure 7 illustrates the button pad included in the control plate 6. The
5 buttons available to the user are:

- an on/off switch 71 (ON/OFF) for switching the device on or off;
- program start/stop button 72 (START/STOP);
- increment (+) or decrement (-) buttons 73 and 74 for
10 increasing/decreasing the intensity of the emitted colors or for
changing the programming levels, depending on the mode of the
operation of the device;
- red, green and blue buttons 75-77, for accessing stored programs,
preferably dedicated to energy, balance and rest, respectively.

In a preferred embodiment of the invention, the processor 11 is
15 programmed so as to perform the following operations.

At power-on, the display 8 displays the letter E and the hemisphere
emits a white light.

Advantageously, if the device is off, the disconnection of the power
supply plug or the actual lack of power supply from the mains switches the
20 power supply to the battery. In this mode, referenced here as emergency
mode, the processor sends commands to the power interface 20 of the LEDs
to light them up simultaneously at a preset intensity level. If the button 74 is
pressed, the level of white light is lowered and the display 8 is activated to
display the symbol E (for EMERGENCY) in a flashing mode. Then, if the
25 button 73 or 74 is pressed, the luminous intensity of the LEDs is increased
or decreased respectively in order to reach the selected lighting level.

If the buttons 73 or 74 are pressed at the same time as a color button
75, 76 or 77, the intensity of the emission of the LED connected to the
pressed color button is changed. In this case, the processor 11 displays on
30 the display 8 the letter C, which is alternated with a number which indicates

the level of intensity that has been selected as long as the button 73 or 74 is kept pressed together with the button that corresponds to the color.

If the button 73 or 74 is released, the device remains active on this function for two seconds, displaying the letter C on the display 8. Finally,
5 the letter E is displayed and the circuit settles to a steady-state condition.

In this last mode, the processor remains in standby for commands. If one of the color buttons 75, 76 or 77 is pressed, the processor accesses an index area of the memory means 15. The index area contains the addresses to suitable records which are present in said memory, each containing a
10 series of instructions which correspond to operating modes of the device.

The letter P is displayed on the alphanumeric display 8 and is alternated with the digit 0. The three LEDs (or the three series of red, green and blue LEDs) are supplied with power according to a preset or default intensity and the hemisphere 3 is lit according to a corresponding color. In
15 this step, by pressing the buttons 73 or 74 it is possible to respectively increase or decrease the brightness of the color in the hemisphere.

By keeping a color button 75, 76 or 77 pressed, the program preferred by the user is searched for and the display 8 is actuated in order to display the selected number. In this step it is possible to change the choice of the
20 program; by pressing a different color button, the hemisphere lights up in the new selected color, while the display shows the intermittent symbol 0. At this point it is possible to select a subprogram related to the new selected color.

By pressing the button 72, the subprogram starts and the display 8
25 displays intermittently one of three horizontal segments which correspond to the colors and alternately the number of the subprogram.

The segments that correspond to the colors are therefore: (l) Red, (m) Green, (n) Blue.

In this step it is possible to act on the subprogram by means of the
30 buttons 73 or 74, in order to increase or decrease the program execution

speed. If a subprogram consists in displaying a single color, it is possible to increase or decrease its brightness by means of these buttons.

When the letter P is displayed on the alphanumeric display 8, if one of the buttons 73 or 74 is pressed, the microprocessor displays on the display 8 the letter L intermittently for one second, alternating it with a number which indicates the level of execution. This function remains active for five seconds. If no choice is made, the letter P is displayed again on the display. If the button 73 or 74 is kept pressed, the level increases or decreases depending on which button is pressed.

10 In the described embodiment, the program selected by means of the color buttons 75-77 starts from the level indicated by the reference numeral 5 and can drop to level 1 if the button 74 is pressed or rise to level 9 if the button 73 is pressed.

By pressing the buttons 73 and 74 simultaneously, program execution is halted and the letter A is displayed on the alphanumeric display 8. The light inside the hemisphere stops on the color emitted at the time of the halting. To reactivate execution of the program, the button 72 is pressed.

At any time, if the button 72 is pressed for two seconds, the device enters the standby mode, indicated by the letter E on the display 8.

