(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 245 101**
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **87304080.2**

(22) Date of filing: **07.05.87**

(51) Int. Cl.[4]: **G 08 B 13/14**

(30) Priority: **07.05.86 GB 8611104**

(43) Date of publication of application:
11.11.87 Bulletin 87/46

(84) Designated Contracting States: **DE FR GB**

(71) Applicant: **Hodgkinson, John Vernon**
c/o Batten & Co. (Solicitors) Church House
Yeovil Somerset BA20 1HB (GB)

(72) Inventor: **Hodgkinson, John Vernon**
c/o Batten & Co. (Solicitors) Church House
Yeovil Somerset BA20 1HB (GB)

(74) Representative: **Meddle, Alan Leonard et al**
FORRESTER & BOEHMERT Widenmayerstrasse 4/I
D-8000 München 22 (DE)

(54) **An alarm device.**

(57) An alarm device, said alarm device comprising a portable housing containing an arming and dis-arming arrangement, and an alarm signal generator, and a switch, closure of the switch serving to actuate the alarm signal generator when the device is armed, the switch being adapted to be closed when part of the device on the exterior of the housing is permitted to move away from the rest of the housing, said arming and dis-arming arrangement comprising means adapted to receive and respond to a predetermined arming signal to arm the device and a predetermined dis-arming signal to dis-arm the device, the arming and dis-arming signal being transmitted to the device from a position remote from the device.

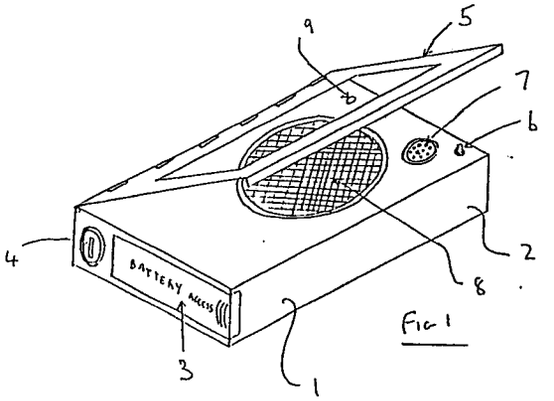

Fig 1

EP 0 245 101 A2

Description

Improvements in or relating to an alarm device

THE PRESENT INVENTION relates to an alarm device and more particularly the present invention relates to an alarm device which can be utilised to provide an alarm whenever an item such as a suitcase or bag is opened by an unauthorised person. Whilst the invention will be described with reference to an alarm adapted for use in a suitcase, it is to be appreciated that an alarm in accordance with the invention may also be utilised, if desired, to provide an alarm whenever a drawer or cupboard is opened by an unauthorised person.

According to this invention there is provided an alarm device, said alarm device comprising an arming and dis-arming arrangement, means to close a switch when part of the device is permitted to move relative to another part of the device, and an alarm signal generator actuated on closure of said switch when the device is armed, said arming and dis-arming arrangement comprising means adapted to receive and respond to a predetermined arming signal to arm the device and a predetermined dis-arming signal to dis-arm the device, the arming and dis-arming signal being transmitted to the device from a position remote from the device.

Preferably said arming and dis-arming arrangement is adapted to respond to an arming signal comprising one or more pulses of ultrasonic sound and a dis-arming signal comprising one or more pulses of ultrasonic sound.

Alternatively the arming and dis-arming is adapted to respond to an arming signal comprising one or more pulses of electromagnetic radiation of a predetermined frequency and dis-arming signal comprising one or more pulses of an electromagnetic radiation of predetermined frequency.

Conveniently said pulse, when received by the arming and dis-arming arrangement are passed through a filter so that only pulses of a predeter mined frequency are accepted.

Advantageously said arming and dis-arming arrangement incorporates a counter to receive said pulses, the counter being adapted to execute a predetermined count and return to zero, the counter advancing one count for each pulse received thereby, the arrangement being such that the alarm device is armed when a predetermined count or counts are present on the counter, and dis-armed when another count or counts are present on the counter.

Conveniently an electric latch is provided to maintain actuation of the alarm signal generator even if the said switch is re-opened after the switch has been closed to actuate the alarm signal generator.

