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680230

P/00/001
Section 29

AUSTRALIA
Patents Act 1990

PATENT REQUEST: STANDARD PATENT

We, being the person identified below as the Applicant, request the grant of a patent to the person identified below as the Nominated Person, for an invention described in the accompanying standard complete specification.

Full application details follow.

[71] **Applicant:**
KONE OY

Applicant's Address:
Munkkiniemen Puistotie 25 FIN-00330 Helsinki, Finland

[70] **Nominated Person:**
KONE OY

Address:
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[54] **Invention Title:**
INDICATOR DEVICE FOR AN ELEVATOR AND PROCEDURE FOR CONTROLLING THE DISPLAY OF AN INDICATOR DEVICE

[72] **Names and Addresses of actual inventors:**
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BASIC CONVENTION APPLICATION DETAILS:

[31] Application Number	[33] Country	Country Code	[32] Date of Application
FI 931524	Finland	FI	5th April 1993

Dated this 5th day of April 1994

KONE OY
By their Patent Attorneys
COLLISON & CO.

GEOFF HABEL

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NOTICE OF ENTITLEMENT

(To be filed before acceptance)

I/We KONE Oy

of Munkkiniemen puistotie 25
00330 Helsinki, Finland

being the Applicant(s) in respect of the Application ~~*filed herewith~~/*No. 59286/94 , state the following:-

Part 1 - Must be completed for all applications

The person(~~s~~) nominated for the grant of the patent:

~~*is/*are the actual inventor(s)~~

or *has entitlement from the actual inventor(s) by assignment dated 12 October 1992

(eg by assignment dated ..., by reason of normal employment of the inventors, as legal representative of ..., etc)

***Part 2 - Must be completed for all convention applications**

The person(~~s~~) nominated for the grant of the patent:

is/~~are~~ the applicant(~~s~~) of the basic application(s) listed on the patent request form

or ~~*has entitlement from the applicant(s) of the basic application(s) listed on the patent request form~~

(eg by assignment, by consent, etc)

The basic application(~~s~~) listed on the request form:

is/~~are~~ the first application(~~s~~) made in a Convention country in respect of the invention

or ~~*was/*were not the first application(s) made in a Convention country in respect of the invention, and~~ a request has been made under Section 96 of the Patents Act 1990 (or ~~Section 142AA of the Patents Act 1952~~) ~~to disregard the following application(s)~~

~~**Part 3 - Must be completed for PCT applications.**~~

The person(s) nominated for the grant of the patent:

*is/*are the applicant(s) of the application(s) listed in the declaration under Article 8 of the PCT

or *entitled to rely on the application(s) listed in the declaration under Article 8 of the PCT.

***Part 4 - Must be completed if the application relates to a microorganism and relies on Section 6 of the Act.**

The person(s) nominated for the grant of the patent *is/*are:

*the depositor(s) of the deposits listed hereafter (by number, depositary institution and date)

or *entitled to rely on the deposits listed hereafter (by number, depositary institution, date, and depositor's name and address) for the following reasons:

Part 5 - Must be completed if the application is a Convention application, or the application was made under the PCT and the applicant made a declaration under Article 8 of the PCT in respect of the basic application.

Except as stated in the next paragraph, the basic application(s) *listed on the patent request form/*referred to in the declaration under Article 8 of the PCT *is/*are the application(s) first made in a Convention country in respect of the invention.

A request has been made under Section 96 of the 1990 Act (or Section 142AA of the 1952 Act) to disregard ~~the following application~~

7th April 1994
Date

KONE Oy

Insert full name: pp. Juha Salomäki pp. Olli Rauhakoski
*Position: Manager Director

By their/his/her Patent Attorneys
COLLISON & CO.

* delete as applicable

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(12) PATENT ABRIDGMENT (11) Document No. AU-B-59286/94
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 680230

(54) Title
INDICATOR DEVICE FOR AN ELEVATOR AND PROCEDURE FOR CONTROLLING THE DISPLAY OF AN INDICATOR DEVICE

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(56) Prior Art Documents
US 5134387
US 5056629
US 4965561

(57) Claim

1. An indicator device comprising:

a display, the display including picture elements having LED units, at least one LED unit being so designed that it can be caused to emit at least two light radiations of substantially different substantially primary colours and in which LED unit the ratio of the durations of the transmission periods for the different colours is set so as to output a desired non-primary colour, and

a controller for controlling a perceivable brightness of the non-primary colour output by the LED unit, the perceivable brightness being set by controlling, for a given period, a light emission duration for each LED in the LED unit during the given period, said controller driving each LED so that each LED continuously emits light for a period corresponding to its light emission duration during the given period.

