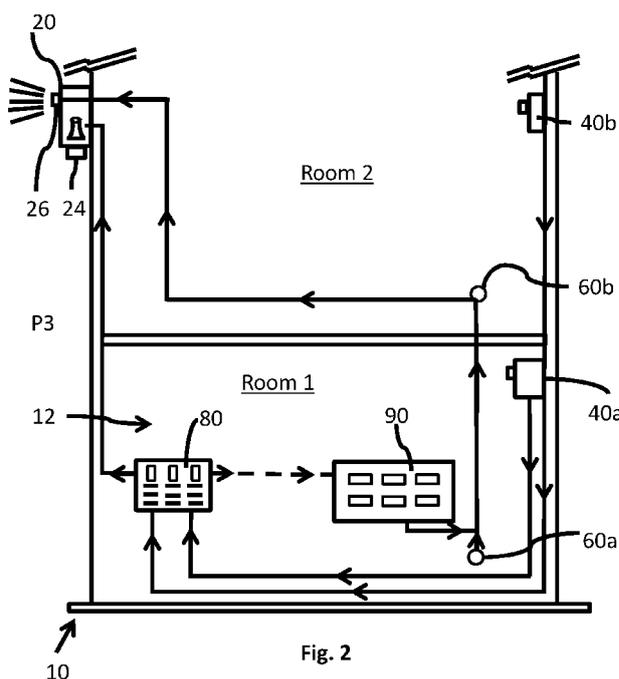




- (51) International Patent Classification:
G08B 13/22 (2006.01) G08B 13/16 (2006.01)
- (21) International Application Number:
PCT/GB2017/052878
- (22) International Filing Date:
26 September 2017 (26.09.2017)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
1616407.1 27 September 2016 (27.09.2016) GB
- (72) Inventor; and
(71) Applicant: DOWNEY, Graham Anthony [GB/GB];
Units 11-13, Safestore, Reddish Road, Reddish, Stockport
Cheshire SK5 7BW (GB).
- (74) Agent: LINN, Samuel Jonathan; 23 Bings Road, Whaley
Bridge Derbyshire SK23 7ND (GB).
- (81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,

(54) Title: IMPROVEMENTS IN ALARM SYSTEMS



(57) Abstract: An alarm system (12) for monitoring an environment (10), e.g. a house or business premises, on one or more security criteria, e.g. intruder/burglar detection or fire detection, the system (12) comprising: first detection means (40a, 40b), e.g. one or more movement sensors or shock sensors, for detecting the existence of a first alarm condition in the environment (10) being monitored; first reporting means (R1), operable in response to the first detection means (40a, 40b) having detected the existence of the said first alarm condition, for providing an output reporting the existence of the said first alarm condition; at least one second detection means (60a, 60b), e.g. one or more sound sensors, for detecting the existence of at least one respective second alarm condition in the environment (10) being monitored; at least one second reporting means (R2), operable in response to the or a respective said second detection means (60a, 60b) having detected the existence of the or a respective said second alarm condition, for providing an output reporting the existence of the or the respective second alarm condition; actuation means (ACT), operable in response to the outputs of the first reporting means (R1) and the or the respective second reporting means (R2), for providing an actuating output only when both of the outputs of the first reporting means (R1) and the or the respective second reporting means (R2) have each reported the existence of their respective first and second or respective second alarm conditions; and alarm indicator means (AL), e.g. one or more visual and/or audible alarm warning indicator(s), operable in response to the actuating output of the said actuation means (ACT), for indicating that the said first and/or the said second alarm



TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

condition(s) has/have been detected by the first (40a, 40b) and/or the second (60a, 60b) detection means.³⁰ The inclusion of the second detection means (60a), second reporting means (R2) and the actuation means (ACT) serves as a secondary or confirmatory/validating aspect or sub- system of the system in order to verify the genuineness of the detected first alarm condition, thereby avoiding or reducing the occurrence of false alarms occurring.

IMPROVEMENTS IN ALARM SYSTEMS

TECHNICAL FIELD

5 This invention relates to alarm systems. In particular, though not exclusively, it relates to improvements in various types of alarm system, especially though not exclusively intruder or security alarm systems and fire alarm systems. The improvements provided by this invention relate in particular, though not exclusively, to the introduction into such alarm systems of features or functionalities which reduce risks or occurrences of false alarms and unwanted
10 or unnecessary reactions thereto, and/or which improve the reliability of, and reactivity of relevant persons to, genuine alarm conditions. The invention relates not only to such alarm systems *per se*, but also to their methods and methodologies of operation and use.

BACKGROUND AND PRIOR ART

15

It is a common feature of many modern domestic dwellings and business and industrial premises to provide them with an electronic burglar or intruder alarm system for protecting them from unwanted intrusion by unauthorised persons, e.g. burglars or thieves, and thus for helping to protect them from theft of property or contents therein. Many such premises
20 also include an electronic fire alarm system to help protect against damage to the premises or their contents by fire. In some cases such a fire alarm system may even be integrated together with a burglar/intruder alarm system into a unified overall electronic alarm protection system.

25

Known intruder alarm systems generally comprise a collection of electronic detection devices or switches, often of varying types depending on the type of monitoring being done, placed at various strategic points, e.g. entry and/or exit points, within and throughout, commonly inside, the building or other region being monitored. These devices, which may include various combinations of e.g. motion detectors, shock detectors, PIR (passive infra-red)
30 sensors, heat or IR (infra-red radiation) sensors, sound sensors, mechanical disturbance detectors, reed-type switches, magnetic sensors, switch mats, panic or emergency call buttons and even cameras, are usually hard-wired to a central control panel which is controllable by an authorised user by means of a switching key or fob, or more commonly by entering an electronic code into a keypad on the unit to switch it "on" (i.e. into its armed state)
35 or "off" (i.e. into its disarmed state).

Further to this there is usually wired into the system and mounted on the exterior, e.g. on an

exterior wall, of the building or premises an external audible alarm sounder such as a bell or siren, often coupled with a visual alarm indicator such as a warning (e.g. flashing) light. Such a system is generally configured such that when the system is in its "on" (i.e. armed) state and an activation of one of the aforementioned detection devices or switches takes place
5 inside the building or premises - for example a PIR is triggered, or the opening of a reed-type switch connected to a door or window is detected, or a switch mat placed beneath a floor covering is actuated - the alarm system will activate the external sounder and/or warning light and indicate externally of the building or premises that it is potentially being burgled. The idea is that anyone, such as a neighbour or member of the public or a security guard, who
10 hears and/or sees such an alarm bell/siren and/or warning light emanating from the building or premises will investigate it themselves or at least report it or call an appropriate emergency response service, such as the building's or premises' owner, a dedicated security response firm, or the police. Buildings or premises fitted with a fire alarm system often rely on a similar principle.

15

Unfortunately, however, a very common problem with such known alarm systems is that false or accidental activation of the system can take place, for example owing to an object falling over or moving within the building or premises, e.g. as a result of a draught, or as a result of a fault within the system itself, or as a result of the system being improperly set (i.e. armed),
20 e.g. if one or more individual zones are intended to be excluded from a set condition but the system is not correctly set/armed. Such false alarms are a nuisance and lead to genuine alarm activations being ignored, especially if such false alarms are frequent. Furthermore, nowadays the police service will generally no longer visit any property that has an alarm bell/siren actually sounding or an alarm light actually lit and flashing, because in most cases
25 it is generally found to be a false alarm, and owing to limited resources the police cannot afford to visit every building or premises where an alarm is activated. Dedicated security response firms, and also neighbours and members of the public, may also be loath to attend or report activated alarms where false alarms are frequent. This often negates the whole purpose of having an alarm system installed in the first place.

30

Some known alarm systems seek to mitigate against the above problem by including in the system a provision for it to be remotely monitored, such as by a dedicated security monitoring and response service, such as an ARC (Alarm Receiving Centre). This relies on the alarm system being linked directly to that service at a remote location, e.g. by a telecommunications
35 link, and continuously monitored. This, at the very least, tends to make such systems expensive to install, maintain and run. Nevertheless, they do have an advantage that if an alarm should be activated and that system is being monitored by a dedicated response

service, then the police will generally react and attend.