Preferably the device includes a key operated master switch.

Preferably the device is powered by means of a battery, a cover providing access to the battery being normally locked in the closed position.

Conveniently the key utilised to actuate the key operated switch also actuates a lock retaining the battery cover in position.

Preferably the alarm device is mounted within a housing provided with a hinged cover or lid, the hinged cover or lid being adapted, when pressed towards the housing, to depress a spring biassed plunger, to open said switch, the arrangement being such that when the pressure applied to the cover or lid maintaining the cover or lid in the closed position is released the plunger moves the cover or lid thus permitting the switch to close.

Advantageously the device comprises means to emit a visible signal to indicate whether the device is armed or not.

Preferably said light signal emitting means are actuated when the device is in the unarmed condition.

The invention also relates to an alarm device as described above in combination with an arming and dis-arming device adapted to generate said arming and disarming signals.

Preferably said arming and disarming device comprises a housing containing means adapted to generate pulses of ultrasonic sound.

Conveniently the housing is additionally provided with a key adapted to actuate a key operated switch on the alarm device.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated, the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a perspective view of an alarm housing containing an alarm circuit;

FIGURE 2 is a perspective view of an arming and dis-arming device;

FIGURE 3 is a block circuit diagram of the circuitry contained within the arming and dis-arming device; and

FIGURE 4 is a block circuit diagram of the alarm.

Referring initially to Figures 1 and 2 of the drawings an alarm arrangement in accordance with the present invention consists of an alarm device 1 and an arming and dis-arming device 2.

The alarm device 1 consists of an appropriate casing 2 provided with a slidable panel 3 which can be removed to permit a battery to be located in position within the housing. A key operated switch 4 is provided to enable the device to be turned on and off. The key operated switch also locks the battery cover in the closed position so that when the device is switched on the battery cannot be removed. The housing 2 is provided with a component 5, in the form of a hinged lid, which is movable relatively to the rest of the housing. The component 5, when in the closed position, engages a spring loaded plunger 6, which is associated with an appropriate switch as will be described hereinafter, and thus, when the lid is in a closed position the plunger is depressed. The plunger, however, is spring biassed and thus tends to force the lid 5 upwards. The housing 2 has an ultrasonic receiver or transducer 7,

a noise emitting transducer or loud speaker 8, and an indicator lamp 9.

The arming and dis-arming device 2 consists of a tubular housing 10 formed of two separate parts 11, 12 which are screw connected together and which thus present a junction line 13. A battery may be inserted within the housing before the two housing parts are screwed together. The housing part 11 has a key 14 mounted thereon. The key operates the key operated switch 4. The housing part 12 is provided with an operating push button 15 and an ultrasonic sound emitter 16.

When the illustrated device is to be utilised, the alarm device is switched on utilising the key 14 in the key operated switch 4. Initially the device will be in a "safe" condition and the indicating lamp 9 will thus be illuminated. The device may be packed within a suitcase, briefcase or bag in such a way that the lid 5 is pressed firmly downwardly against the upper surface of the housing 2, thus depressing the plunger switch 6. When the suitcase is fully closed, the alarm device may be armed by using the arming and dis-arming device to transmit, to the alarm device, a predetermined ultrasonic signal. This may be done by pressing the button 15 on the arming device 2 a selected number of times, for example, six times. The arming device will thus send six pulses of ultrasonic sound to the alarm device. If the suitcase or bag is then opened by an unauthorised person, the lid 5 will move away from the housing 2 under the spring bias applied by the plunger 6. The alarm device will thus be activated, and will emit a loud sound. Even if the cover 5 is pressed back down into position so that the plunger 6 is again pushed down into the housing, the alarm will still continue to sound until the battery has run out. It is not possible for a person without the key 14 to switch off the device, or to remove the battery.

However, when an authorised person wishes to open the suitcase, the arming and dis-arming device is again utilised, and the button 15 is again pressed a selected number of times to send another predetermined ultra sonic frequency signal to the alarm device. The number of times the button is pressed is such that the total number of depressions of the button during the arming sequence and the dis-arming sequence is 20. The alarm device will then again be in a "safe" condition, allowing the suitcase to be opened without the alarm device emitting any noise.