20 Moreover, if the button 71 is pressed for two seconds, the device switches off.

In the example of use of the controls described above, it has been shown that with a small number of buttons it is possible to utilize easily the characteristics of the device according to the invention. What has been described is merely an example which demonstrates a possible embodiment and does not constrain at all the configuration criterion of the device. It is therefore possible to provide alternative embodiments, in which each operation is associated with a single button.

From what has been shown, by means of the buttons 75, 76 and 77 it is possible to select a total of 27 execution levels, since nine levels can be

associated with the pressing of each one of these buttons.

A first example of program used in the device according to the invention is now described. This program is not linked to a particular use and consists only in performing a full sequence of seven colors which is
5 repeated continuously over time.

The following table lists, in seconds, the times when a certain event occurs. For example, with reference to the first row of the table, the hemisphere is lit with the color red gradually, and seven seconds after the instant indicated by 0 and up to 38 seconds, the color remains unchanged.

10 At the thirty-eighth second, and up to the forty-fifth second, the LEDs are driven so as to change from reducing the red level and increasing the orange content until a full orange color is emitted and maintained up to the eighty-third second, and so forth, until violet is reached. At the 308th second, the cycle restarts from red.

15

Table 1

Color	Rise start	Rise end	Hold	Fall start	Fall end
Red	0	7	38	38	45
Orange	38	45	83	83	90
Yellow	83	90	128	128	135
Green	128	135	173	173	180
Blue	173	180	218	218	225
Indigo	218	225	263	263	270
Violet	263	270	308	308	315
Red	308	315	353	353	360

As can be seen, with the sequence of Table 1, seven contiguous colors

of the visual spectrum are displayed sequentially and harmoniously and one fades into the other. As already described earlier, it is possible to increase or decrease the execution times by acting on the buttons 73 or 74.

In a second example of application, the programming of the device is selected so as to train the user for a correct way of eating.

The duration and sequences of the colors reflect the steps and times intended for proper eating. The exercise is divided into two steps: the first step relates to a single transition in the sequence of seven colors, in order to establish a certain psychological familiarity of the user with the diffuser.

The second step, with three colors, is a specific guide to administration, chewing and swallowing times.

Table 2: first step

Color	Rise start	Rise end	Hold	Fall start	Fall end
Red	0	0.7	3.8	3.8	4.5
Orange	3.8	4.5	8.3	8.3	9
Yellow	8.3	9	12.8	12.8	13.5
Green	12.8	13.5	17.3	17.3	18
Blue	17.3	18	21.8	21.8	22.5
Indigo	21.8	22.5	26.3	26.3	27
Violet	26.3	27	30.8	30.8	31.5

15

Table 3: second step

Color	Rise start	Rise end	Hold	Fall start	Fall end
Red	30.8	31.8	46.8	46.8	47.8
Yellow	46.8	47.8	67.8	67.8	68.8

Color	Rise start	Rise end	Hold	Fall start	Fall end
Green	67.8	68.8	73.8	73.8	74.8
Red	74.8	75.8	90.8	90.8	91.8
Yellow	90.8	91.8	111.8	111.8	112.8
Green	111.8	112.8	117.8	117.8	118.8

In the second step, the sequence of the colors red, yellow and green is repeated every 44 seconds and the hold time of each color is respectively 17, 22 and 7 seconds. The sequence of the second step is repeated until
 20 1230.8 seconds are reached.

Interaction with the device according to the invention is as follows. If one has to eat a plate of spaghetti, for example, the sequence of actions is divided into three steps:

- 25 – First step, preparation of the forkful: this occurs with a timing set by the red emission.
- Second step, chewing: this occurs with a timing set by the yellow emission.
- Third step, swallowing: this occurs with a timing set by the green emission.

30 Of course, there is no particular diet to be associated with the exercise, which becomes a support to diets proposed by specialist physicians or dietitians. In this case, the device is a valid aid and not a replacement, but allows the possibility to make the diets more effective.

35 If no diets are being followed and a healthy person wishes to reach his or her ideal weight without resorting to diets, this food training is sufficient, after a certain time, to allow to rediscover the pleasure of eating, of natural nutrition and one's own ideal weight.