Such monitored alarm systems usually work on the basic principle that, being connected via a (usually wired, or perhaps wireless) telecommunications link or network to the remote monitoring/response service or station, when the alarm is activated (for whatever reason), the system automatically dials up and alerts the monitoring/response service or station to that fact. The monitoring/response service or station can then check from their remote location that the activated alarm appears genuine and not a "false alarm", and this may even involve their being able to identify exactly which of the detection devices or switches has/have been apparently triggered or activated. This therefore may go some way to confirming whether the alarm is genuine and what the reason for its activation is, leading to the monitoring/response service then being able to react accordingly, such as by sending an appropriate person, guard or officer to investigate or even to call the police themselves who will indeed then react, in the knowledge that the call-out is genuine (or at least most probably genuine).

Unfortunately, however, even this type of alarm system has various problems. One problem, as already mentioned, is that the annual cost of installing and running such a dedicated monitoring and response service is high. Another problem is that response times are often slow. This is primarily a result of the time lag involved in completing all the above steps involved in the monitoring, examining, checking and responding procedures, which can be time consuming. This may be exacerbated by the fact that the whole job is done at a remote location, and any response person or team could be an appreciable distance from the building or premises to be attended, even if the police do it themselves. Slow response times allow burglars plenty of time to do their deeds and escape, and they often know this. Another problem is that such a system usually relies on a wired connection to a telecommunications link or network. Experienced burglars may therefore first cut the telecommunications line before entering the building or premises, in the hope that even if the alarm is activated then it will not connect through the network to the monitoring and response service. Even if this does not work and the alarm is still activated as the building or premises are broken into, then even though the building or premises may be attended, perhaps even in time to catch the burglar red-handed, significant damage to the system has been done, leading to inconvenience and more cost to repair it. Furthermore, during that time the alarm system, or at least its monitoring/response link, may be out of action.

Monitored fire alarm systems, based on other types of sensor and linked in a corresponding manner to a remote monitoring and response service or station, can also suffer from at least

some of the above-discussed problems.

It is therefore a primary object of this invention to address the above problems and shortcomings of known alarm systems and to provide designs of intruder and fire alarm systems which reduce the occurrence of, or reduce the risk of occurrence of, false alarms and/or unwanted or unnecessary reactions thereto, and which improve the reliability of, and reactivity of relevant persons to, genuine alarm conditions.

SUMMARY OF THE INVENTION

Accordingly, in a first aspect of the present invention there is provided an alarm system for monitoring an environment on one or more security criteria, the system comprising:

first detection means for detecting the existence of a first alarm condition in the environment being monitored;

first reporting means, operable in response to the first detection means having detected the existence of the said first alarm condition, for providing an output reporting the detected existence of the said first alarm condition;

at least one second detection means for detecting the existence of at least one respective second alarm condition in the environment being monitored;

at least one second reporting means, operable in response to the or a respective said second detection means having detected the existence of the or a respective said second alarm condition, for providing an output reporting the detected existence of the or the respective second alarm condition;

actuation means, operable in response to the outputs of the first reporting means and the or the respective second reporting means, for providing an actuating output only when both of the outputs of the first reporting means and the or the respective second reporting means have each reported the detected existence of their respective first and second or respective second alarm conditions; and

alarm indicator means, operable in response to the actuating output of the said actuation means, for indicating that the existence of the said first and/or the said second alarm condition(s) has/have been detected by the first and/or the second detection means.

In many practical embodiments of the invention the environment to be monitored by the system may be a building, such as a domestic dwelling, or premises of any sort, such as an office, business premises, retail premises, storage premises, industrial premises, leisure or sports premises or facilities, or even an exterior or open-air (or part-open-air) environment that needs monitoring for any reason, e.g. a car park, sports venue, or an agricultural,

horticultural or forestry environment. Other types of environment needing monitoring for security purposes may also be applicable to embodiments of the invention.

5 In many embodiments of the invention the one or more security criteria on which the system monitors the environment may comprise or include intruder or burglar detection, or may include a criterion being of the nature of intruder or burglar detection. Accordingly in such embodiments the said first alarm condition (and optionally also the said second alarm condition) may comprise a condition that an intruder or burglar has been detected in the environment being monitored. In order to detect such a condition, in such embodiments the 10 first (and optionally also second) detection means may be independently selected from any of one or more of the following: motion detectors, shock detectors, PIR (passive infra-red) sensors, heat or IR sensors, microwave-based sensors, sound sensors, mechanical disturbance detectors, reed-type switches, magnetic sensors, switch mats or pads, panic or personal attack or emergency call buttons or switches and cameras (e.g. visible light-based 15 or IR or thermal imaging cameras). Practical examples of each of the aforementioned types of detector suitable for use in embodiments of the invention are *per se* well known in the art and readily commercially available.

In other embodiments of the invention the one or more security criteria on which the system 20 monitors the environment may comprise or include fire and/or smoke detection, or may include a criterion of the nature of fire and/or smoke detection. For example, the detection of smoke may be likely to indicate the occurrence also of a fire, or at least a serious likelihood that fire will occur. Accordingly in such embodiments the said first alarm condition (and optionally also the said second alarm condition) may comprise a condition that fire, or an 25 unusual or concentrated heat source, or smoke has been detected in the environment being monitored. In order to detect such a condition, in such embodiments the first (and optionally also second) detection means may be independently selected from any of one or more of the following: heat sensors, IR (infra-red radiation) sensors, smoke sensors, noxious gas detectors (e.g. carbon monoxide (CO) detectors). Practical examples of each of the 30 aforementioned types of detector suitable for use in embodiments of the invention are *per se* well known in the art and readily commercially available.

In other embodiments of the invention the one or more security criteria on which the system 35 monitors the environment may comprise or include tamper detection, i.e. that someone has tampered with, or attempted to tamper with, the system or a component of it. For example, it may detect if or when someone tries to access the workings of a main control panel, or perhaps even one or more detectors or sensors, or even one or more alarm indicator means,

such as for the purpose of seeking to disable it/them or circumvent it/them from being operated or actuated. Accordingly in such embodiments the said first alarm condition (and optionally also the said second alarm condition) may comprise a condition that a component of the system has been tampered with in some way, e.g. by a person such as an intruder or burglar, especially that a component or element of the system has been sought to be accessed or disabled or otherwise interfered with other than by an authorised person for authorised purposes. Practical examples of suitable anti-tamper circuits or other hardware or software that may provide such tamper detection capability, for use in such embodiments of the invention, are *per se* well known in the art and readily commercially available.

10

In some embodiments of the invention, monitoring of one or more combinations of any two or more of the above-defined security criteria may even be employed in and incorporated together into any single given embodiment system within the scope of the invention.

15

In yet other embodiments of the invention the one or more security criteria on which the system monitors the environment may even comprise or include one or more other emergency situations as the first alarm condition (and optionally also the said second alarm condition), such as the presence of a gas or a water leak. In order to detect such a condition, in such embodiments the first (and optionally also second) detection means may be

20

independently selected from any of one or more of the following: gas sensors or detectors, water sensors. Practical examples of each of the aforementioned types of detector suitable for use in embodiments of the invention are *per se* well known in the art and readily commercially available.

25

In some embodiments of the system of the invention at least the first detection means and the first reporting means may form or constitute, or be provided as, parts of or features, components or elements of, a first sub-system. Likewise, in such embodiments at least the second detection means and the second reporting means may form or constitute, or be provided as, parts of or features, components or elements of, a second sub-system. In such

30

embodiments the first and the second sub-systems may be at least partially dependent on each other in their respective contributions to the overall operation of the overall system. In some such embodiments each of the actuation means and the alarm indicator means may independently be formed or provided as part of either one of the first and/or second sub-systems, or as independent features of the overall system, over and above the first and

35

second sub-systems themselves.

In some embodiments comprising the above-defined first and second sub-systems, it may if

desired be provided that the second sub-system is only enabled or "active" (or even powered), so as to be operational and the second detection means (and/or the second reporting means) to be activatable, once the first sub-system has already detected and/or reported the existence of the first alarm condition. In this manner, it may be the first sub-system only that is normally "on" or "enabled" (or even powered) when the overall alarm system is in its "armed" state, and the second subsystem may only be activated or switched into its "on" or "armed" (or even powered) state once the first sub-system has already detected and/or reported the existence of the first alarm condition.