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Regulation 3.2

AUSTRALIA
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COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

Name of Applicant:

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Actual Inventors:

ASKO JUNTUNEN
RALF EKHOLM

Address for Service:

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Invention Title:

INDICATOR DEVICE FOR AN ELEVATOR AND PROCEDURE FOR CONTROLLING THE DISPLAY OF AN INDICATOR DEVICE

The following statement is a full description of this invention, including the best method of performing it known to us:

INDICATOR DEVICE FOR AN ELEVATOR AND PROCEDURE FOR CONTROLLING THE DISPLAY OF AN INDICATOR DEVICE

The present invention relates to an indicator device and to a procedure for controlling the display of an indicator device for an elevator.

The indicator devices of an elevator and their operation are subject to various requirements. The requirements relating to the outward appearance of an elevator have become more and more significant in the elevator market. This also applies to the floor indicators, indicator lights and equivalent. The indicators must be clear and capable of imparting enough information, and they must fit to their environment and comply with the regulations of each country, both in respect of external design and the signs, figures and colours presented. To meet these requirements, several different parallel models of floor indicators and other devices are needed, and this tends to increase the unit prices of elevators and may involve problems e.g. with the delivery times of equipment. Requirements concerning variability of the external appearance of an elevator result in increased costs and may also cause problems in elevator deliveries.

To provide a solution to the problems and requirements mentioned above a new type of indicator device is presented as an invention.

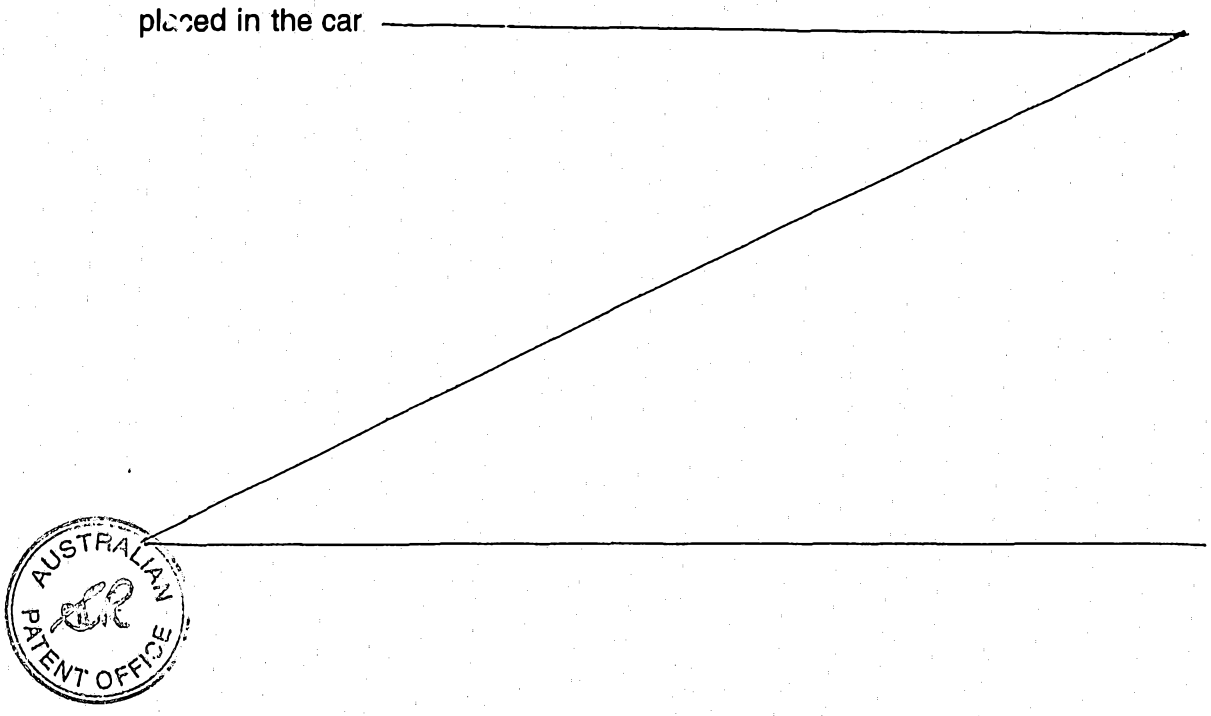
Thus there is provided according to the invention an indicator device comprising:
a display, the display including picture elements having LED units, at least one LED unit being so designed that it can be caused to emit at least two light radiations of substantially different substantially primary colours and in which LED unit the ratio of the durations of the transmission periods for the different colours is set so as to output a desired non-primary colour, and
a controller for controlling a perceivable brightness of the non-primary colour output by the LED unit, the perceivable brightness being set by controlling, for a given period, a light emission duration for each LED in the LED unit during the given period, said controller driving each LED so that each LED