Referring now to Figure 3 it can be seen that the circuit of the arming and dis-arming device is relatively simple. The circuit includes a battery 17, and a switch 18, which is actuated on depression of the push button 15, which effectively connects the battery to the rest of the circuit components which comprise a tuned oscillator 19, the output 20 of which is fed to amplifier 21, the output 22 of which is connected to an ultrasonic sound emitting transducer. The arrangement is such that whenever the switch 18 is closed the oscillator generates a signal which is amplified and fed to the transducer which consequently emits a pulse of ultrasonic sound.

The alarm circuit, shown in Figure 4, is more complex. The alarm circuit consists of a battery 24, which can be connected to the rest of the circuit components by means of the key operated switch 4. When the switch 4 is closed power is supplied to an initial set of components which will now be described.

The initial set of components includes a transducer 25 adapted to receive the ultrasonic sound generated by the arming and dis-arming device. The output 26 of the transducer is connected to a frequency filter 27 which is tuned to the frequency of the oscillator 19. Thus the filter 27 only passes signals generated by the arming and dis-arming device. The output 28 of the filter 27 is amplified by an amplifier 29 and passed to a counting circuit 30. The counting circuit 30 is effectively a shift register adapted to cycle through a count of 20. The shift register is associated with an indicator which is constituted by the light emitting diode 9. The light emitting diode 9 is illuminated whenever the count is zero, and thus when the alarm circuit is in a "safe" condition.

A switch 31, activated by the plunger 6, connects the line energized by the key operated switch 4 to a second set of components when the plunger 6 is not in the depressed condition. The second set of components comprises a relay 32, which is controlled by a signal from the counter 30 so that the relay 32 is closed whenever the count in the counter is not zero. When the relay is closed further components are connected to the battery 24.

The output of the relay which is energized when the relay is closed is fed through a lead 33 to a node 34. The node is connected to an oscillator the output of which, 36 is connected to an amplifier 37 and thence to a sound emitting transducer or loudspeaker 38 (shown as loudspeaker 8 in Figure 1). When the switch 31 and the relay 32 are both closed alarm device will thus emit a loud alarm signal. To prevent the signal being terminated merely by depressing the plunger a further relay 39 is provided. The relay 39 is normally open. The relay 39 receiving power from a lead 40 regardless of whether the switch 31 and/or the relay 32 are closed. The relay is adapted to close whenever a voltage is present on the node 34, since this node is connected to the control terminal of the relay by lead 41. The terminal of the relay 39 that becomes energized when the relay is closed is connected, by lead 42, to the node 42. Thus the relay 39 acts as a latch to maintain a voltage on the node 34, when such a voltage has been detected, until the key operated switch 4 is opened.

When the alarm device is armed, as described above, initially the key 14 is used to close the switch 4. The count in the counter is then zero, and the indicator lamp 9 lights up. The relay 31 will then be opened. The alarm device is then packed into a suitcase with the lid 5 pressed downwardly so that the plunger 6 is depressed and the switch 32 is in the opened condition. the arming device 2 is then utilised and the push button 15 is pressed any number of times between 1 and 20 selected at the whim of the person utilising the device. As the push button 15 is depressed so that the switch 18 is closed and the arming circuit issues a series of

pulses of ultrasonic sound of a predetermined frequency. These pulses of sound are received by the transducer 25 and pass through the filter 27, then being amplified by the amplifier 29 and passing to the counter 30. The count in the counter 30 thus advances. The indicator lamp 9 is extinguished, and the relay 31 is closed.

When the authorised person wishes to open the suitcase, he again utilises the arming device, pressing the push button 15 an appropriate number of times so that the number of pulses of ultrasonic sound issued by the arming device during the arming procedure and the disarming procedure taken together is 20. These pulses of sound are again received by the transducer 25 and passed through the filter 27 and the amplifier 29 to the counter 30. The count in the counter 30 is thus returned to zero. The indicator lamp 9 is re-illuminated and the relay 31 is opened. It is then possible to open the suitcase without the alarm device sounding.

