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(54) Indicator means

(57) Indicator means for association with an object and operable to indicate if the object is moved from a desired location includes an annunciator (40, 42) and drive circuitry therefor including a switch (26, 26') which when closed enables the annunciator and which is held open when the object is at the desired location. The switch described is a magnetic reed relay carried by the object and is normally held open by the action of a magnet (28, 28') supported adjacent the switch when the object is in the desired location. The drive circuitry includes means (54) (possibly a Schmitt trigger) for delaying operation of the annunciator after movement of the object. The annunciator incorporates an LED (40) and a tone sounder (42).

A described indicator is for mounting on the face of a door (22, 22') with the switch (26, 26') carried adjacent an edge of the door and normally held open by operation of a magnet (28, 28') mounted in the doorframe (32). Another form of indicator disclosed is for mounting adjacent a location at which it is desired to store an object, the annunciator means being disabled while the object is at that location and enabled should the object be moved. The indicator may include means for relaying a signal to a central location should the annunciator be enabled.

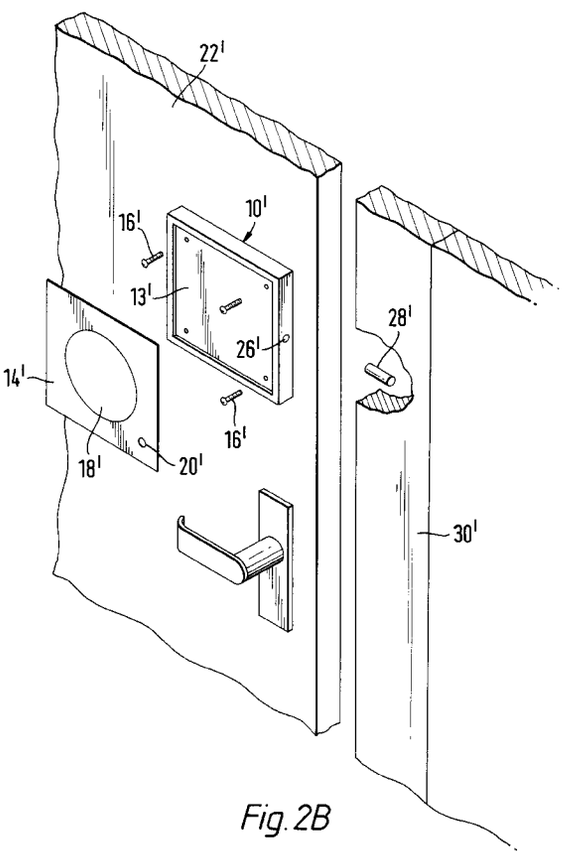

Fig. 2B

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Description

The invention relates to indicator means, in particular devices operable to indicate when an object which is movable is in a described location.

There are many applications in which it is desirable to know if an object is in a desired location. One may need to know, for example, if an item normally stored at a particular location is moved from that location.

Again, there is particular need to provide an indication if a fire or other normally closed safety-door is held open.

It has increasingly become the case in recent years for fire or other normally closed safety-doors provided in industrial or commercial buildings to be wedged open by the inhabitants of those buildings for one or other of a number of reasons which may include ease of movement of individuals and/or material along a passage way or simply to maintain airflow along the passageway.

This propensity for individuals inhabiting commercial and industrial environments to wedge or otherwise hold open normally closed fire doors is highly undesirable, as it negates the purpose of the fire-door.

In an effort to reduce the frequency at which such doors are wedged or otherwise held open it is a requirement that each door (on each of its faces) be provided with a sign or decal indicating that the door is a fire or other form of normally closed safety door and should be kept closed. Unfortunately, these signs or decals are increasingly ignored.

It is an object of the invention to provide indicator means effective to alleviate the above noted difficulty of the known arrangements.

In a first aspect the present invention provides means for association with an object and operable to indicate if the object is moved from a desired location, said means including an annunciator and drive circuitry therefor, the drive circuitry including a switch which is normally operable to enable the annunciator and which is held in a condition disabling the annunciator when the object is at said desired location.