continuously emits light for a period corresponding to its light emission duration during the given period.

Also there is provided according to the invention a procedure for controlling an indicator device for an elevator, picture elements of a display of said indicator device including LED units at least one of which is so designed that it can be caused to emit at least two light radiations of substantially different substantially primary colours, and in which LED unit the ratio of the durations of the light emission for the substantially different primary colours is controlled so as to output a desired non-primary colour, comprising:
controlling a perceivable brightness of the non-primary colour output by the LED unit, the perceivable brightness being set by controlling, for a given period, a light emission duration for each LED in the LED unit during the given period, said controller driving each LED so that each LED continuously emits light for a period corresponding to its light emission duration during the given period.

Other embodiments of the invention are characterized by the features presented in the other claims.

The indicator device of the invention may be e.g. a floor indicator or a direction arrow indicator in an elevator car or at a landing, a signal light indicator placed in the car



call or landing call buttons or in connection with them, or some other kind of indicator connected to an elevator system for the display of information, e.g. a display placed in an elevator lobby to guide arriving passengers.

The advantages achieved by the present invention include the following:

- The various symbols can be displayed in a desired colour by means of a single hardware version.
- The colour to be displayed can be selected as one of the nominal colours of the light emitted by the display elements or as a mixture of these colours.
- In certain embodiments of the invention, it is possible to display figures in two or more colours.
- The brightness of the display can be adjusted to a suitable level with respect to the brightness of illumination in the environment.
- The display colour and brightness are adjusted by means of parameters which can be altered when necessary. This allows suitable brightness and colour settings according to the environment e.g. for indicator units on different floors.

In the following, the invention is described in detail by the aid of some of its embodiments by referring to the attached drawings, in which

Fig. 1 presents the circuit diagram of the display unit of a landing call device according to the invention.

Fig. 2 presents a landing call device placed in push buttons with a display, and

Fig. 3 presents a matrix display device according to the invention.

Fig. 1 presents the circuit diagram of the display unit 2 of a landing call device 1. A processor 3 comprised in the landing call device 1 sends control signals to the controller 4 of the display unit along signal lines UPRED, UPGREEN, DWRED, DWGREEN. The processor may also handle other functions besides those relating to the control of the display unit. The display 5 of the display unit is made up of two-colour LED units V50...V61,V63,V64,V65,V67. The other functions of the landing call device 1 are not described here. The display of the landing call device 1 is generally only used to display simple figures, such as stylized up-arrow and down-arrow, so the figures can be formed by appropriately positioning the LED units V50...V61,V63,V64,-V65,V67. Alternatively, the figures can be formed by using a partially transparent display surface and illumining it by means of LED units placed behind it.

Fig. 2 shows a landing call device 1 with a display 5 divided into two parts so that the up-arrow 5a is contained in the up-call button and the down-arrow 5b in the down-call button. In this case, the two-colour LED units V50...V61, V63,V64,V65,V67 are so placed in the display that the up-arrow contains LED units V50...V55,V64,V65 while the down-arrow contains LED units V56...V61,V67,V63. Each LED unit V50...V61,V63,V64,V65,V67 contains LEDs emitting red light (between pins 1 and 2) and LEDs emitting green light (between pins 3 and 4). Based on the control signals received via the signal lines UPRED, UPGREEN, DWRED, DWGREEN, the controller 4 turns the red and green LEDs in the LED units of the up- and down-arrows on and off.