If any unauthorised person attempts to open the suitcase, firstly they will not be aware of the fact that the suitcase contains the alarm device. Secondly, even if they suspect that the suitcase contains an alarm device of the described type, they will not be aware of the precise pass frequency of the filter 27, and will thus have great difficulty in determining if any particular ultrasonic frequency will or will not be usable to advance the count present in the counter 30. Also the unauthorised person does not know how many pulses have been used to set the count in the counter 30, and thus the unauthorised person does not know how many additional pulses are required to return the count in the counter 30 to zero.

When an unauthorised person opens the suitcase containing the described alarm device when in the activated condition, the plunger 6 will push the cover 5 upwardly, thus closing the switch 31. The oscillator 35, and the amplifier 37 will thus be connected to the battery 24 and the signal generated by the oscillator 35 will be amplified by the amplifier 37 and will be emitted as a loud screech by the transducer 38. Even if the unauthorised person rapidly re-closes the suitcase, thus again depressing the plunger 6 and opening the switch 31, the presence of the relay 39 ensures that the oscillator 35 and the amplifier 37 still receive power to enable the transducer 38 to emit the alarm signal.

If the described device is accidentally actuated by an authorised person, in other words if the person using the device has not advanced the counter by a complete cycle of 20 steps when the suitcase is opened, the alarm will sound, but the authorised person may insert the key 14 in the key actuated switch 4, thus switching the device off.

Whilst the invention has been described with reference to one particular embodiment in which the counter is adapted to count up to 20 it is to be appreciated that the counter may count up to any appropriate selected number.

Whilst the invention has been described with reference to an embodiment in which the device is armed by means of an arming and dis-arming circuit which emits ultrasonic sound pulses, it is to be appreciated that the alarm device may be activated in some other way, for example by means of a radio transmitter or the like.

Also, whilst the described circuit includes relay devices, it is to be appreciated that these relay devices may be constituted by transistor switches or the like.

The features as disclosed in the foregoing description, in the claims and/or in the accompanying drawings may, both separately and in any combination thereof, be material for realising the invention in diverse forms thereof.

Claims

1. An alarm device, said alarm device comprising a portable housing containing an arming and dis-arming arrangement, and an alarm signal generator, and a switch, closure of the switch serving to actuate the alarm signal generator when the device is armed, the switch being adapted to be closed when part of the device on the exterior of the housing is permitted to move away from the rest of the housing, said arming and dis-arming arrangement comprising means adapted to receive and respond to a predetermined arming signal to arm the device and a predetermined dis-arming signal to dis-arm the device, the arming and dis-arming signal being transmitted to the device from a position remote from the device.

2. An alarm device according to claim 1 wherein said arming and dis-arming arrangement is adapted to respond to an arming signal comprising one or more pulses of ultrasonic sound and a dis-arming signal comprising one or more pulses of ultrasonic sound.

3. An alarm device according to claim 1 wherein the arming and dis-arming arrangement is adapted to respond to an arming signal comprising one or more pulses of electromagnetic radiation of a predetermined frequency and a dis-arming signal comprising one or more pulses of an electromagnetic radiation of predetermined frequency.

4. An alarm device according to claim 2 or claim 3 wherein said arming and dis-arming arrangement incorporates a counter to receive said pulses, the counter being adapted to execute a predetermined count and return to zero, the counter advancing one count for each pulse received thereby, the arrangement being such that the alarm device is armed when a predetermined count or counts are present on the counter, and dis-armed when another count or counts are present on the counter.

5. An alarm device according to any one of the preceding claims wherein an electric latch is provided to maintain actuation of the alarm signal generator even if the said switch is re-opened after the switch has been closed to actuate the alarm signal generator.

6. An alarm device according to any one of the preceding claims wherein the alarm device is mounted within a housing provided with a hinged cover or lid, the hinged cover or lid being adapted, when pressed towards the housing, to depress a spring biassed plunger, to open said switch, the arrangement being such that when the pressure applied to the cover or lid maintaining the cover or lid in the closed position is released the plunger moves the cover or lid thus permitting the switch to close.