In practice, each function required by the device has its own program,

which is selected according to the times and modes most suited to the intended aim. Therefore, the present invention uses light emissions the colors whereof are presented in a pattern over time, creating a programmable guiding mechanism for exercises adapted to synchronize
5 various physical and psychological requirements.

The electronic assembly that derives from the described inventive concept is meant to illustrate, during its execution, the elements required for correct operation.

The circuits thus conceived are susceptible of numerous
10 modifications and variations, all of which are within the scope of the appended claims and all the details may be replaced with other technically equivalent elements.

For example, as an alternative to the independent unit proposed, the color device according to the invention can be implemented by means of
15 any personal computer, cellular telephone or electronic diary.

The device can further comprise a known means of the optical or mechanical or electromechanical type for reading multimedia cards, each of which contains instructions for performing a certain activity and a number N of protocols for performing a certain number of activities.

In this case, the user selects the title of a card, which relates to the
20 field of application, in which he is interested. The user then learns from the protocol that a color is associated with each action that he must perform. Each color prompts the user to start, and the appearance of a new color indicates to him the transition to the action of the next step, and so forth.

The color sequence times and the number of colors involved do not
25 have a standard but vary a number of times depending on the N protocols.

The user has the additional option of acting at will, according to his execution skills, by applying variations, increasing or decreasing the times set by each individual protocol that he has selected.

In practice, the shapes and the dimensions, the types of material used
30

and the electronic implementation, so long as they are compatible with the specific use, may be any according to requirements and to the state of the art.

The disclosures in Italian Patent Application No. MI2005A000350
5 from which this application claims priority are incorporated herein by reference.

CLAIMS

1. A device with colored luminous emissions, characterized in that it comprises a light diffuser, a plurality of lighting elements contained within said diffuser and adapted to emit light according to a respective preset color,
5 and a control means for controlling the mode, duration and sequence of the variation of intensity of the emission of said lighting elements.

2. The device according to claim 1, characterized in that said control means is of the electronic type and comprises a control circuit of the programmable type, which has a processor and a memory means which
10 stores a plurality of programs, each program comprising a series of instructions for varying the mode, speed and sequence of variation of intensity of said lighting elements.

3. The device according to any one of the preceding claims, characterized in that said lighting elements are distributed so as to comprise
15 in equal numbers emitters of red, green and blue light.

4. The device according to any one of the preceding claims, characterized in that said lighting elements are LED diodes.

5. The device according to any one of the preceding claims, characterized in that said light diffuser is made of opalescent or opaque
20 material.

6. The device according to any one of the preceding claims, characterized in that said device comprises a supporting structure inside which said control means is fitted, said control means being connected to said lighting elements and to a control plate for manual adjustment of the
25 light emission parameters by way of said control means.

7. The device according to claim 6, characterized in that said light diffuser is a hemisphere, said control plate being fitted on said supporting structure in the opposite position with respect to the position of said hemisphere.

30 8. The device according to any one of the preceding claims,

characterized in that it is waterproof and comprises floating elements for using the device in water.

9. The device according to any one of the preceding claims, characterized in that said control plate comprises buttons connected to an interface for said processor, which is programmed so as to access said
5 memory means in response to a first sequence of pressings of said buttons or to vary directly the intensity of the emission of at least one of said lighting elements in response to a second sequence of pressings of said buttons.

10. The device according to any one of the preceding claims, characterized in that it comprises a second interface for the connection of
10 said memory means to a data input peripheral, in order to update the content of said memory means by way of said peripheral.

