



(12) UK Patent (19) GB (11) 2 312 311 (13) B

(54) Title of Invention

An alarm device having a long-life power supply

(51) INT CL⁷; G08B 17/10

(21) Application No
9614995.0

(22) Date of filing
17.07.1996

(30) Priority Data

(31) 960285

(32) 15.04.1996

(33) IE

(43) Application published
22.10.1997

(45) Patent published
19.04.2000

(72) Inventor(s)
Michael Byrne
Michael Guinee
James Duignan

(73) Proprietor(s)
E.I. Technology Limited

(Incorporated in Ireland)

Shannon Industrial Estate
Shannon
County Clare
Ireland

(74) Agent and/or
Address for Service
Marks & Clerk
57-60 Lincoln's Inn Fields
London
WC2A 3LS
United Kingdom

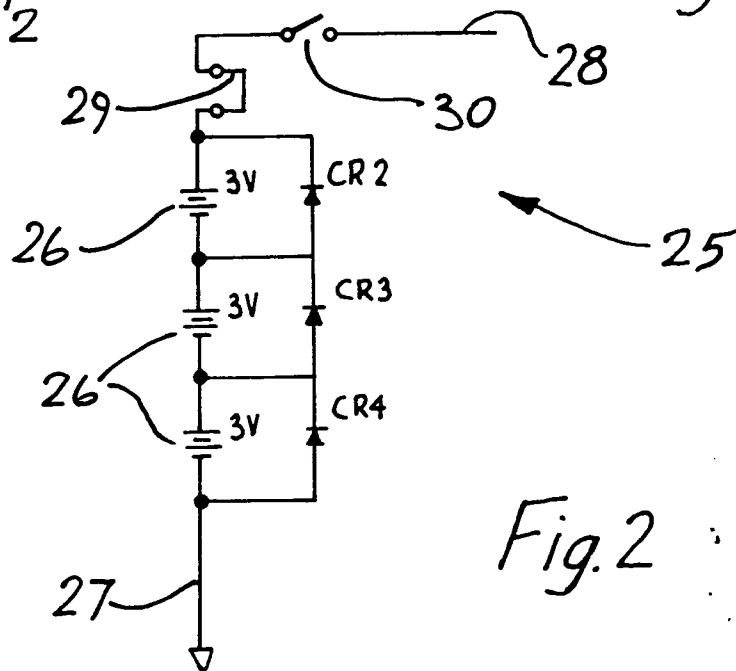
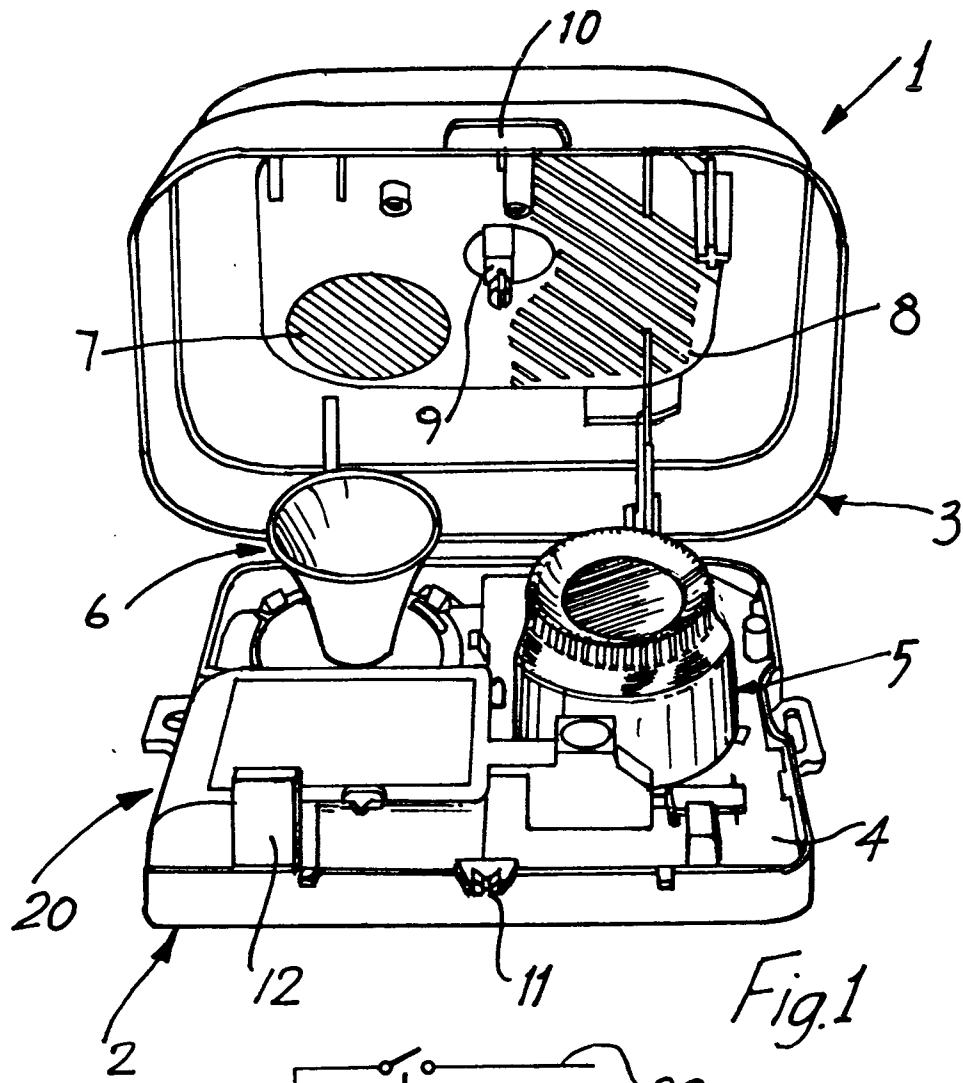
(52) Domestic classification
(Edition R)
G4N NAFB N6D5
H1N NGD N569 N618
U1S S2192