In the circuit of our example, the controller 4 is implemented using a commercially available IC, ULN2803A, which contains 8 transistors. In the following, only the operation of the up-arrow is described. The transistor with its base connected to pin 1 of the controller 4 is turned on by a pulse supplied via the UPRED line, producing a pulse at pin 18 which is further transmitted to the base of another

transistor, the one connected to pin 2 of the controller, switching it into conduction. In this way, a current path is established between the ground GND and the +15V power supply via pin 17 of the controller and the LED chains connected to it. There are two LED chains in parallel, each containing four LEDs connected in series. The current in the LED chains is limited by resistors R97 and R83 connected in series with the chains. When the transistors are not conducting, the voltage at pins 17 and 18 is pulled up to the supply voltage via a resistance which is large as compared with the resistance of the LED chains. The voltage at pin 17 is monitored via line UPDIAC1. The voltage data UPDIAC1 tells the processor 3 whether the red up-arrow is functioning according to the control. The operation of the red down-arrow and the green arrows is implemented in a corresponding manner and will not be described here in detail.

Fig. 3 presents a block diagram representing a display unit 101 included in the signal devices for the elevator car. The display unit comprises a two-colour 16x16 LED matrix display 105 in which each picture element consists of a two-colour LED unit having rows R1...R16 and columns, the latter consisting of green and red columns C1G...C16G and C1R...C16R. Individual picture elements in the matrix display 105 can be designated using row/column coordinates (RM,CN), which indicate the location of the picture element unambiguously as the position at row M, column N. The LEDs in the picture elements of the matrix display 105 are lit by feeding each one of them with a current supplied by the controller unit 104 in accordance with control signals received by the controller unit via signal lines A1...AN. Connected between the column inputs 17...48 of the matrix display 105 and the controller 104 are resistors R62...R93. The matrix display 105 may be e.g. the commercially available MD251BC-ARG.

The LEDs in the LED units of both the display 5 and the matrix display 105 are controlled with a constant current so that they emit light for short periods of a preset length

and are extinguished during the intervals between these periods. The repetition frequency of these short periods is at least a few tens of times a second, causing the human eye to perceive the picture element as being continuously lit. The magnitude of the feeding current is preferably equal to the nominal current of the LED unit, in which case the pulse ratio of the control signal for each LED can be kept at a relatively low value in each LED unit without impairing the readability of the display. The repetition frequency and the frequency of the supplying mains are not multiples of each other, which means that e.g. the periodic variations in the light intensity of a fluorescent lamp will not cause disturbing contrast variations which could be perceived as 'flicker' of the display or a part of it or as dimness of some of the picture elements. The brightness of a given colour in the LED unit is controlled by varying the pulse ratio between the light emission period and the subsequent interval (or vice versa), and tone control is achieved by varying the ratio of the durations of the emission periods of LEDs emitting different colours in the same LED unit. In simple applications where only the colour and brightness are selected, the pulse ratio for each basic colour of the LED units is set in connection with installation. The brightness and colour of the display can also be controlled according to the illumination conditions of the environment and/or according to a programmed schedule. In indicator devices according to the invention, in which the LED units can be controlled separately, it is easy to produce multicoloured figures.

It is obvious to a person skilled in the art that different embodiments of the invention are not restricted to the examples described above, but that they may instead be varied within the scope of the claims presented below. For example, the invention is not restricted to the use of red-green LED units, but the colours of the LEDs in the LED units can be chosen differently and the number of colours in the LED units can be larger than two. In addition to having an

external appearance adapted to the environment, the disply can be used to present additional information to elevator passengers. For instance, in car call buttons a dim red light can be used to indicate locked floors while the call buttons for other floors are lit with their ordinary colour. Similarly, landing calls pertaining to the elevator can be indicated in a manner differing from car calls, enabling the passenger to recognize and anticipate stoppages due to landing calls as well. It is further obvious to the skilled person that the displays of indicator devices implemented according to the invention can easily be dimmed during low elevator traffic to prolong their useful life.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An indicator device comprising:
a display, the display including picture elements having LED units, at least one LED unit being so designed that it can be caused to emit at least two light radiations of substantially different substantially primary colours and in which LED unit the ratio of the durations of the transmission periods for the different colours is set so as to output a desired non-primary colour, and
a controller for controlling a perceivable brightness of the non-primary colour output by the LED unit, the perceivable brightness being set by controlling, for a given period, a light emission duration for each LED in the LED unit during the given period, said controller driving each LED so that each LED continuously emits light for a period corresponding to its light emission duration during the given period.