10 Alternatively, the first and the second sub-systems may both be normally "on" or "enabled" (or even powered) when the overall alarm system is in its "armed" state, so that both the first and the second sub-systems are "on" or "enabled" (or even powered) into their respective "armed" states, ready for detection and reporting of their respective alarm conditions, during the normal operation of the armed system.

15 In practising some of the preceding embodiments, at least some of the components or elements of the first sub-system may be provided or constituted by components, elements or features of an existing alarm system, such as a known alarm system pre-installed in a building or premises, with the components, elements or features of the second sub-system constituting a novel add-on or additional feature or functionality that enables the existing alarm system to be transformed into an alarm system according to the present invention. In this manner such a second sub-system may be retro-fitted into an existing alarm system to enable the novel functionality(ies) of an alarm system according to the invention to be realised.

25 In practising some alternative embodiments, the components, elements or features of both the first and the second sub-systems may be provided together in an overall new alarm system, for installation *ab initio* into the building or premises to be monitored.

30 In some embodiments of the system of the invention the environment to be monitored may be divided into a plurality of discrete zones or regions, with each zone or region being independently monitorable by the system or a respective portion thereof in a similar manner to many conventional multi-zone alarm systems. Thus, in such cases each respective zone or region may comprise its own one or more first and second detection means, as well as
35 any other components of the system that enables that respective zone or region to be monitored in an independent manner in accordance with the invention.

In some embodiments the actuation means may be configured and operable such that it provides an actuating output only when both of the outputs of the first reporting means and the or the respective second reporting means have each reported the detected existence of their respective first and second (or respective second) alarm conditions, and those
5 reportings of the detected existence of the respective first and second (or respective second) alarm conditions by the first and second reporting means have occurred either (i) substantially simultaneously, or (ii) sequentially or spaced apart in time, and in either order, relative to each other.

10 It is an important feature of embodiments of the invention and the manner in which many of its embodiments are practised, that not only is there provided the first detection means, which may be thought of as a primary or "master" detection means responsible for triggering a detection of a primary security condition that warrants an alarm state, but there is also provided the at least one second detection means, which may be thought of as a or a
15 respective secondary or "subsidiary" detection means responsible for confirming or verifying the detection of whatever security condition has been detected by the first ("primary") detection means as being a genuine security condition warranting an alarm state. This functionality is provided by the first and second reporting means and actuation means being provided and operable in combination in the above-defined manner - that is to say, in many
20 embodiments they are operable in combined response to the outputs of both those reporting means, such that the alarm indicator means is only actuated upon both of the outputs of the first and the second (or respective second) reporting means having each reported the existence of their respective first and second (or respective second) alarm conditions, with the first reporting means having reported the existence of the primary security condition and
25 the second reporting means having reported the existence of the secondary or confirmatory security condition.

In many embodiments, therefore, if the primary detection means detects the existence of a first alarm condition, then through the operation of the first and second reporting means and
30 the conditional operation of the actuation means, the inclusion of the second detection means, in the manner of a "check", or "confirmatory" or "verifying" detection means, enables the actuation means to only operate to indicate the existence of the first alarm condition if that second detection means has been triggered also to detect the second alarm condition. That second alarm condition may be the same as the first alarm condition, or it may a different
35 alarm condition, for example depending on the security criterion being monitored or the nature or identity of the first alarm condition and thus the nature or identity of the second alarm condition that most reliably or appropriately is able to check, confirm or verify that first

alarm condition.

Thus, triggering of both the first and the second detection means to detect both the first and the second alarm conditions is required before a "positive" or "confirmed" indicator of the first alarm condition being genuine will occur. In the event that the first detection means, or
5 alternatively the second detection means, alone detects a respective alarm condition, e.g. of the nature of or in the manner of a false alarm, or even as a result of a fault in the system, then the actuation means will not provide an actuating output, so the alarm indicator means will not be actuated. This therefore avoids the alarm indicator means being triggered in the
10 event that a false alarm condition exists.

In any given embodiment of the system of the invention, whether it be an intruder/burglar alarm system or a fire alarm system, each of the first and the second alarm conditions may, independently of each other, take any of several different forms. Indeed, in such
15 embodiments the first alarm condition detected by the first detection means and the second alarm condition detected by the second detection means may be the same as or different from each other.

For example, each of the first and the second alarm conditions may each independently be
20 selected from any of the following:

- (i) a condition that an intruder or burglar is in the process of breaking into or forcing entry into the building/premises, e.g. as a result of the triggering of a shock sensor, reed-type switch, magnetic sensor, etc as the first and/or second detection means;
- (ii) a condition that an intruder or burglar is in the building/premises, e.g. as a result
25 of movement or the presence thereof being detected by a relevant movement or motion sensor such as a PIR sensor, heat sensor, sound sensor, switch mat, camera, etc as the first and/or second detection means;
- (iii) a condition that a panic or personal attack or emergency situation exists within the building/premises, e.g. as a result of a panic, personal attack or emergency button or
30 switch, as the first and/or second detection means, being activated by a person within the building/premises;
- (iv) a condition that there is a fire, smoke or noxious gas or fumes in the building/premises, e.g. as a result of that being detected by a heat or IR sensor, smoke detector, or noxious gas sensor, etc as the first and/or second detection means.

35

Thus, in implementing various embodiments of the system of the invention, any of the following example scenarios may be envisaged, among others:

(i) The first alarm condition detected by the first detection means may be a first security condition that warrants an alarm state, and the second alarm condition detected by the second detection means may be the same or a different security condition, that likewise warrants an alarm state.

5 (ii) As one example of (i), the first and the second detection means may each be of the same type, and the first and second alarm states whose existence is detected by the respective first and second detection means may each be warranted by the same security condition, e.g. an intruder/burglar being within the building/premises. For instance, both the first and the second detection means may be e.g. PIR detectors and both may detect
10 movement of an intruder in the building/premises, such as in the same, or sequentially in adjacent or neighbouring, or even spaced-apart, region(s) within the building/premises. In this manner, for example, the first detection means may for instance initially detect movement of an intruder/burglar within the building/premises, and the second detection means then detects the same presence of the same intruder/burglar but for a second time, which
15 therefore acts as a “confirmatory” detection which “validates” the first detection by the first detection means.

(ii) As an alternative example of (i), the first and the second detection means may each be of a different type to the other, but again the first and second alarm states whose existence is detected by the respective first and second detection means may each be
20 warranted by the same security condition, e.g. an intruder/burglar being in the process of breaking into the building/premises. For instance, one of the first and second detection means may be a shock detector and may detect an initial breaking-in of an intruder/burglar through a door or window of the building/premises, and the other of the first and second detection means may be a PIR detector and may then detect movement of the
25 intruder/burglar moving about within the building/premises, which second detection then acts as a “confirmatory” detection which “validates” the first detection by the first detection means.

(iii) As yet another alternative example of (i), the first and the second detection means may each be of a different type to the other, and furthermore the first and second alarm states whose existence is detected by the respective first and second detection means may each
30 be warranted by a different security condition, e.g. there is a fire in the building/premises and there is/are also one or more persons therewithin who need to be rescued. For instance, one of the first and second detection means may be a fire or smoke detector within the building/premises and may detect a fire or potential fire therein, whereas the other of the first and second detector means may be e.g. a PIR detector and may detect movement of a
35 person in the building/premises (such as an intruder/burglar or even another person, such as someone having caused or attending to the fire or even someone accidentally or circumstantially trapped in the building/premises). Such an example could be useful for

detecting a fire or potential fire in the building/premises and at the same time being able to confirm that someone, whether it be an intruder/burglar or someone else, is in the building and thus may be in danger of being injured by the fire and needs to be rescued or may even be appropriate to apprehend as being a potential arsonist.

5 (iv) As yet another example of (i), the first and the second detection means may be one and the same single detection means, especially a panic, personal attack or emergency button or switch, whose activation by an occupant of the building/premises has been to signal that help is required or that an emergency condition exists that needs responding to (e.g. the calling out of one of the emergency services). Thus in this case, whilst the first detection
10 means may detect the activation of the panic or emergency button or switch and the first reporting means may thus report that activation, the second detection means is in effect the already detected fact that it was the panic button or switch itself that was activated, so the second reporting means may automatically report that fact without the need for any further discrete detection of any other alarm condition by the second detection means.

15 Thus, in the case of such an example scenario represented by possibility (iv) above, in certain embodiments of the invention the second detection means may comprise identification means that detects the identity of the first detection means that has detected the first alarm condition, whereby the above-generally-defined "second alarm condition" may be not a
20 distinct security alarm state as such, but instead may be a fact that a particular identity of first detection means has been activated.