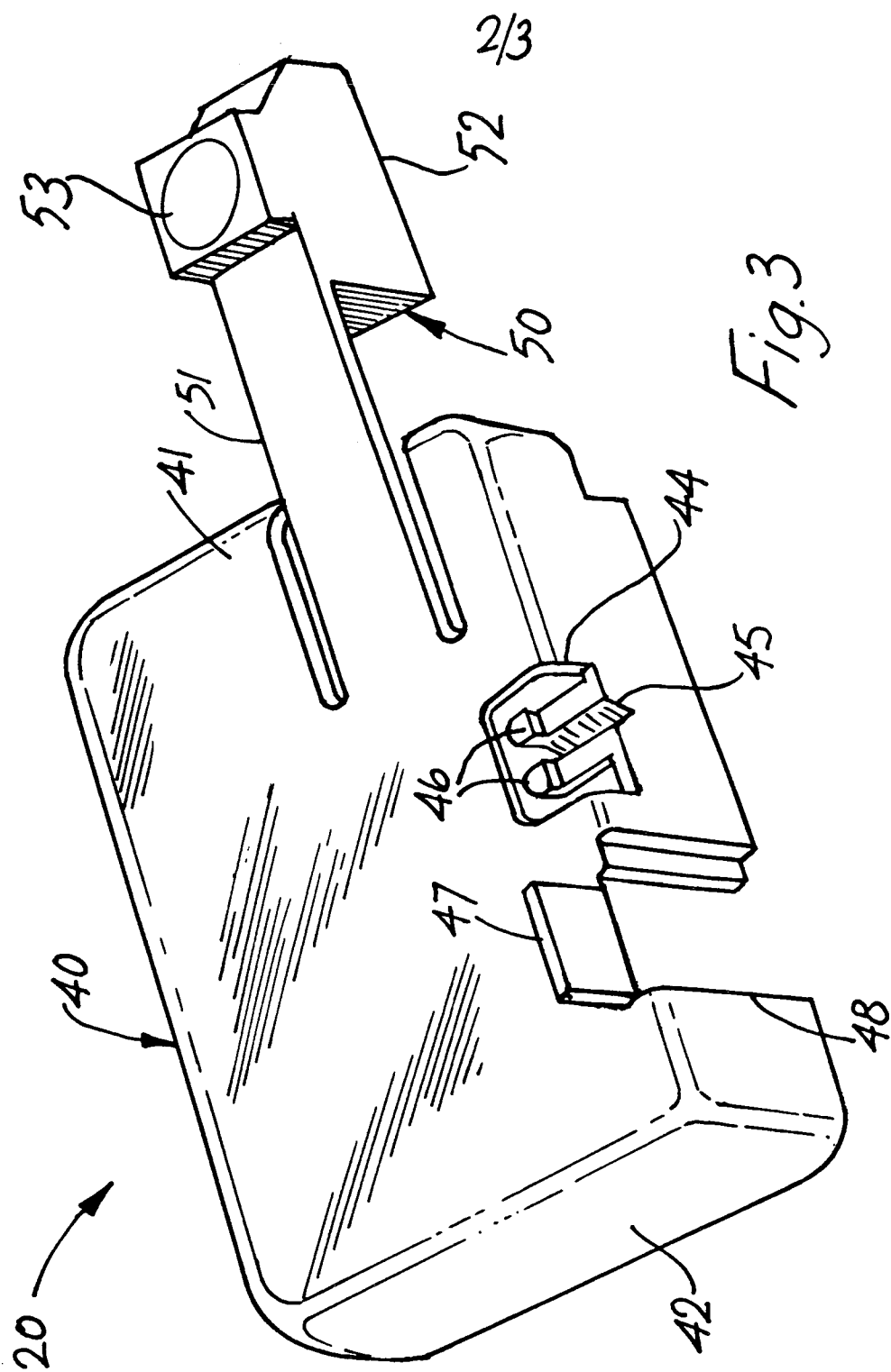
(56) Documents cited
None

(58) Field of search

As for published application
2312311 A viz:
UK CL(Edition O) G4N NAFA
NAFB
INT CL⁶ G08B 13/00 17/00
17/10 29/18
Online: WPI
updated as appropriate