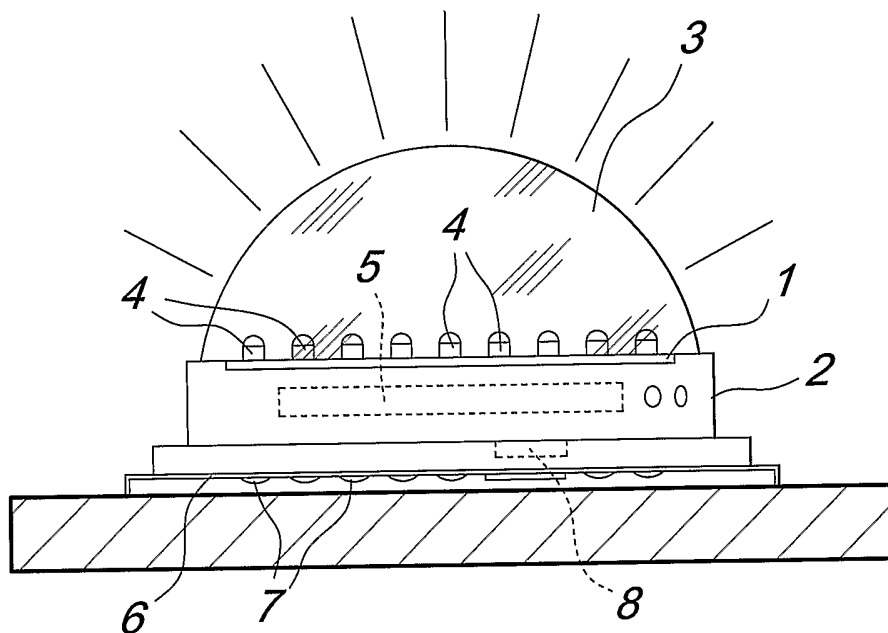


Fig. 1

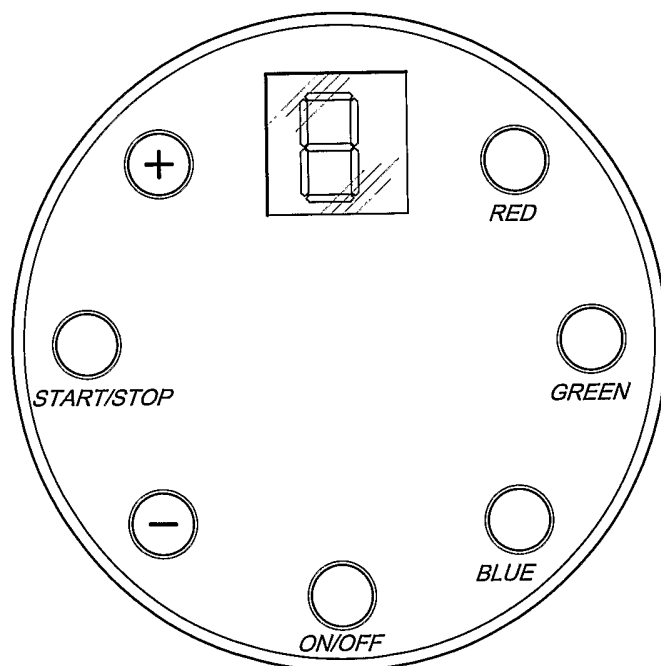


Fig. 2

2/4

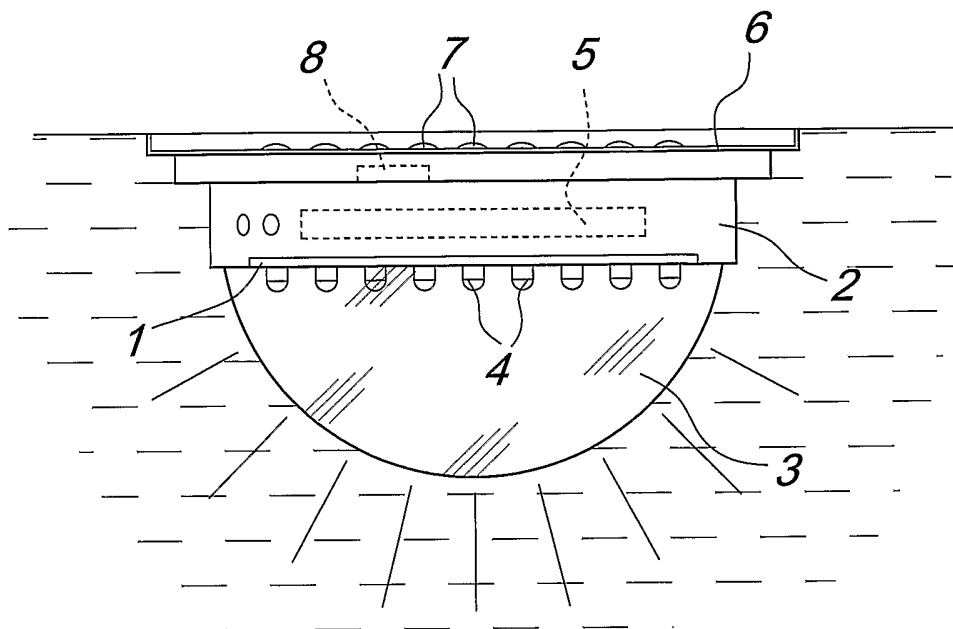


Fig. 3

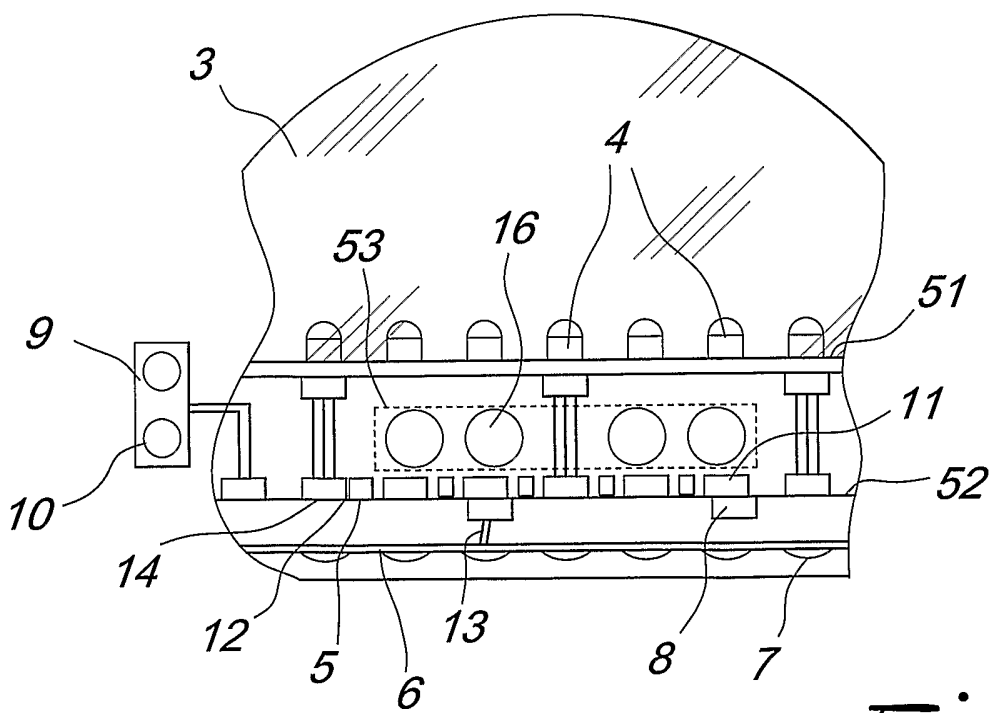


Fig. 4

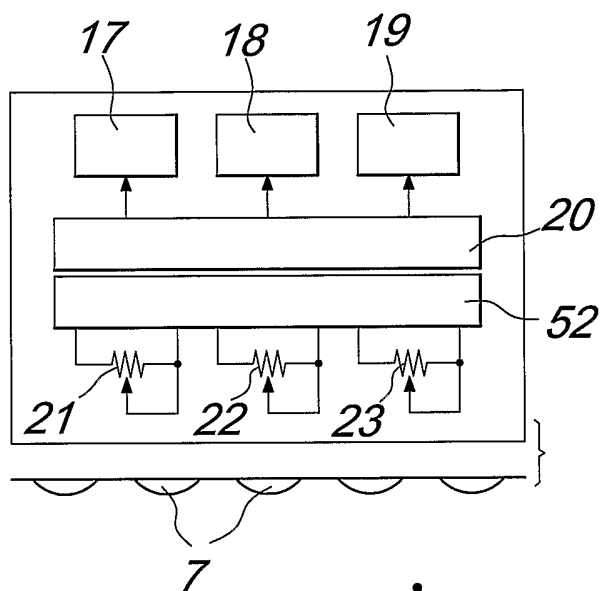


Fig. 5

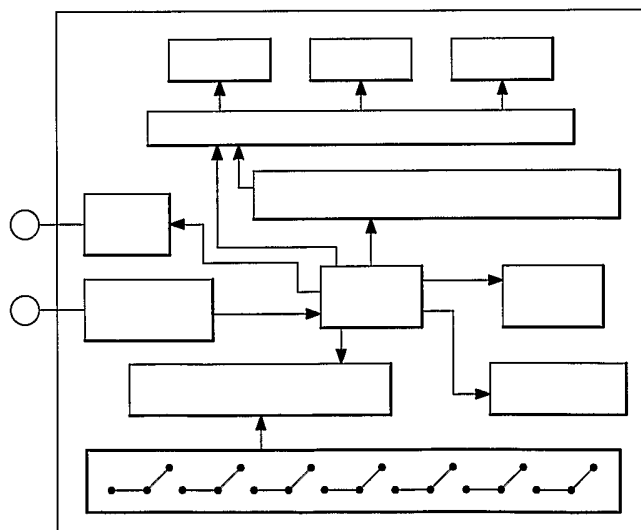


Fig. 6

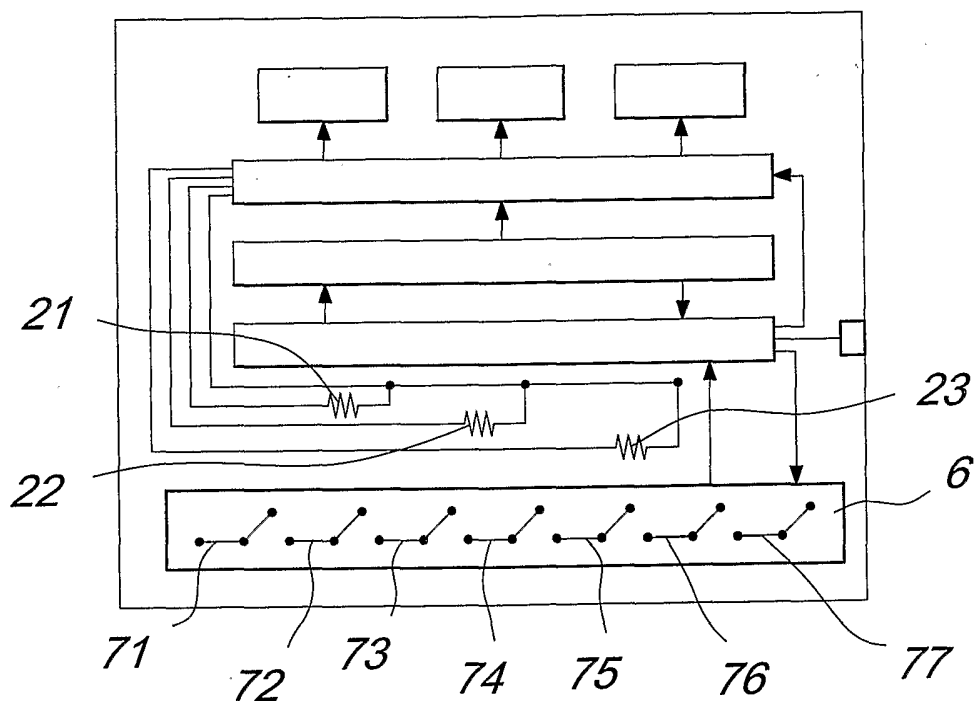


Fig. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/001867

A. CLASSIFICATION OF SUBJECT MATTER
INV. H05B37/02 H05B33/08

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)
H05B

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 practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/035728 A1 (SCHANBERGER ERIC K ET AL) 17 February 2005 (2005-02-17) abstract paragraphs [0013] - [0019], [0026], [0028], [0032], [0034] - [0036], [0042] figures 1,2 <div style="text-align: center; margin-top: 10px;"> ----- -/-- </div>	1-10

Further documents are listed in the continuation of Box C.

See patent family annex.

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Date of the actual completion of the international search

26 April 2006

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/001867

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