Further example scenarios or criteria to which various embodiments of the system of the invention may be devised and designed to account for and to be operable to monitor on may
25 be possible within the scope of this invention and its practising. Some such additional examples are given further hereinbelow.

Furthermore, in any given practical overall alarm system according to the invention, any two or more individual example scenarios as per any of those defined or described herein may
30 be covered by any respective two or more individual part-systems or part-functionalities which may be integrated into a single overall alarm system, so that the system as a whole may be operable to take account of and work in such a way as to cover any such combination of two or more such scenarios. Of course, the design of any given overall system may be tailored to suit any particular combination of requirements or functionalities of any building or
35 premises or other environment, and/or security criteria needing monitoring, that may be required.

In some embodiments of the alarm system of the invention, the alarm indicator means, which is operable in response to the actuating output of the said actuation means, may be constructed and/or configured for indicating solely that the existence of said first alarm condition has been detected by the first detection means, whereby the “confirmed” or “validated” (primary) first alarm condition is indicated as having been detected by the actuation of the alarm indicator means. However, in other embodiments the alarm indicator means may be constructed and/or configured for indicating solely that the existence of the or the respective second alarm condition has been detected by the or the respective second detection means, whereby the “confirming” or “validating” (secondary) second alarm condition is indicated as having been detected by the actuation of the alarm indicator means. In yet other embodiments, it may be possible for the alarm indicator means to be constructed and/or configured for indicating that the existence of both the first and the or the respective second alarm conditions have both been detected by the respective first and the or the respective second detection means, whereby both the “confirmed” or “validated” (primary) first alarm condition and the “confirming” or “validating” (secondary) second alarm condition are both indicated as having been detected by the actuation of the alarm indicator means.

In some embodiments of the system of the invention, the alarm indicator means, which are operable in response to the actuating output of the actuation means actually signifying that both the outputs of the first and the second reporting means have each reported the detected existence of their respective first and second alarm conditions, may comprise first alarm means which is the only alarm indicator means, and may thus serve exclusively to indicate that the first - and/or the second, as the case may be - alarm condition that has been detected has been both detected and “confirmed” or “validated” as being a “real” or “genuine” alarm condition and not a “false alarm”.

However, in alternative embodiments the alarm indicator means may comprise first and second alarm means, the first alarm means being actuatable to signify that the first (e.g. “primary”) alarm condition has been detected by the first detection means as existing, and the second alarm means being actuatable to signify that the or the respective second (e.g. secondary, or “confirming” or “validating”) alarm condition has been detected by the or the respective second detection means as existing. In such embodiments, the first and second alarm means may be different or distinct from each other, especially for example in terms of a visual and/or audible (or other sensory) signal they emit to indicate their respective alarm conditions.

In this manner it may be possible to advantageously provide that a particular alarm signal is

emitted to indicate a particular “primary” alarm state subsisting, and another, different alarm signal is emitted to indicate a particular “secondary” alarm state subsisting. This functionality may help people witnessing, viewing or inspecting the alarm indicator means to recognise exactly which detection means, and/or which type of detection means, has been triggered, so that for example it may be provided that only one particular type of signal, e.g. a particular colour or flashing of a light signal or a unique sound of an audible signal, is emitted when a “confirmed” or “validated” alarm condition has been detected.

It may even be arranged that only a “confirmed” or “validated” alarm condition is ever signalled by an appropriate alarm means, such as by virtue of an appropriate given alarm means only being actuated in response to a detected second (secondary) alarm condition having already “confirmed” or “validated” a detected first (primary) alarm condition.

The above functionalities may therefore help to reduce the exposure of people to “false alarms”, since only “confirmed” or “validated” alarm conditions may be signalled by particular - or indeed the only actuated - alarm indicator means.

In some such embodiments, either of such first and/or second alarm means constituting the alarm indicator means may for example independently comprise a visual alarm indicator, such as one or more lights, lamps, LEDs or combinations of two or more lights, lamps or LEDs, which optionally may be designed to flash or pulse. Alternatively or additionally to conventional lights, lamps or LEDs, one or more lasers or laser-based lights may even be used, since they may have an advantage of being viewable over wide viewing angles and/or as lit (e.g. even coloured) light paths through atmospheric air. Various colours (e.g. white or any of various non-white colours, e.g. red, blue, yellow, green, etc) of such light(s), lamp(s), LED(s) or laser light(s) may be employed, if desired or appropriate. For example, an appropriate number of different coloured lights/lamps/LEDs/lasers may be used to provide one or more specific indicators of precisely which detection means and/or type of detection means has been triggered, reported and validated/confirmed in any particular instance, such as to provide a unique indicator of which detection means (e.g. in which room or zone within the building or premises) has been triggered, reported and validated/confirmed and/or which type of detection means (e.g. red for a panic button or switch) has been triggered and reported in any given instance. In some example systems, it may even be arranged that particular one(s) of plural variations in flashing or pulsing rates, sequences or patterns of such lights/lamps/LEDs/lasers occur upon the actuation of the alarm indicator means being indicative of a particular one of two or more specific alarm conditions, so that it may be visible from the nature of the alarm indicator means what type of alarm condition has genuinely

triggered the system. This may thus for example enable one to easily see from the state of operation of the alarm indicator means what security condition has been genuinely breached or detected, enabling one to more reliably, quickly and efficiently react or respond to that triggering of the system.

5

In some of the foregoing embodiments including a visual alarm indicator means, e.g. one or more lights, lamps, LEDs or lasers, it/they may be provided mounted on or in or in close proximity to the building/premises being monitored. In particular, one particularly advantageous embodiment may employ the visual alarm indicator means actually mounted
10 on the outside of the building or premises, e.g. on an exterior wall thereof, so it/they is/are readily visible by neighbours, passers-by, other members of the public, a security guard stationed at a nearby location, or a camera trained thereon. The illumination of such light(s)/lamp(s)/LED(s)/laser(s) actually on the outside of the building/premises may thus
15 provide a clear and self-explanatory announcement to neighbours, passers-by and the like that the building/premises in question is under a security alert, that that alert is a genuine one, and even perhaps what the nature of that alert is. This may therefore help to elicit and/or facilitate a rapid and tailored reaction or response to that security alert.

Another alternative advantageous embodiment may employ the visual alarm indicator means
20 mounted within the building or premises, such as adjacent an entrance thereof or a monitoring station therewithin. In this case such a visual alarm indicator means may be provided on a control or monitoring panel or display, e.g. of the nature of that of existing security and fire alarm systems. This alternative arrangement may likewise provide a clear and self-explanatory announcement that the building/premises in question is under a security
25 alert, that that alert is a genuine one, and even perhaps what the nature of that alert is, but to a person who enters the building/premises and inspects the panel or display. In this alternative arrangement similar possibilities for flashing, pulsed or sequenced lights/lamps/LEDs/lasers of white or other colours may be employed in a like manner, to provide an indication at the panel or display of the nature of the alarm condition that has been
30 triggered.

Additionally in such alternative embodiments it may further be advantageous for the panel or display to indicate the location within the building or premises at which the relevant first detection means has been triggered, in order to provide guidance about where in the
35 building/premises the security breach has occurred. Again, this may help to elicit and/or facilitate a rapid and tailored reaction or response to that security alert.

In other such embodiments, either of such first and/or second alarm means constituting the alarm indicator means may for example independently comprise an audible alarm indicator, such as one or more audible sounders, bells, sirens, klaxons, sirens, recorded verbal messages or warnings, or any other suitable audible warning or alarm sound. Again, for
5 example, different sounds, pitches of sounds, volumes of sounds, notes, recorded messages or warnings may be used to provide a unique aural indicator of the precise nature, and/or optionally location, of the alarm condition that has been triggered by the system, and that it is genuine. Again, therefore, this may help to elicit a more reliable, quick and efficient reaction or response to that triggering of the system by virtue of an audible alarm indicator,
10 rather than a visual one.

The mounting of an audible sounder or other audible warning or alarm indicator directly on the outside of or in close proximity to the building/premises being monitored may, as with the example forms of visual alarm indicator means discussed above, likewise facilitate the
15 identifying by neighbours, passers-by, other members of the public, a security guard etc of the nature of the security alert and the fact that it is genuine, thereby again helping to elicit a more reliable, quick and efficient reaction or response to that triggering of the system.