1/3





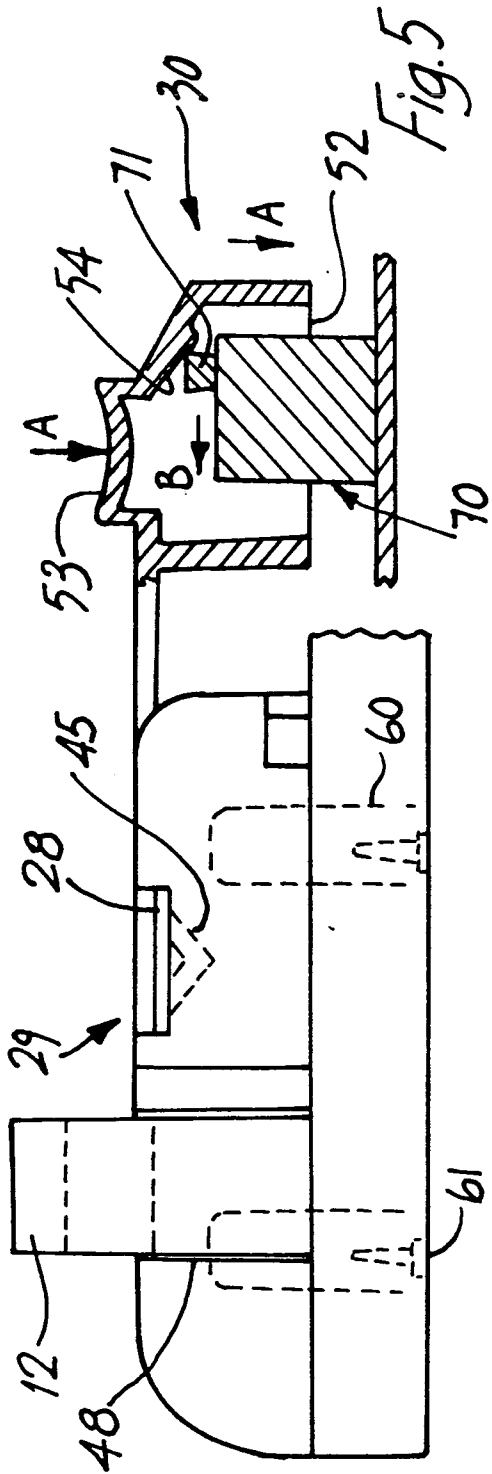


Fig. 5

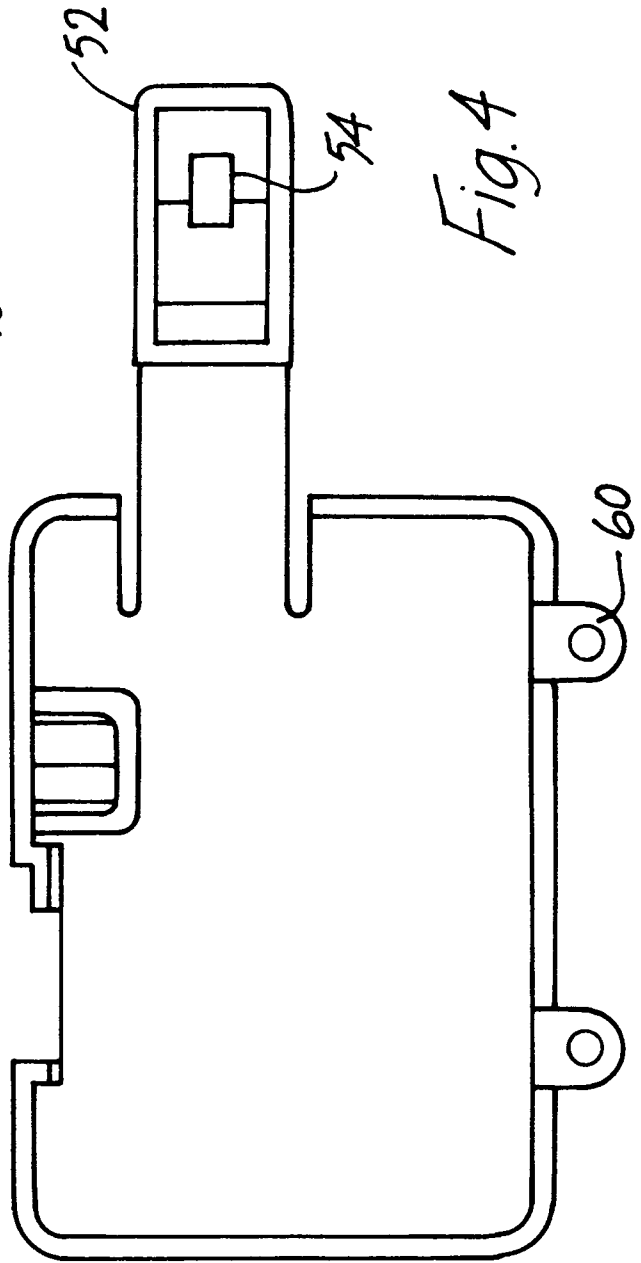


Fig. 4

"An Alarm Device having a Long-Life Power Supply"Introduction

The invention relates to an alarm device having a long-life power supply which operates in a stand-alone mode without connection to a mains power supply, and without
5 need to replace batteries. Typically, such an alarm device has Lithium batteries, such as the smoke alarm device described in the United States Patent Specification No. US 5,444,434 (Serby VM). In this specification, the
10 term "battery" is intended to mean one or more power supply cells.

In such an alarm device it is desirable that users do not have access to the power supply because there is no need to replace the battery and if the power supply is
15 accidentally disconnected, then the alarm device is useless. At best, this means that the user must replace the alarm device and at worst it means that the alarm device is not operating when the user thinks it is and there is a safety hazard.

However, there are also some desirable features which
20 conflict with the above requirement and these are the fact that it is desirable that the user can connect in the power supply at the beginning of its use to avoid power being drawn from the battery prior to use. This maximises the life of the battery and prevents operation of the
25 alarm device before it reaches the customer. Another such desirable feature is that the user should be capable of disconnecting the power supply when it has reached the end of its useful life in order to prevent battery-low indications being emitted after it has been discarded.

The invention is directed towards providing an alarm device to satisfy all of these objectives without compromising on safety. Another object is that the alarm device be inexpensive to produce.