2. An indicator device according to claim 1, wherein:
each one of the LED units used as picture elements in the display of the indicator device can be caused to emit at least two light radiations of substantially different colours.

3. An indicator device according to claim 1, wherein:
the display of the indicator device includes at least one dot matrix display module containing several LED units used as picture elements.

4. A procedure for controlling an indicator device for an elevator, picture elements of a display of said indicator device including LED units at least one of which is so designed that it can be caused to emit at least two light radiations of substantially different substantially primary colours, and in which LED unit the ratio of the durations of the light emission for the substantially different primary colours is controlled so as to output a desired non-primary colour, comprising:
controlling a perceivable brightness of the non-primary colour output by the LED unit, the perceivable brightness being set by controlling, for a given period, a light emission duration for each LED in the LED unit during the given

period, said controller driving each LED so that each LED continuously emits light for a period corresponding to its light emission duration during the given period.

5. An elevator indicator device comprising:
a display including a plurality of LED units, each LED unit having at least a first substantially-primary colour emitter element and a second distinct substantially-primary colour emitter element; and
a controller for controlling each LED unit to thereby configure an output of the display;
the controller controls an LED unit so that at least the first emitter element emits for a first duration and the second emitter element emits for a second duration within a given period, respectively, the controller controls the LED unit to output a non-primary colour by selectively controlling the ratio of the first duration to the second duration, controls a brightness of the non-primary colour by controlling the ratio of the first duration to the given period and the ratio of the second duration to the given period, drives the first emitter element to continuously emit light for the first duration during the given period, and drives the second emitter element to continuously emit light for the second duration during the given period.

6. An indicator device as in claim 5, wherein:
the plurality of LED units is a matrix of LED units.

7. An indicator device as in claim 5, wherein:
the controller varies the brightness of the LED unit according to ambient illumination conditions.

8. An indicator device for an elevator system, comprising a plurality of LED units formed into a display, each LED unit having at least a first substantially-primary colour emitter element and a second distinct substantially-primary colour emitter element; and
a controller for controlling each LED unit to thereby configure an output of the display;

the controller controlling an LED unit to output a non-primary colour by selectively controlling the ratio of the first emitter element to emit for a first duration to the second emitter element to emit for a second duration within a given period, respectively;

the controller selectively varying the perceivable brightness of the non-primary colour output by varying the a light emission for each LED during the given period, wherein

the controller controlling the display to indicate a first condition of a particular floor by decreasing the output intensity, relative to a reference output intensity, of a first group of LED units in an area of the display corresponding to the particular floor while maintaining an output intensity at the reference intensity of a second group of LED units in an area of the display corresponding to the other floors.

9. An indicator device as in claim 8, wherein:

each LED unit controllably emitting at least two colours; and

the controller also controls the display to indicate the first condition of the particular floor by controlling the first group of LED units to produce a first colour and controlling the second group of LED units to produce a second colour distinct from the first colour.

10. A device as in claim 9, wherein:

the first condition is that the particular floor is locked.

11. A device as in claim 9, wherein:

the first condition of the particular floor is indicative of it having been selected by a landing call in contrast to a car call.

12. A device as in claim 5, wherein:

the controller causes each of the LED units to output at a reduced intensity during periods of low elevator system usage.

13. An elevator indicator device comprising:
a display including a plurality of LED units, each LED unit having at least a first substantially-primary colour emitter element and a second distinct substantially-primary colour emitter element; and
a controller for controlling each LED unit to thereby configure an output of the display;
the controller controlling an LED unit to output a non-primary colour by selectively controlling at least the ratio of the first emitter element to emit for a first duration to the second emitter element to emit for a second duration within a given period, respectively;
the controller selectively varying a perceivable brightness of the non-primary colour output by varying a light emission duration for each LED during the given period wherein
the controller varies the brightness of the LED unit according to ambient illumination conditions.