Of course, in certain yet further alternative embodiments, combinations of the above exemplified visual and audible alarm means, constituting the alarm indicator means, may be
20 employed, e.g. in more advanced system designs.

In yet other embodiments of the system, instead of any of the above-discussed first and/or second alarm means being provided on or in or in close proximity to the building or premises
25 being monitored, they may alternatively be provided, or at least one or more or some of them may alternatively be provided, at a remote location, for example at a remote monitoring or response station or service provider, or with a neighbour or other nominated person having responsibility for monitoring the building/premises and alerting a relevant party in the event of a break-in (or even a fire). Such remote-located alarm indicator means may for example
30 be linked back to the main system at the building/premises being monitored by a hard-wired connection, or a telecommunications link which itself may be wired or wireless or of the nature of mobile phone technology.

This alternative arrangement may relieve neighbours, passers-by or members of the public
35 of the responsibility to observe, interpret and react to an alarm means being activated (i.e. "going off"), and place that responsibility in the hands of a dedicated monitoring and/or response service or personnel. Thus, although the observance of the relevant activated

alarm means still takes place at a location remote from the building or premises being monitored, the novel alarm system of the invention itself now renders the going-off of such an alarm means much more reliably indicative of it being a genuine alarm condition. Thus, even with such an alternative system still relying on a remote monitoring/response station, the propensity for false alarms and wasted call-outs may be significantly reduced or perhaps even avoided substantially altogether.

In another aspect of the present invention there is provided an environment which is in need of or is susceptible to monitoring on one or more security criteria, the environment having installed or mounted therein or applied thereto at least some of the components or features of an alarm system according to the first aspect of the invention or any embodiment thereof.

In some embodiments of the preceding aspect, the components of the alarm system which are installed or mounted in the environment to be monitored may comprise at least the first and the second detection means.

In practical embodiments of the preceding aspect, the said environment may be a building or premises which may be any of: a domestic dwelling, an office, business premises, retail premises, storage premises, industrial premises, leisure or sports premises or facilities, an exterior or open-air or part-open-air environment, car park, sports venue, or an agricultural, horticultural or forestry environment.

In yet another aspect of the present invention there is provided a method of monitoring an environment on one or more security criteria, the method comprising:

(i) providing an alarm system according to the first aspect of the invention or any embodiment thereof; and

(ii) operating the system according to its protocol to monitor the environment for existence of a first alarm condition and at least one second alarm condition;

wherein, in the event that both of the outputs of the first reporting means and the or the respective second reporting means have each reported the existence of their respective first and respective second alarm conditions, the alarm indicator means is actuated by the actuation means to indicate that the said first and/or second alarm condition(s) has/have been detected by the first and/or second detection means.

In various embodiments of the foregoing method aspect, various additional and/or more particularly defined method steps may be included in the overall method, as will follow from various more particular definitions of embodiments or features of the alarm system *per se*

elsewhere in this specification.

In building or practically implementing any or all embodiment systems within the scope of this invention, any suitable hardware components may be used, such as are already widely
5 commercially available in the art of various types of alarm systems. For example, there are readily commercially available many examples of various types of detector for use in detecting the various kinds of alarm conditions that may be required of any given design of system, as there also are for the alarm indicator means, e.g. in the form of various lighting, LEDs, or other illumination devices, and audible sounders of various types, and respective
10 electronic circuitry or control devices/units for controlling their operation.

Furthermore, in practising any or all embodiments within the scope of the invention, the system's overall operation may be controlled by any suitable combination of electronic hardware and, especially, software. Many modern intruder and fire alarm systems rely for
15 their control and operation on various software-driven components and sub-systems, and suitable software elements for implementing the various functions, sub-systems and/or part-systems of overall embodiment systems of the present invention will either be readily derivable therefrom, or readily engineered by persons skilled in the art of alarm systems software. In particular, this applies to the first reporting means, the at least one second
20 reporting means and the actuation means of practical examples of systems according to, and embodying, the present invention, as well as to the overall manner by which the systems' individual components, elements, sub-systems, part-systems, databases and/or other operational or function features are realised, implemented and used. Thus, such aspects or features or components of practical embodiment systems in accordance with the invention
25 will be within the existing general skill and knowledge of persons skilled in the relevant art(s) to design and implement in working form.

In providing some practical embodiments of the alarm system of the present invention, the system may be manufactured and provided as a ready-for-use complete system, e.g.
30 substantially self-contained and containing all the necessary components to enable it to be installed and brought into operation. However, in certain other practical embodiments, at least some elements, components, features or aspects of the system may be retro-fitted into an existing alarm system, e.g. in order to convert that existing system into a system according to this invention.

35

The above-discussed general functionality of some embodiment systems of the invention and many of their principal features, and in particular the identity of the first and the second

detection means and the respective alarm conditions which they are designed to detect, may be manifested in an overall practical alarm system that may work and be used in a wide variety of operational modes, with a wide variety of different functionalities and individual features. Various identities, combinations and permutations of features may be incorporated
5 into a given practical system in various ways, in order to design an overall alarm system that suits any given practical scenario and meets individual demands made of it.

Accordingly, and by way of example only, the following numbered paragraphs define and discuss various additional (or in some cases already briefly mentioned) specific embodiment
10 systems and features thereof in which the invention, or functionalities or individual optional or preferred features or components thereof, may be independently included and implemented in practical example systems. Furthermore, at least some of these additionally exemplified features, functionalities or components may be able to be employed individually and/or independently in their own right as novel features, functionalities or components of
15 other alarms systems, including otherwise known alarm systems. However, it is to be understood that these following paragraphs represent mere examples of such embodiments, functionalities, features or components, and various others still within the scope of the present invention may be employed and practised in other example forms.

20 1. Any one or more of the options and possibilities for individual features or functionalities of the system may be switchable on or off, i.e. may be independently selectable by an installer and/or a user during normal operation and use of the system.

2. The system could be activated by first and/or second detection means constituted by hidden switch pads under floor coverings, which an intruder may find difficult
25 to locate and not be able to disable so easily, compared with other, more easily accessible detection means, such as PIRs.

3. A combination of switch pads and motion sensors could be employed, as the first and second detection means. For instance, hidden switch pads (as one of the first or second detection means) could be made to trigger external lights (as one of the first or
30 second alarm means), while motion sensors (as the other of the first or second detection means) could alter the pitch and/or volume of an audible sounder or siren (as the other of the first or second alarm means).

4. When different sensors constituting the first and second detection means are sequentially (especially temporally sequentially) triggered during a break-in, e.g. different
35 PIRs in different rooms or areas within the building/premises as the intruder moves around, this could be arranged to alter or modulate the alarm sound and/or pitch of a first and/or second alarm means in response to that sequential triggering, such as to indicate that

somebody is actually in the building/premises and moving around therein when the sounder is heard outside. An advantage of this feature could be that a neighbour or passer-by would hear the differing or modulating sound, alerting them that somebody is actually in and moving around inside the building/premises, rather than forcing them to (e.g. at night time) get up
5 out of bed to look at e.g. different external lights being lit on an external visual alarm means.

This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems. Thus, as yet another independent aspect of this invention there may be provided an alarm system for monitoring an environment, the system comprising:

10 first detection means for detecting the existence of a first alarm condition, e.g. movement of a person, in the environment being monitored;

at least one second detection means for detecting the existence of at least one respective second alarm condition in the environment being monitored, the or the respective second alarm condition being the same as or different from the first alarm condition; and

15 alarm indicator means, operable or actuatable in response to the first and/or the second detection means having detected their respective first and/or second or respective second alarm condition(s), for indicating that the said first and/or second alarm conditions has/have been detected;

wherein sequential (especially temporally sequential) detection triggering of both the
20 first and also the or the respective second detection means alters the mode or output of the alarm indicator means as a function thereof, so as to provide to an observer an indication of, and optionally an indication specific to, said sequential detection triggering.

5. A unique audible sounder and/or unique external light as a first and/or second alarm means could be employed to alert neighbours or passers-by that a “confirmed” or
25 “validated” instance of a panic button or switch having been pressed has occurred and the occupant or owner of the building/premises is in need of assistance.