5 Statements of Invention

According to the invention, there is provided an alarm device comprising a condition sensor, a control circuit, an output alarm indicator, and a power supply comprising at least one permanently-
10 connected long-life battery for stand-alone operation, wherein,

the alarm device comprises a battery chamber within which the battery is located to prevent user access to the battery,
15

a one-way activation switch for user connection of the battery to the control circuit, and

a one-way de-activation switch for user disconnection of the
20 battery from the control circuit.

In one embodiment, the activation switch comprises a movable switch member mounted on the control circuit and an interface which covers the switch member and allows action on the switch
25 member in one direction only.

In this latter embodiment, the switch member is preferably of the sliding type and the interface comprises a sloped surface to urge movement of the switch member in one direction only upon user
30 depression of the interface.

In one embodiment, the interface is mounted on an arm cantilevered to the battery chamber.

35 In one embodiment, the de-activation switch comprises a lead connected between the power supply and the control circuit and means in the chamber for allowing user access to cut the lead for de-activation.

In the latter embodiment, said user access means preferably comprises an opening in the chamber to allow access to the lead, and a barrier to prevent access to other items within the chamber. Preferably, the barrier
5 comprises a V-shaped notch extending inwardly within the chamber.

In one embodiment, the chamber has a label to allow a user mark the date of activation of the alarm device.

In a further embodiment, the power supply comprises a
10 diode connected across each battery to allow continuity of operation of the control circuit in the event of a fault arising in one battery.

Detailed Description of the Invention

The invention will be more clearly understood from the
15 following description of some embodiments thereof, given by way of example only with reference to the accompanying drawings in which:-

Fig. 1 is a perspective view from above of a smoke alarm of the invention;

20 Fig. 2 is a circuit diagram illustrating a power supply of the smoke alarm;

Fig. 3 is a perspective view showing a power supply compartment housing of the alarm;

25 Fig. 4 is a plan view from underneath of the compartment housing; and

Fig. 5 is a diagrammatic part cross-sectional view of the battery compartment.

Referring to the drawings, there is shown a smoke alarm 1 of the invention which comprises a base 2 hinged to a cover 3, both of plastics moulded construction. The alarm 1 comprises a control circuit 4, an ionisation chamber 5 for smoke sensing, and a horn 6 for emitting an audible alarm signal. The circuit 4, the chamber 5 and the horn 6 are mounted on the base 2. The cover 3 comprises a grille 7 in registry with the horn 6 to allow sound emission and a grille 8 over the ionisation chamber 5 to allow access of smoke for detection. The cover 3 has a tab 10 for engagement with a snap-fit notch 11 in the base 2. The base 2 also has a snap-fit retainer 12.

The alarm 1 comprises a compartment 20 for a power supply comprising three long-life Lithium cells. The power supply circuit is indicated by the numeral 25 in Fig. 2 and comprises 3V Lithium batteries 26 having a life of at least ten years. The batteries 26 are connected in series and there is a diode CR2, CR3 or CR4 connected across each. The batteries 26 are connected between ground 27 and a positive rail 28 of the control circuit 4. The circuit 4 comprises a one-way de-activation or OFF switch 29 and a one-way activation or ON switch 30.

Referring in particular to Figs. 3 to 5 inclusive, the compartment 20 comprises a rectangular chamber 40 enclosing the three batteries 26 and preventing user access. The chamber 40 has a flat top face 41 to which a label may be adhered to allow a user mark the activation date of the alarm 1 and any indicia. The chamber is completed by depending side walls 42 and has lugs 60 for connection to the base 2 by screws 61.

The OFF switch 29 comprises a cut-out 44 in the housing 40 and a notched barrier 45 extending inwardly and

terminating in a pair of retainers 46. The chamber 40 also has a tab 47 and an opening 48 for engagement with the base retainer 12.