14. Indicator device having a display with picture elements consisting of LED units substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 29th day of April 1997

KONE OY
By their Patent Attorneys
COLLISON & CO.

ABSTRACT OF DISCLOSURE

Of the LED units used as picture elements (V50...V61,V63,V64,V65,V67,(RM,RN)) in an indicator device for an elevator, at least one is capable of emitting under appropriate control at least two light radiations of substantially different colours. The colour to be displayed by the picture element is selected or mixed from the colours of the LEDs in the LED units. In the procedure, at least one of the LED units is caused to emit at least two light radiations of different colours, and the LED unit is caused to emit at least one of the colours of the LED for short periods of a preset length at intervals of a preset length.

Fig. 2

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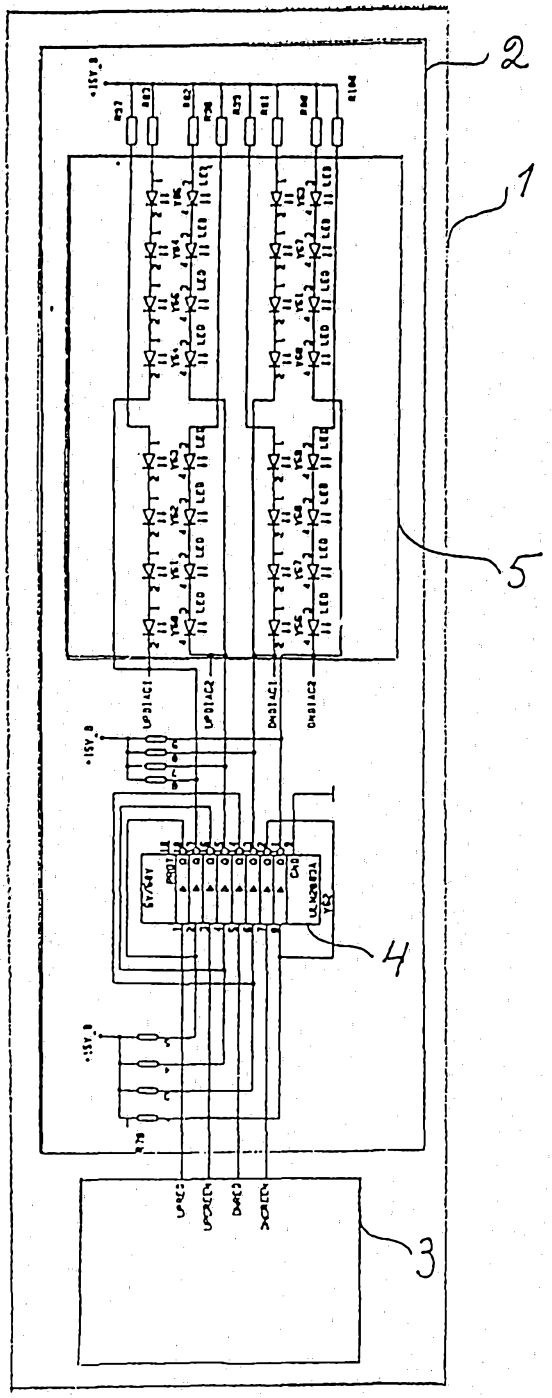