Desirably, said switch is normally closed and is held open when the object is in said desired location.

Said switch may comprise a mechanical switch carried by the object, or an article adjacent the object when the object is at the desired location, and be then engaged by an element associated with the article or with the object.

Alternatively, said switch may comprise a magnetic reed switch carried by the object, or an article adjacent the object when the object is at the desired location, and be then held in a condition disabling the annunciator by the action of a magnet supported by the article or object.

Preferably, the drive circuitry includes delay means for delaying operation of the annunciator for a predetermined period after movement of the object from the desired location.

The delay means may comprise a timer or counter.

The annunciator may incorporate an LED and/or a tone sounder. The LED may be an auto-flashing device.

The indicator means may be for mounting on the face of a door with said switch means formed as a magnetic reed switch carried adjacent an edge of the door and normally held open by operation of a magnet mounted in the frame of the doorway, the arrangement being such that the annunciator is disabled when the door is closed and is enabled after the door is opened.

The indicator means may be for mounting in a position adjacent a location at which it is desired to store an object, the annunciator means being disabled while said object is at said desired location and enabled should the object be moved from the desired location.

The indicator may further include means for relaying a signal to a central location should the annunciator become enabled.

The above and other aspects, features and advantages of the invention will become apparent from the following description of an embodiment thereof now made with reference to the accompanying drawings in which:-

Figure 1 schematically illustrates at A and B two forms of an annunciator body forming part of indicator means embodying the invention,

Figure 2 schematically illustrates at A and B ways of using the annunciators bodies of Figures 1A and 1B respectively when mounted on a fire safety door, and

Figure 3 illustrates schematically at A, B and C three different forms of circuitry which may be used in indicator means embodying the invention.

Referring now to the drawings. Figure 1A shows the casing of an annunciator forming part of an indicator means embodying the present invention to comprise a shallow box 10 with upstanding side walls 12 to which a front plate 14 may be fitted.

The front plate 14 is fittable to the side walls 12 of the shallow box 10 by means of vandal proof screws 16 which are used to mount box 10 on a door. The plate 10 carries a decal 18 on its outermost surface indicating that a door on which the annunciator body is mounted is a fire door and should be kept closed. The face plate 14 is pierced by an aperture 20 enabling a flashing LED device within the box 10 to be seen when the LED device enabled.

The annunciator body shown in Figure 1A is securable to a fire door 22 - as shown in Figure 2A - by the screws 14 after a cable 24 has been passed through the body of the door 22 from a switch 26 mounted in a side edge of the door.

Switch 26 is a normally closed magnetic reed relay switch. Magnet 28 is mounted in the jam 30 of the door frame against which the door 22 closes and proximate the position of the switch 26 when the door is closed.

Figures 1B and 2B shows a second form of annun-

ciator body embodying the present invention and in particular shows the body to comprise a plastics material box 10' having side walls 12' and a rear wall 13. In this embodiment of the invention the front plate 14' for the annunciator body is held in position in use by being trapped in grooves in return lips 12A on the outer edges of the walls 12' of the body. Screws 16' pass through the rear wall 13 to secure the box 10' on the face of a door 22' at a position approximately 10mm from the free edge of the door.

In this arrangement a magnetic reed relay switch 26' is carried by the annunciator body in a wall 12' of box 10' closest to the frame 34' of the door when the door is closed.

After positioning the annunciator body on the face of the door 22' a user then drills a hole in the frame 34' at a position opposite the reed switch 26' and inserts in it a magnet 28'. It will be appreciated that in this position the magnet 28' is proximate the position of the reed switch 26' when the door is closed.

It will be seen that in either of the arrangements described above closure of the door 22, 22' will carry the switch 26, 26' into the field of the magnet 28, 28'. In this condition the switch will be held open. When the door is opened the switch 26, 26' moves out of the field of the magnet 28, 28' and relaxes to its normally closed state. In this condition an annunciator within the body 10, 10' is enabled.

Three different forms of circuitry usable in the annunciator will now be described with reference to Figure 3.