5 When the chamber 40 is mounted over the batteries 26, the positive lead 28 from the batteries is trained over the barrier 45 and retained by the retainers 46 so that it is exposed in a manner whereby it may be cut by the user, while at the same time the barrier 45 prevents access to the remainder of the inside of the chamber 41. The parts
10 of the OFF switch 29 are thus extremely simple as they comprise parts which are integral with the housing 40, and a positive lead 28 which is required in any event. Further the OFF switch 29 is not reversible and as it is highly unlikely that the user will be able to re-connect
15 the lead. In summary, the OFF switch 29 allows the alarm 1 to be de-activated in an extremely simple manner, which is not reversible and which is provided in an inexpensive manner. Further, cutting of a wire is to the user clearly a destructive operation and is not reversible.

20 The ON switch 30 comprises a sliding switch 70 housing a sliding member 71 on the circuit 3, over which an interface 50 of the compartment 20 is mounted. The interface 50 is integral with the chamber 40 and comprises a cantilevered arm 51 extending from the chamber 40 and
25 terminating in a cover 52 which covers the sliding switch 70. There is a push-button depression 53 at the top of the cover 52. Referring in particular to Figs. 4 and 5, the inside of the cover 52 comprises a tapered ramp 54 which allows sliding engagement of the cover 52 with the
30 sliding switch so that it may be pushed only once and may not be reversed back to the OFF position.

In order for the user to activate the alarm 1, all he or she must do is open the cover 3 and press the button 53.

This causes the sliding switch to slide to the ON position and connect the batteries 26 to the circuit. This may not be reversed because the interface 50 allows the sliding switch to be pushed in one direction only. Again, the ON switch 30 is
5 provided in an extremely simple manner by an integral extension of the housing 40 and a conventional sliding switch which is inexpensive to purchase.

It will be appreciated that the invention provides an alarm
10 device which provides for long-life operation without the need to replace batteries and without the need to connect to a mains power supply. It is tamper-proof in that the batteries 26 are inaccessible to the user and it is highly unlikely that the user can cause faults to arise. At the same time, the user can cause
15 faults to arise. At the same time, the user is provided with a very simple facility for activating the control circuit so that power is drawn from the batteries only after the alarm is ready for use. This operation is very simple, and inexpensive components are used.

20 For de-activation of the control circuit, the user must simply cut a piece of wire which is clearly presented, while at the same time not allowing access to other parts within the chamber. This feature is also very simple.

25 The invention is not limited to the embodiments hereinbefore described, but may be varied in construction and detail. For example, the cells may be provided in a single battery pack. In this case, the circuit may not have diodes connected across the
30 cells.

CLAIMS

1. An alarm device comprising a condition sensor, a control
circuit, an output alarm indicator, and a power supply
5 comprising at least one permanently-connected long-life
battery for stand-alone operation, wherein,

the alarm device comprises a battery chamber within which
the battery is located to prevent user access to the
10 battery,

a one-way activation switch for user connection of the
battery to the control circuit, and

15 a one-way de-activation switch for user disconnection of
the battery from the control circuit.
2. An alarm device as claimed in claim 1, wherein the
activation switch comprises a movable switch member mounted
20 on the control circuit and an interface which covers the
switch member in one direction only.
3. An alarm device as claimed in claim 2, wherein the switch
member is preferably of the sliding type and the interface
25 comprises a sloped surface to urge movement of the switch
member in one direction only upon user depression of the
interface.
4. An alarm device as claimed in claim 3, wherein the
30 interface is mounted on an arm cantilevered to the battery
chamber.
5. An alarm device as claimed in any preceding claim, wherein
the de-activation switch comprises a lead connected between
35 the power supply and the control circuit, and means in the
chamber for allowing user access to cut the lead for de-
activation.

- 5 6. An alarm device as claimed in claim 5, wherein
 said user access means comprises an opening in the
 battery chamber to allow access to the lead, and
 a barrier to prevent access to other items within
 the chamber.
7. An alarm device as claimed in claim 6, wherein the
 barrier comprises a V-shaped notch extending
 inwardly within the chamber.
- 10 8. An alarm device as claimed in any preceding claim,
 wherein the chamber has a label to allow a user
 mark the date of activation of the alarm device.
9. An alarm device as claimed in any preceding claim,
15 wherein the power supply further comprises a diode
 connected across each battery to allow continuity
 of operation of the control circuit in the event
 of a fault arising in one battery.
10. An alarm device substantially as hereinbefore
20 described, with reference to and as illustrated in
 the accompanying drawings.