Fig. 1

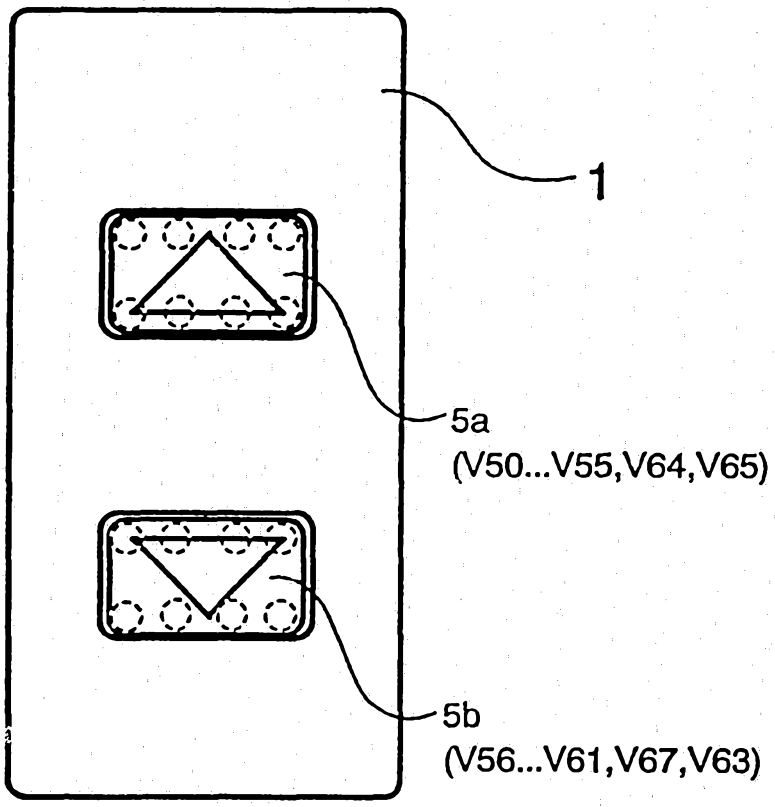

Fig. 2

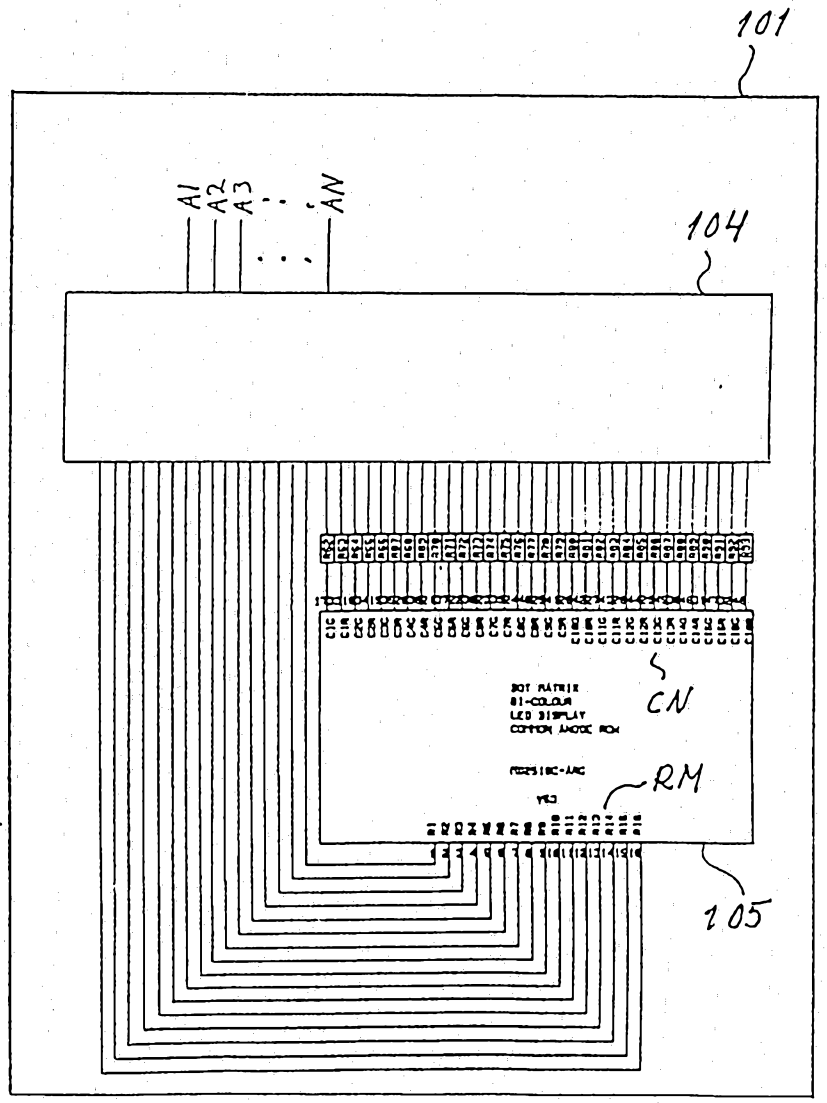

Fig. 3