Figure 3A shows circuitry for the annunciator including, to an LED display 40 a tone sounder 42 and a battery 44. Tone sounder 42 may be any suitable device commercially available and the battery 34 preferably comprises one or more long life, lithium batteries.

It will be seen from Figure 3A that switch 26, 26', when closed, enables operation of the LED display 40 and the tone sounder 42 by completing the circuit of those devices with the battery 44.

As noted above, however, when the door 22, 22' on which the body 10, 10' is closed magnet 28, 28' is proximate switch 26, 26' and the switch is held open, disabling both LED display 40 and tone sounder 42.

As a result if the door is held open (e.g. wedged open) the annunciator will emit a warning tone (preferably an intermittent buzz) and LED display 40 will become illuminated (preferably this display is a flashing display).

If desired a delay may be introduced to the indicator means, for example by providing between switch 26, 26' and the annunciator a Schmitt trigger, a capacitive link, a counter or any other suitable form of delay device. Again the arrangement may be modified by being mains powered and further be arranged to send a signal to a central location if desired.

Such an arrangement is shown in Figure 3B.

In the arrangement of Figure 3B the indicator means is powered from a mains electrical supply via leads 50 which are coupled to an inverter 52 forming part of the indicator.

A battery 44 is again provided as a back-up in case of mains power failure.

As with the arrangement of Figure 3A switch 26, 26' is coupled to enable the LED display 40 and tone sounder 42 but in this arrangement via a delay device 54.

The arrangement of Figure 3B also includes an R/F sender 56 enabled with the LED display 40 and tone sounder 42 to emit a radio frequency signal identifying the door.

Operation of the device is as with the arrangement of Figure 3A. If the door is closed, the proximity of switch 26, 26' to magnet 28, 28' has the effect of holding the switch open. When the door is open switch 26, 26' is moved out of the field of magnet 28, 28' and relaxes to a closed condition.

After a delay introduced by the delay device 54 (for example 5 to 30 seconds) the tone sounder 42 and LED display 40 are enabled and the R/F sender 56 begins emitting a radio frequency signal indicating the door on which the annunciator is mounted is being held open.

Figure 3C illustrates a third form of circuit which may be employed in an annunciator embodying the present invention. In this Figure parts common to Figures 3A and 3B are given the same reference numerals.

In the arrangement of Figure 3C use is made of an integrated circuit such as is sold By Messrs. Maplins Electronics of 282-284 London Road, Westcliffe-on-Sea, Essex, England under designation NE555N Timer, S G S Thomson as indicated at 60. In the arrangement of Figure 3C it will be seen that the switch 26, 26' is held normally open by the magnet 28, 28' but that when the door is open the switch closes such that a potential difference is provided across two rails 62 and 64.

Power to the integrated circuit 60 is provided by coupling a pin 8 to the positive supply rail 62 and its pin 1 to the negative supply rail 64. The reset pin 4 of the integrated circuit is also coupled, as can be seen, from Figure 3C to the positive rail 64.

The threshold and discharge pins 6 and 7 of the integrated circuit are coupled to the junction of a resistor 70 and capacitor 72 running between the rails 62 and 64 and its trigger pin, pin 2, is coupled to the junction of a resistor 74 of capacitor 76 also running between the positive and negative supply rails 60, 62 and 64.

Pin 3, the output pin of the integrated circuit, is coupled to the positive supply rail via a tone sounder 42 and LED 40 as shown. In this arrangement the LED device is preferably one such as sold by Messrs. Maplins Electronics of 282-284 London Road, Westcliffe-on-Sea, Essex, England stock code UK30H.

It will be appreciated that when the door is opened and the switch 26, 26' mounted out of the field of the magnet 28, 28' battery 44 will supply a positive voltage, of approximately 6 volts, across the supply rails 62 and 64. The suppply of power to the integrated circuit is controlled by resistor 74 and capacitor 76. After a period deter-

mined by values of the resistor 70 and capacitor 72 integrated circuit 60 will provide an output, on pin 3, effectively coupling tone sounder 42 and LED 40 to rail 64.