7. An alarm device according to any one of the preceding claims comprising means to emit a visible signal to indicate whether the device is armed or not.

8. An alarm device according to any one of the preceding claims in combination with an arming and dis-arming device adapted to generate said arming and disarming signals.

9. A combination according to claim 8 wherein said arming and dis-arming device comprises a housing containing means adapted to generate pulses of ultrasonic sound.

10. A combination according to claim 9 wherein the housing is additionally provided with a key adapted to actuate a key operated switch on the alarm device.

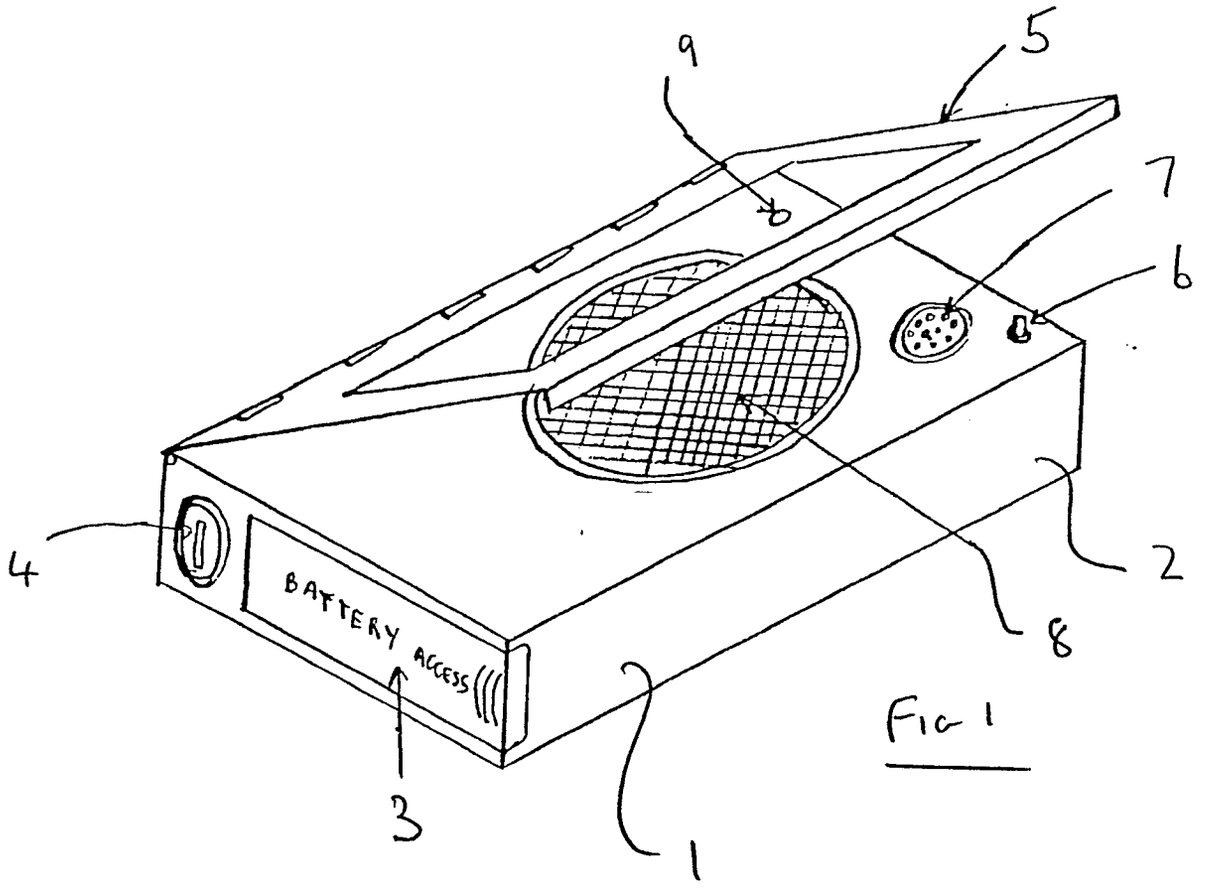

FIG 1

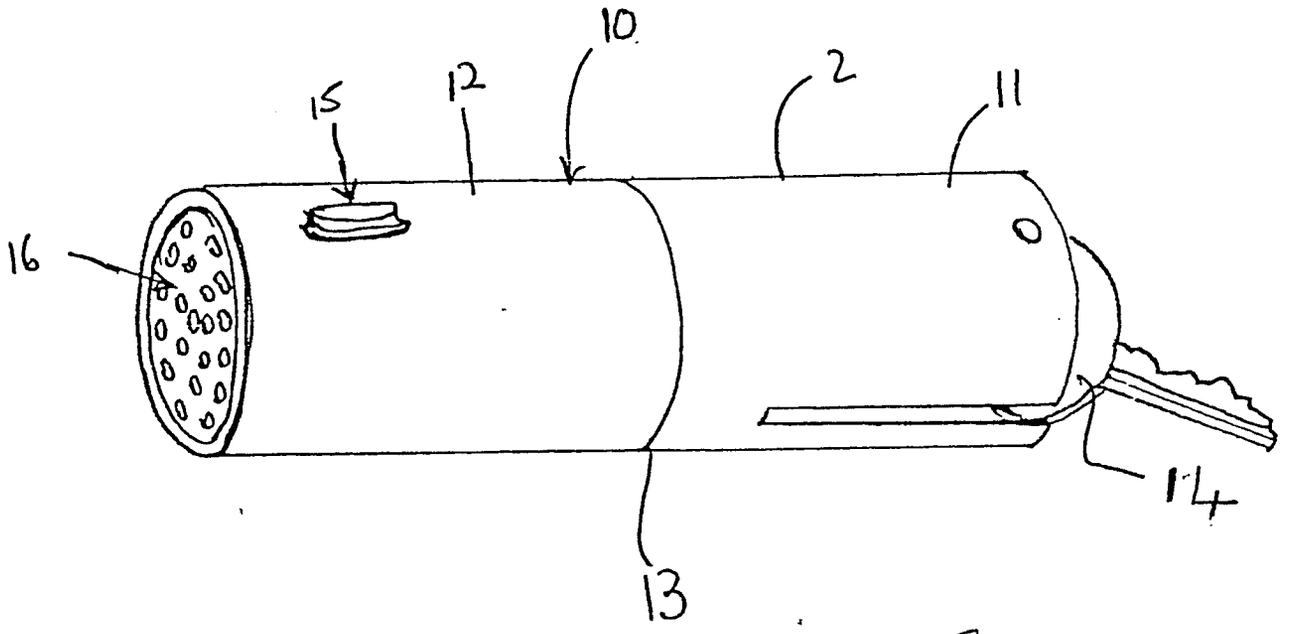

FIG 2

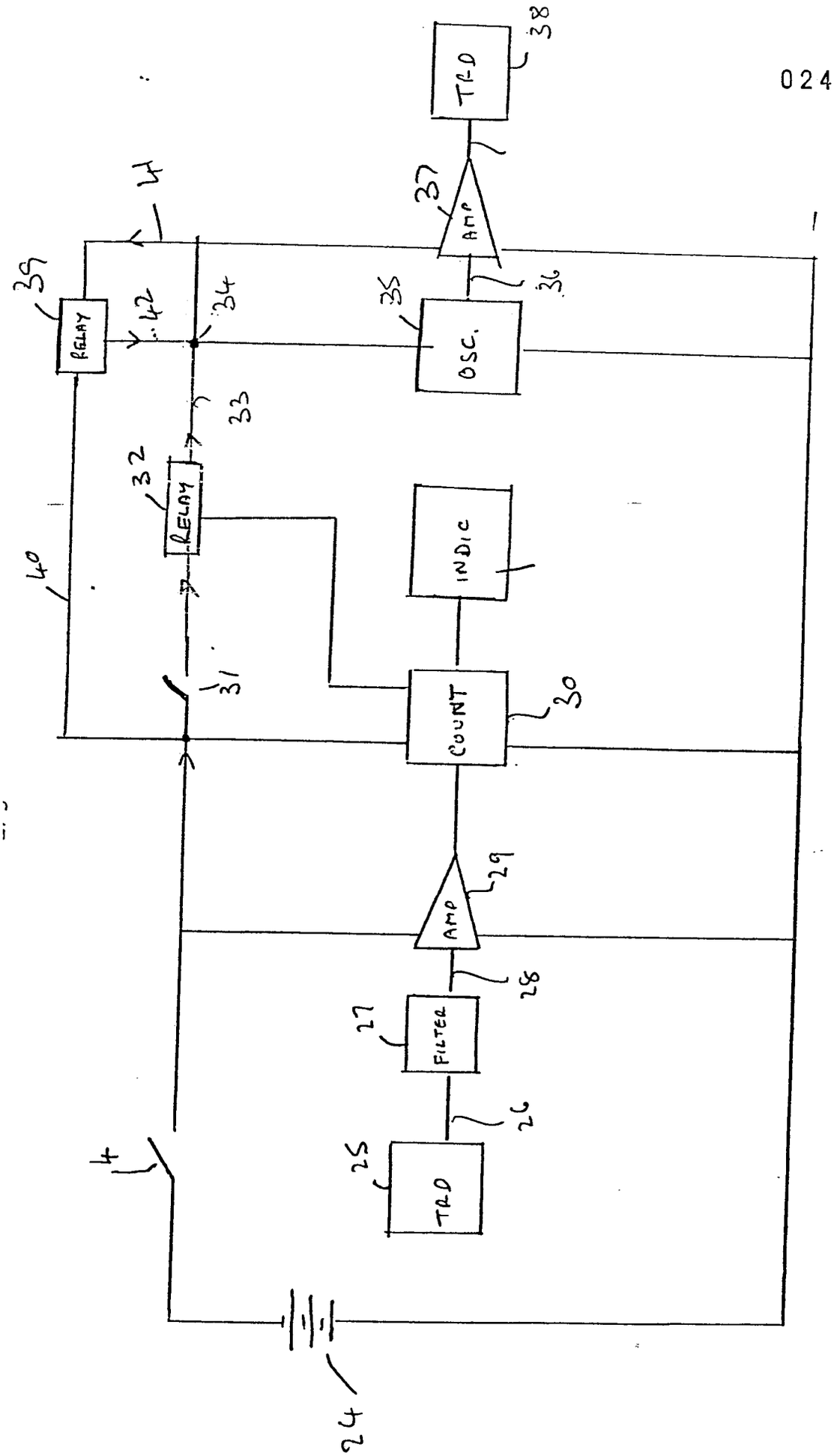
TRD
38
37
AMP
4
39
RELAY
42
34
35
OSC.
36
33
32
RELAY
INDIC
40
31
COUNT
30
AMP
29
28
27
FILTER
26
25
TRD
4
24

FIG 4

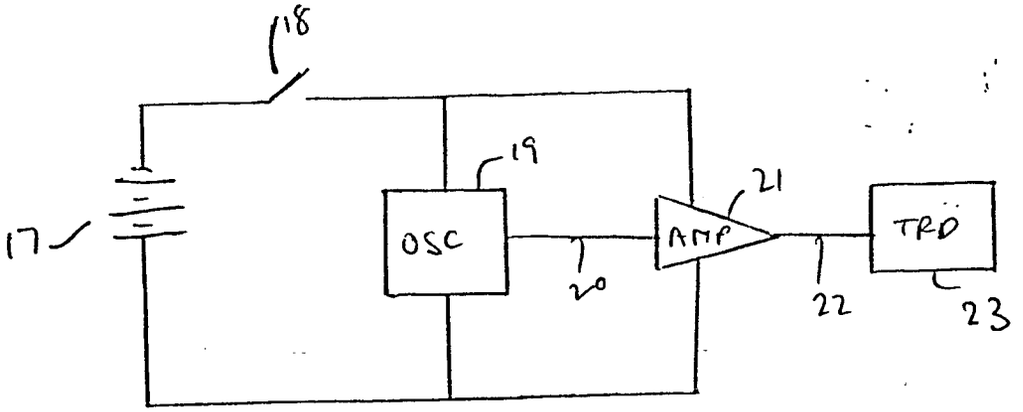

Fig 3