6. The system could be set up so there is a remote wireless (e.g. mobile telecommunications) device, as a first and/or second alarm means, held by a neighbour or other nominated person remote from the building/premises, to indicate whether or not
30 somebody is indeed moving around therewithin. This could potentially be used to confuse any intruder, as they would not know whether or not such a system is in place. The neighbour or other person with the mobile device could then call out the police anonymously. Once such a system is in place and armed, it could further deter an intruder/burglar as it would not be immediately apparent whether or not the property is protected in this way, as there could
35 be arranged to be no visual external evidence that the device is in operation. Better still, with the advent of mobile phone technology to register whether such a mobile/remote first alarm means were to be sounding or lit, this system could easily be adapted to show that somebody

is indeed moving around inside the building/premises, in a similar manner to the feature described in paragraph 4 above.

7. Lights placed in an external sounder, bell or siren box (as a dual form of first and second alarm means) could be concealed inside the unit, and only visible to the outside
5 when the light(s) is/are on, i.e. they would illuminate through the surface of the box cover. This feature could have the advantage that it would keep the intruder/burglar guessing as to whether or not the additional checking/confirming/verifying functionality of the system was actually in place in this given building/premises, which could add to the deterrent factor.

8. The system could indicate a fire in the building/premises, in addition to an
10 intruder therein, by for example arranging for a combination of a first alarm means audibly sounding and, as a second alarm means, one or more differently coloured lights on the sounder box being lit and/or a different sounder sounding, each type of alarm means being uniquely indicative of a different one of the first (e.g. fire) and second (e.g. intruder) alarm states.

15 9. All the hard-wiring end connections of the first and second detection means in the alarm system could, or advantageously perhaps even should, be terminated in a separate unit or housing hidden away from any main alarm control panel or unit which is used to house and/or control the overall system, with the essential components of the alarm system or sub-systems of the invention being housed in such a separate unit. This separate
20 unit could be out of sight to all but authorised persons and could for example be reinforced or armour-plated in some way. The reason for this feature is that it is known that some intruders, when they enter a property and the alarm begins to sound, look for the main alarm control panel/unit and smash or break it off the wall, rendering the whole alarm system inactive or in the "off" (i.e. disabled or disarmed) condition (this practice is sometimes known
25 as a "crash and smash" operation). In this event anyone on the outside of the building/premises who may hear an alarm means sounding for a short time would usually think that the owner has simply accidentally set off the alarm and ignores it (i.e. it is assumed to be a false alarm). If however the system were to be a system according to an embodiment of the invention, and the essential components of the embodiment system or sub-systems thereof were to be housed in such a separate unit, the external lights for example in or as a
30 first and/or second alarm means could still provide an indication that somebody was moving around inside the building /premises.

10. In installing systems according to embodiments of the invention, existing PIRs
35 could be used that are parts of an existing system, or additional PIRs could be employed, either wirelessly or wired, and simply clipped or fixed onto the existing PIRs in a room or other area within the building/premises. This may enable easier retro-fitting of the new system into an existing building/premises. If the additional PIRs were wireless, then there

could be an extra pick-up unit placed into a first alarm means (e.g. bell or siren) box which could activate e.g. extra zone lights (as a second alarm means), but only when the first alarm means was sounding. This might require an extra battery or other power source being provided in the alarm box. These are known as "SAB"s or self-actuating bells, so for privacy purposes such external zone lights might only operate when the bell was sounding. An advantage of separate wireless PIRs as an add-on would be that if the main alarm control unit were to be removed from the wall during a break-in (such as a "crash and smash" operation), the alarm indicator lights in the box (as the second alarm means) would still operate for each zone even though the main control unit had been removed from the wall.

11. It may be preferable to position PIRs in a non-conventional part of a room or space inside the building/premises, for instance at a lower point than is hitherto the norm, so an intruder would not be so aware of them and nor so easily able to disable them.

12. It may be preferable to arrange the electronics and other hardware and/or software workings of the alarm system so that if any of the PIRs and/or the main internal control panel/unit were to be removed from the system or disarmed by an intruder (e.g. by a so-called "crash and smash" operation), the associated light(s) on an external first and/or second alarm means box/unit could e.g. continuously flash in a rapid manner, or stay continuously lit for example, or an audible alarm means could emit a special and recognisable signal, to indicate in a unique fashion that tampering had taken place. This information could be passed on to the police or a monitoring/response service to further let them know that an intruder was in the property and that alarm state was genuine, as opposed to being a possible "false alarm".

13. It may be preferable to employ a delay, or an extra delay, within the system when it is initially set into its "armed" or "on" condition, such as for example a 30 seconds delay (or other optionally variable period), before any external light(s) or sounder(s) (as a first and/or second alarm means) is/are actually actuatable. This may give the building/premises' owner or monitor time to deactivate the alarm system in a normal manner when a false or accidental alarm has been caused, and would not immediately alert an outsider/neighbour who was watching the property to call the police or a response service straightaway.

14. It may be preferable to have at least two external indicator lights (or other alarm indicators), as first and/or second alarm means, one for indication of a panic/personal attack/emergency alarm state triggered by a help/panic/personal attack/emergency button or switch being pressed, and the other for giving an indication that somebody is moving around inside the building/premises. Thus, different lights could be indicative of different alarm states. These light(s) could for example be of suitable different colours, and/or could flash on and off to give an extra element or degree of efficacy as alarm indicators. These lights

could be an addition to the usual lights that are presently fitted into an external light/bell alarm box which show it is not in fact a “dummy box” and is a live connected alarm system.

15. The system could be configured so that if any given one of the PIRs or other detection devices (as the first or second detection means) were to be activated at least once
5 when the alarm system was in a “set” or “on” (i.e. armed) condition, and then again upon being tampered with, then external indicator light(s) (or other alarm indicators), as first and/or second alarm means, would e.g. flash continuously (or light in some other unique fashion) or an audible sounder would emit a unique sound. The reason for this feature is that if an intruder attempted to remove or disable a given one of the internal detection devices, they
10 would still activate that one device at least once, which would thus cause the external light(s) or other alarm means to light/sound uniquely, thereby showing that somebody was actually inside the property and also tampering with the system.

This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems. Thus,
15 as yet another independent aspect of this invention there may be provided an alarm system for monitoring an environment, the system comprising:

first detection means for detecting the existence of a first alarm condition, e.g. movement of a person, in the environment being monitored;

second detection means for detecting the existence of a second alarm condition, the
20 second alarm condition being a condition that the first detection means is being tampered with; and

alarm indicator means, operable or actuatable in response to the first and the second detection means having detected their respective first and second alarm conditions, for indicating that the said first alarm condition has been detected and the first detection means
25 is being tampered with.

16. In e.g. larger premises, where there may be a large number of different protected zones, for instance in offices or schools, the security services or the police could find great help in examining a main alarm control panel in order to ascertain where an intruder is situated. This may make it a desirable option in the case of such premises to mount a
30 main alarm control/indicator panel or unit at a convenient location at or adjacent an entrance to the premises, or even just outside it.

17. Having such a new system as per the present invention in existence could itself quickly make would-be intruders aware through “word of mouth” or media (e.g. social media) that any property might have such a system installed in it. This could provide more
35 effective opportunities for the fitting of “dummy” lights or other alarm means to an existing external alarm sounder or light box. In this case a would-be intruder would think twice about breaking into a building/premises fitted therewith, as there would be greater uncertainty as

to whether it was in fact a more advanced and real wired system according to the invention. This would therefore lead to a greater deterrent value of such a system.

18. It may be preferable to fit a separate unit externally on the building/premises which houses additional indicator light(s) or sounder(s) as a secondary one of the first and/or second alarm means, which could be power-linked to a primary one of the first and/or second alarm means unit, so it would only show e.g. secondary indicator lights when e.g. a primary bell was sounding. This would also give the advantage that an observer would not be confused by the existing lights which are presently fitted to alarm bell boxes.

19. In the case of a homeowner activating a panic/personal attack/emergency/assistance button or switch, by use of an embodiment system according to the invention, there could be an advantage that if that person were e.g. disabled, the visiting emergency services could be readily made aware which part of the building the person was situated in if the person could keep activating one or more PIRs in that part of the building through body movement. This could therefore be an added "bonus" functionality of the system. Alternatively, if the person had an "assistance required" fob carried on their person (which are already known technology in the art of personal alarms), this could be configured so as to send an appropriate signal to the nearest PIR in the building, which could then activate an external indicator light or other alarm means outside the property, thereby informing an outsider where that person was situated in the building, thereby making it easier and quicker to locate and attend to them.