With the particular integrated circuit shown the delay given by using a resistor 70 of 10^6 ohms and a capacitor 72 of 10 x 10^{-6} Farads will approximate to 11 seconds. As the LED is, in this case, a flashing device it will when powered emit a flashing signal and at the same time, by interrupting the current passing therethrough, cause the tone sounder 42 to operate.

A reader skilled in the art will appreciate there are many variations which may be made to the arrangements described without departing from the scope of the present invention.

For example the values of the resistor 70 may be variable to enable a user to vary the delay before the annunciator operates.

As described the annunciator is mounted on the door, on that face of the door which is exposed when the door is open. If desired however the annunciator may be mounted on a wall, ceiling or transom adjacent the door and not on the door itself with the magnet 28, 28' carried by the door.

Although switch 26, 26' is described as being a magnetic reed switch which is normally closed it will be appreciated that the switch may be implemented as any form of suitable switch, for example a simple mechanical switch which is normally closed but which is held open by engagement of part of it and with the jamb adjacent the door.

Forms of illuminable display other than the LED display described may of course be used and the annunciator may incorporate an illuminable display or an audible display if desired, and not both.

In the arrangement of Figure 3B the signal is sent to a central location via an R/F sender. If desired this transaction may be performed by hardwiring the annunciator to the central location or by making use of the mains lead 50 bringing power to the device.

It will be seen the broad principles of the arrangements now disclosed may be applied in areas other than ensuring that fire or other normally closed safety doors are in fact closed.

Arrangements embodying the invention may, for example, be provided adjacent items of equipment normally stored in a particular location and arranged to provide an indication should the item of equipment be moved from that location.

Claims

1. Means for association with an object and operable to indicate of the object is moved from a desired location, said means including an annunciator and drive circuitry therefore, the drive circuitry including a switch which when closed enables the annunciator which is held open when the object is at said desired location.

2. Indicator means as claimed in Claim 1, wherein said switch is normally closed and is held open when the object is in said desired location.

3. Indicator means as claimed in Claim 1 or Claim 2, wherein said switch comprises a mechanical switch carried by the object, or an article adjacent the object when the object is at the desired location, and is then engaged by an element associated with the article, or with the object.

4. Indicator means as claimed in Claim 1 or Claim 2, wherein said switch comprises a magnetic reed switch carried by the object, or an article adjacent the object when the object is at the desired location, and is then held in a condition disabling the annunciator by the action of a magnet supported by the adjacent article or object.

5. Indicator means as claimed in any one of claims 1 to 4, wherein said drive circuitry includes means for delaying operation of the annunciator for a predetermined period following movement of the object from the desired location.

6. Indicator means as claimed in any one of claims 1 to 5, wherein said delay means comprises a timer or counter.

7. Indicator means as claimed in any one of claims 1 to 6, wherein said annunciator incorporates an auto-flashing LED device.

8. Indicator means as claimed in any one of claims 1 to 7, wherein said annunciator incorporates a tone sounder.

9. Indicator means as claimed in any one of claims 1 to 8, for mounting on the face of a door, and wherein said switch means is carried adjacent an edge of the door and comprises a magnetic reed switch normally held open by operation of a magnet mounted in the frame of the doorway, the arrangement being such that the annunciator is disabled when the door is closed and is enabled after the door is opened.

10. Indicator means as claimed in any one of claims 1 to 10, for mounting in a position adjacent a location at which it is desired to store an object, and wherein said annunciator means is disabled while said object is at said desired location and is enabled should the object be moved from the desired location.

11. Indicator means as claimed in any one of the preceding claims further including means for relaying a signal to a central location should the annunciator

become enabled.

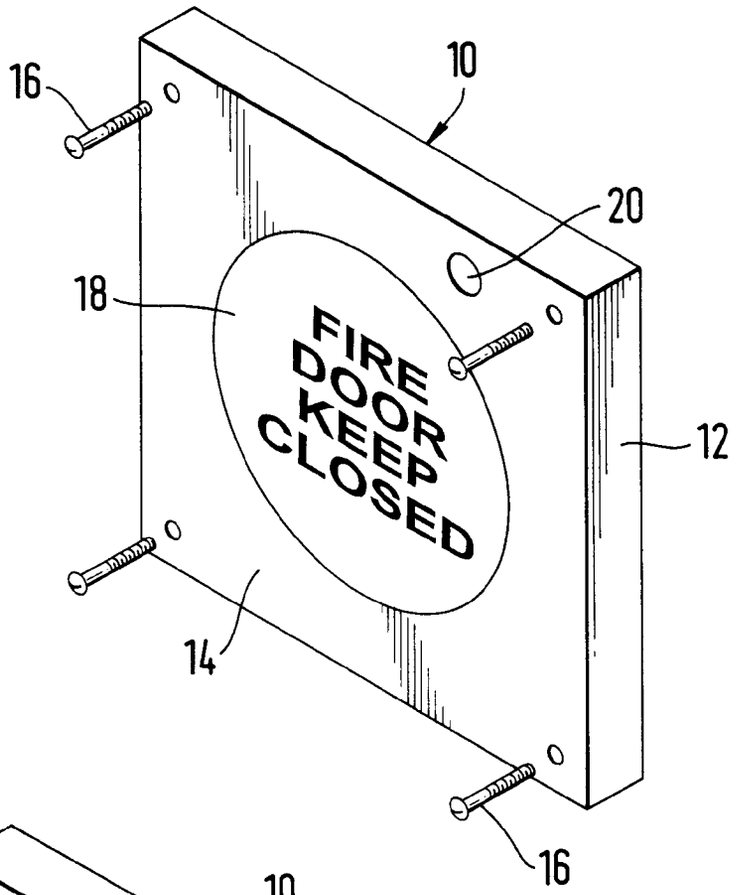
16
10
20
18
FIRE
DOOR
KEEP
CLOSED
12
14
16

Fig. 1A

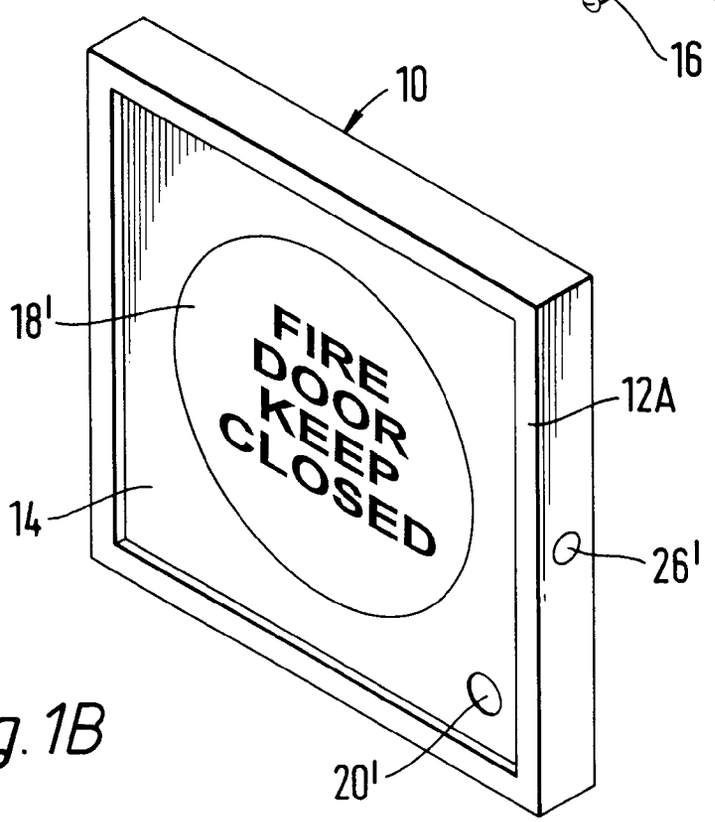
10
18'
FIRE
DOOR
KEEP
CLOSED
12A
14
26'
20'