20. The alarm system could be arranged and configured to have no audible alarm means, but instead to have only large flashing light(s) on an external box, instead of the more usual external alarm indicator lights. An advantage of this could be that an intruder would not be aware that they had activated the alarm system, but only an outsider, neighbour etc would notice that fact and call the police or other response service. This option might therefore increase the chance that the burglar would be caught.

21. The alarm system could have an external light indicator (or other alarm means) to show that the main alarm control panel has been tampered with, optionally along with e.g. a unique or differing or modulating alarm sound, e.g. intermittent bursts of an audible alarm or a repeating recorded message along the lines of "This system has been tampered with". This option could help in the case of an intruder using the "crash and smash" practice of disabling the alarm system within an entry delay period, which on average may be typically of the order of around 30 seconds.

22. It may be noted that property, especially house, owners are often expected to leave lights on in the house/property when they are away, in order to give the impression that the house/property is occupied. Many people either forget to do this or do not bother, especially since it consumes wasteful amounts of power. A potential intruder who may be

watching the house/property will quickly work out that the house/property is empty by observing habits of that and other properties and their occupants. The new alarm system of the invention may not need such an extra setting-on of interior lights to suggest the property is occupied, because its enhanced functionalities do just as good a job.

5 23. It may be preferable to arrange the electronics of the system so that when an alarm means has been activated, and one or more of e.g. the motion sensors or other first or second detection means are triggered or tripped by an intruder, the external associated lights (or other alarm means) indicative of the latter fact may flash (or sound, as the case may be) or stay on continuously. The reason for this is that if an intruder were to attempt to
10 deactivate or disable one or more of the detection devices to prevent the external lights (or other alarm means) activating, the intruder would himself/herself activate that device before he/she had had a chance to disable it. This might particularly be the case if the intruder sought to remove one of the motion sensors from the system with the aim of letting them get on with their job of burgling the property without (or so they thought) alerting anyone outside
15 the building that anyone was inside. Again, this could reduce the likelihood that such a condition would be seen as a "false alarm".

 24. The system could be provided with an additional feature being a remote fob switch which could be handed to e.g. a neighbour or other nominated person, so as to enable them to switch off the sounder and/or light(s) (as the first and/or second alarm means) upon
20 its/their actuation. This could provide a benefit in that the neighbour or other nominated person would alone be able to switch the sounder/light(s) off in the case of a suspected burglary. This could give an impression to an intruder already inside the building/premises that the alarm had failed or switched itself off, leading them to feel free to roam around the building/premises more freely, thereby giving the observant neighbour a better idea of what
25 was going on inside, and giving more information about the intruder's whereabouts to the police or other response service once called out.

 25. It may be preferable to arrange the system so that once an internal detection device has been activated, the outside indicator light(s) (or other alarm means as the first or second alarm means) remains on or e.g. flashes/sounds continuously until the alarm has
30 been reset by the owner/monitor. That alarm means and associated power supply could be situated in an exterior unit (e.g. as per paragraph 9 above) which could be visible to outsiders, e.g. on a wall of the building/premises. An advantage of this arrangement is that if an intruder tries to disable any of the internal detection devices, he/she would activate it first, which would then be too late for them to avoid the consequence of its having been triggered, as the
35 outside indicator light(s) or other alarm means would continue to emit its alarm signal in that event.

 26. The system could be built and configured so as to memorise the

owner's/premises holder's general movement habits and store same in an appropriate database forming a part of the overall system. Then, if the owner chose to do so, when they leave the building/premises empty and the alarm system is switched into its "on" or "armed" state, one or more e.g. indicator light(s) could randomly light up on the outside of the property, e.g. on an indicator panel thereon, giving the impression somebody is at home. This idea is implemented presently by the leaving on of lights when a house or other property is temporarily left empty (or when the owner has left the property), so using the new system of the invention in this way could confuse any would-be intruder/burglar as to whether there is anyone actually still in the house/property. This option could for example be selectively switchable on or off at the main alarm control panel. Of course, any first or second alarm means would be silent in this mode.

Taking this optional feature of the system further, in the case where the system is designed to be configurable (or switchable) such that, when the occupant(s) of the property is/are out, the system may be set to give one or more random signals to the exterior panel on the property to give the idea that the occupant(s) was/were in the property, thereby giving the impression somebody is in, the system may further be designed or configurable such that it could also (or even alternatively) switch on one or more random room light(s) within the property for a predetermined period of time. This idea is mimicked presently in some known systems wherein a householder is able to switch on a room light in the property from a remote location by use of e.g. a mobile phone. But designing an example system according to an embodiment of this invention to do the same thing, but employing the main alarm panel to perform that switching on of one or more e.g. random lights within the property, even while the main alarm system is set or armed, could be a simple and useful additional functionality.

27. As an alternative option for external lighting, when the alarm system is initially activated by an intruder, the system could be configured such that all e.g. external lights as the first or second alarm means are lit, and only when detection devices inside the building/premises are activated for a second time (e.g. when somebody is moving around therein or trying to disable one of the detection devices, having already triggered the system by the action of breaking in), those external lights go out, or flash for example. An advantage of this feature is that if an intruder tried to disable any of the interior detection devices or continued to move around the building/premises having broken in, the behaviour of the external lights would give an indication of that tampering/further movement from the inside.

28. It may be possible to implement a separate new "secondary" system or sub-system according to one or more embodiments of the invention alongside an existing "primary" alarm system, sub-system or unit, so that the additional new (sub-)system receives its signals from the existing (main) (sub-)system/unit wirelessly. Thus, it may be possible to

install a transmitter inside the existing "primary" main alarm (sub-)system/unit which would then operate the new "secondary" alarm (sub-)system remotely. This could help to reduce the need for any associated new electrical wiring in such a retro-fitting application.

29. When PIRs are used in alarm systems currently, there is usually a small
5 indicator light (e.g. coloured red) which illuminates in the PIR unit itself when activated by movement. This aids the alarm fitter/tester when testing the working of the PIR unit. However, the new system according to the invention could be set up such that when a PIR is relied upon as one of the detector devices to activate the external lights or other alarm means, once the alarm has been activated by an intruder, the light(s) on the PIR(s) could be
10 deactivated and switched off. The advantage of this feature is that it would confuse the intruder/burglar, and he or she would not be aware if they were giving a signal to the outside that an intruder was moving around within the property, thereby leaving that and other detection devices to perform as intended in an even more efficient manner.

30. It may be preferable in many cases for a homeowner to set an alarm system
15 at night, e.g. when they go to bed, in order to protect the home. However, false alarms can also occur during the night. When this happens the homeowner would normally have to go to the central alarm panel (which is usually downstairs) to investigate and turn the alarm off. In that situation the homeowner has no idea whether the alarm has indeed been activated by an intruder, or whether it really is a false alarm. Some people, particularly people on their
20 own, could be scared or wary of this happening and so could be put off setting the alarm at all at night time. A possible solution to this problem using a system according to one or more embodiments of the invention could be to have an extra panel as a component of the overall system, but it being at least in part a duplicate of the main control panel located elsewhere in the property but which is located or visible from e.g. a bedroom or other upstairs area in
25 the property, so that the owner would be able to see and determine from that duplicate panel if there really was any genuinely detected movement in any part of the property without having to go downstairs. If that condition were to be detected by the system and thus made visible on the bedroom panel, the next step would be for e.g. the homeowner to lock themselves in the room and call for help (e.g. the police or other response service).
30 Additional to this could be to activate a panic button which would alert neighbours as to what was happening, i.e. to indicate to the outside that the house had an intruder within, and this would reinforce the need for help.

31. It is possible that the new system of the invention could be useful to assist
35 police in the case of an individual embarking on a shooting spree in a building or other environment, e.g. by the system picking up the sound of gunshots and activating exterior lights or other alarm means accordingly. Appropriate sound detectors could be used for this purpose as the first and/or second detection means. This could indicate where the shooter

was in the building/premises, which might for instance be a school, college, store, shopping mall or suchlike.