Fig. 1B

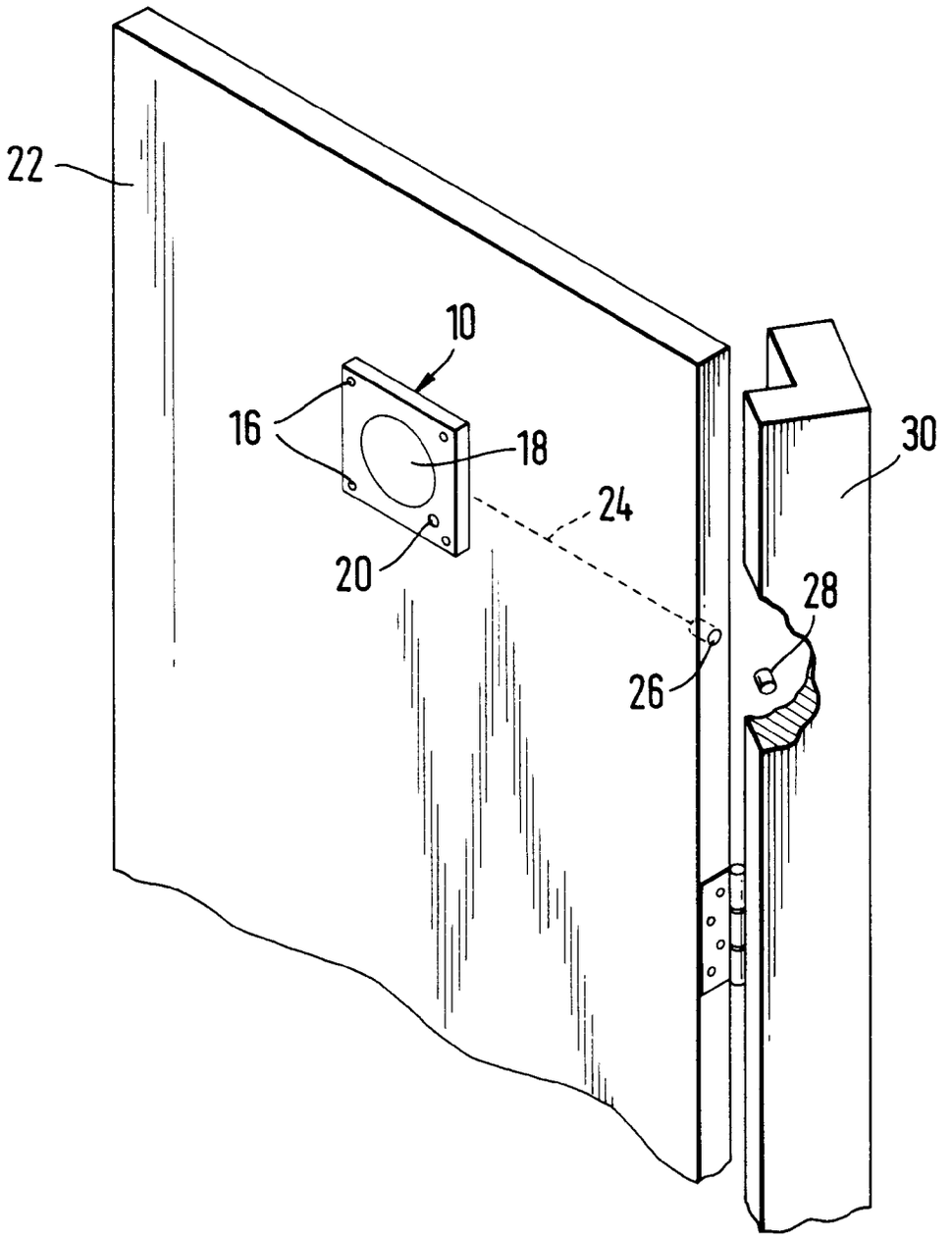

Fig. 2A

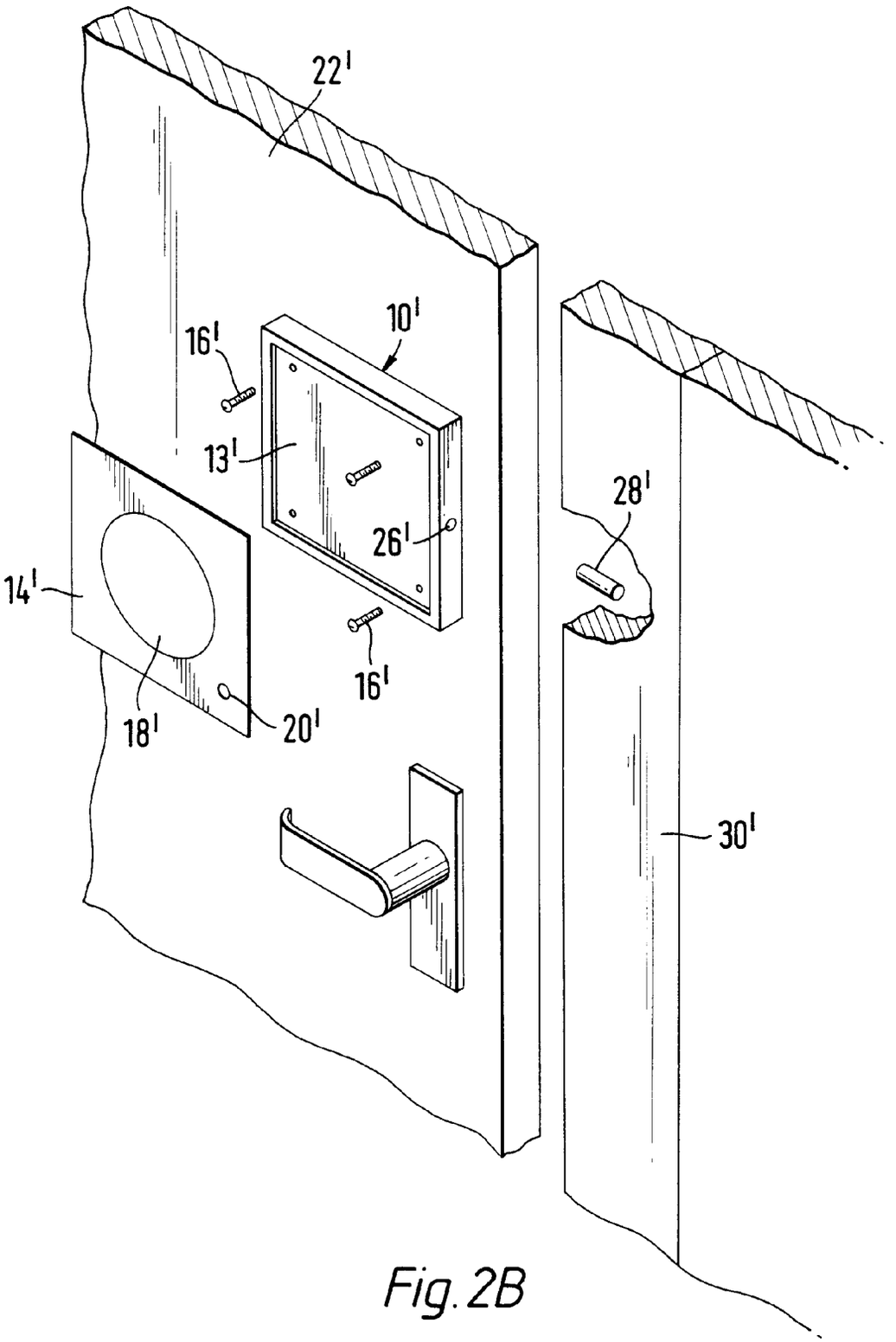

Fig. 2B

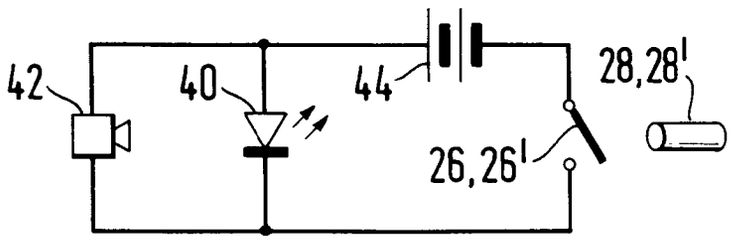

Fig.3A

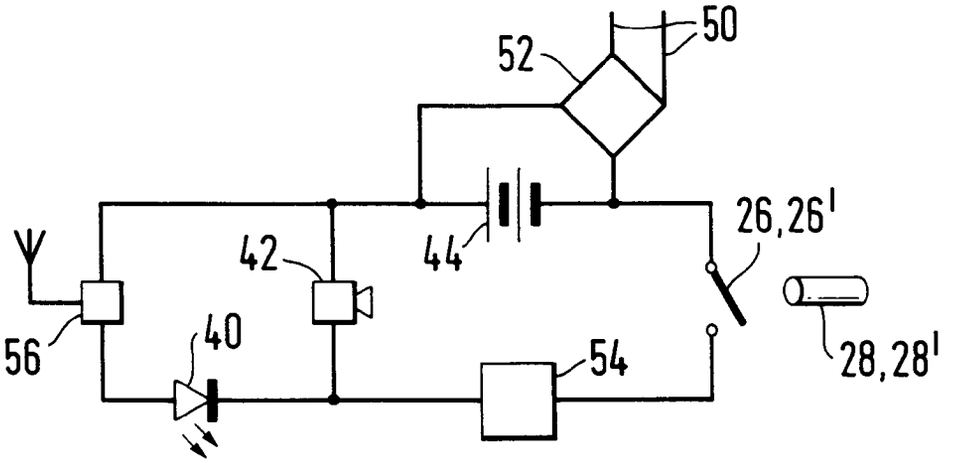

Fig.3B

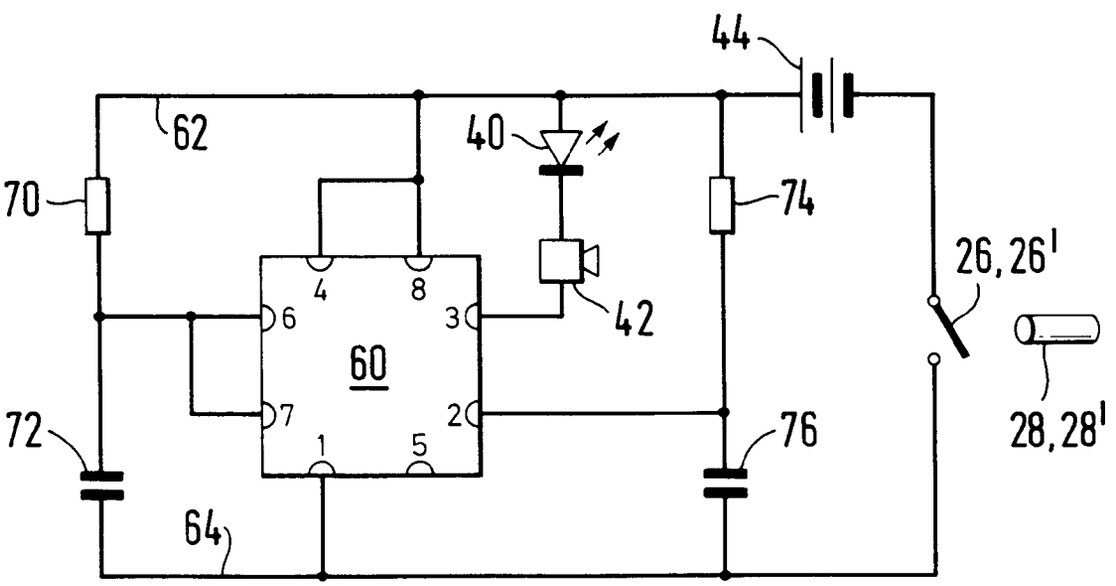

Fig.3C

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 30 4995

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US-A-4 910 497 (H. SEACHRIS) * abstract *	1-11	G08B13/08
X	US-A-4 896 144 (N. BOGSTAD) * abstract *	1-11	
X	US-A-4 241 337 (L. PRADA) * abstract *	1-11	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

G08B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 November 1995	Sgura, S

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
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