32. Possibly the system could be so constructed or arranged that it could be switched on from a remote part of the building/premises, or even from outside it entirely or from a location remote therefrom. In this way the building/premises could be monitored by police or a neighbour or some other monitoring or response service without any activation of the alarm itself. Alternatively, it could be a stand-alone system, and switched on or activated by authorised person(s) to detect if anyone was moving about in the building/premises. This could be helpful in e.g. large buildings where the police or other response services may need to know whether or not there is an intruder inside, and what their location is, which may not be an easy task to determine in the case of conventional alarm systems in such premises.

33. Methods for switching the new system according to embodiments of the invention on or off could be by means of a key, code, fob, or mobile telephone with e.g. a unique PIN code.

34. In the case of the alarm accidentally going off when the property owner/monitor is in the building/premises, the owner/monitor will generally make his/her way to the main alarm control panel to switch it off. This action/movement may itself trigger activation of any detection devices that are encountered on the way to the main alarm control panel. In this space of time before the alarm is de-activated, outsiders may have already alerted the police etc of the alarm going off, which is an undesirable thing to happen. Therefore, the external light system or other alarm means of the system of the invention could in certain embodiments be so designed that when sound detectors are being employed in the system as the first or second detection means, they may also be used to pick up a code word spoken to deactivate the system. This could be applied to switch off, optionally selectively, any or all of the first and/or second alarm means that might have been activated and lit/sounded. Of course, the code word would only be known by the user(s). But the advantage here is that the system could be immediately deactivated without the user having to move around inside the building to reach the main control panel in order to switch it off. Going further, in some embodiment systems there may even be provided a more wide-reaching voice-recognition feature that could be used to operate or switch or arm/disarm any of the system's features or functionalities orally by a user/homeowner or person attending the building/premises.

35. It should be noted that the "secondary" checking/confirming/verifying alarm system or sub-system could be installed as a back-up to the main "primary" alarm system or sub-system. Again, a situation known as "crash and smash" as described above could help to be avoided by use of such a new system.

36. As an additional feature of the system, it could be set up so that the switching

device or method to operate or arm the new system could be attached to the main (visible) control panel. This is where the main system is turned on or off. Within this switching device could be included a tilt switch linked to the new "secondary" checking/confirming/verifying alarm system or sub-system. An advantage here is that the new "secondary" (sub-)system could be activated in the event that a "crash and smash" incident occurs. The "secondary" checking/confirming/verifying (sub-)system could be hidden away and could operate independently of the "primary" (sub-)system. It may also be preferable to actuate a separate light, sounder or other alarm means within the extra light box/unit outside the building to alert outsiders and the like that a "crash and smash" has taken place, again giving the onlooker more information to pass on to the police or other response service.

37. It may be possible to arrange the electronics of the system to recognise when one or more of the "secondary" checking/confirming/verifying alarm system or sub-system detection means have been activated, to enable a complete reset of the alarm system. This might be useful if an intruder stays in one place for the duration of the alarm sounding, which could typically be about 20 minutes (in order to satisfy industry legal requirements). However, it is known practice for an intruder to break in to a particular zone, which would activate the alarm, and then leave the premises and observe the property from a distance. Once the sounder had switched itself off, usually after around 20 minutes, they would then return and enter that particular zone - but which now with the new system could be locked out, i.e. the intruder could not move around in that particular zone without activating the alarm. Presently, most alarm systems will "lock out" that particular zone once it has been triggered, allowing the intruder to chance to move around in that zone without the alarm going off again. With the new system, including this optional feature as above, this scenario may be avoided.

38. In one form of the new system the light-based alarm means may be placed outside the property, and so would be viewable continuously at all times, unlike some light indicators placed inside a building, i.e. as disclosed in US Patent US 4514725A. However, it may be desirable that exterior lights as the first or second alarm means change in some way to indicate movement or presence of an intruder within the building/premises, as is the case with an audible alarm or siren as the first or second alarm means - it would need to change sound and/or pitch in direct response to movement of a person within the building/premises, otherwise onlookers would again assume it is a "false alarm". This feature has already been mentioned in paragraph 4 above.

39. In another optional variant, in the case of a property owner being informed of a potential intrusion to the property for instance by telephone, e.g. by a suspicious neighbour or passer-by, the system could be configured such that the owner could then dial up a specified number that is linked to the building's/premises' alarm system, and activate the

alarm system themselves, as well as or instead of switching on an extra exterior lighting and/or sounder system that may be provided as an additional component or feature of the system. This could give an indication that the property owner has decided to activate the alarm system themselves - which could be for instance a different coloured light or sound alerting a neighbour to take action. This could furthermore give the property owner a choice as to whether the alarm actually requires activating or whether it is sufficient to leave it to the neighbour to take investigative action.

This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems.

40. In certain optional embodiments it may be preferable to arrange for any motion or sound detectors (as the first and/or second detection means) to operate after a predetermined amount or number of switchings or triggerings, e.g. sound sensors could be required to pick up a sound a plurality of times, e.g. at least twice, in succession before the relevant first and/or second alarm means are actually actuated. This may help to avoid the possibility of false, one-off sounds triggering it. However, in order to work properly as intended, this option may additionally require the system to include some e.g. electro-mechanical or other device switching on or off at the time of a false alarm activation.

This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems.

41. Certain embodiment systems according to the invention could be designed to deal not just with intruders to fire, but instead with other emergency situations such as gas or water escape, e.g. if a gas pipe were to burst or leak or a burst water pipe were to be left unattended within a property, a neighbour or suchlike could be alerted. An audible sounder as the first or second alarm means could if desired be left silent in this condition so as not to annoy neighbours etc. In such alternative forms of the system, appropriate other types of detection means, e.g. to detect the presence of water or gas, may be incorporated in the system instead of the more usual intruder and/or fire detection devices.

42. It may be preferable to arrange any outside indicator lights (as the first or second alarm means) on a pole or like elongated structure, which could for instance protrude from a wall or exterior surface in a highly visible position on the outside of the building/premises. This could give much better visibility to lights or other visual alarm means from a greater range of viewing angles, as opposed to lights that are fitted directly into the plane of a wall or exterior surface.

This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems.

43. In published US Patent Application no. US 2014/0191862A there are disclosed motion detectors mounted on the outside of a building which send signals to a

portable device, i.e. a bracelet with lights. These motion detectors are for the purpose of detecting a potential breach of security and do not reveal or tell anybody but the holder of the portable device that an intruder is in the vicinity of or inside the premises, e.g. in the event that they have managed to get past any exterior break-in sensors such as fitted to doors or windows, by for instance getting in through the loft area of an attached property, or even through a basement or underfloor from an attached, unprotected property, or even by hiding away inside the building until the owner has left it. A further problem with this known system arrangement is that there is a much greater chance that an innocent passer-by, or stray animal for instance, could trigger these motion detectors, thereby resulting in false alarm signals. Embodiments of the new system of this invention could mitigate against this happening.

44. It may be preferable to include in the system a digital counter device, of which a counter display component could be mounted visibly on the alarm means box to the exterior (or alternatively to the interior) of the building/premises. This could be in addition to the indicator lights or other alarm means, and could count up one event every time an interior detection means is activated or triggered during operation of the system. An advantage here could be that anyone observing from outside would be given accurate information as to how many times the interior detectors had been activated - therefore the higher the number, the more likely it is that somebody is really inside the building.

This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems.

45. Alternatively or additionally to the feature of paragraph 44 above, in certain embodiments of the system there could be installed a voice-recorded device which could audibly announce a message of the nature of, for example: "... movement number 01", "... movement number 02", and so on, as an adjunct to the digital counter device itself. All this information could be stored e.g. in the main system control panel or unit, and such an event list or replay could be viewed or listened to in "engineers mode". This could tell police or other response service where or what part of the building/premises an intruder has been detected and how many times, etc. This facility might obviate or reduce the need for cameras to be installed, which can be expensive, easy to knock out by the intruder, and more likely to result in false alarm errors.

This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems.

46. Further alternatively or additionally to the features of paragraphs 44 and 45 above, for application of embodiment systems of the invention to detection of a shooting scenario (e.g. as per paragraph 31 above), the digital counter feature could also be adapted to count the number of gunshots that have been fired within a building/premises, as well as

the location/position of the person shooting, which could be a useful aid for the security services.

This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems.

5 47. Further alternatively or additionally to the features of paragraphs 44 to 46 above, when the alarm system has been reset on the main system control panel/unit, the digital counter could be reset to zero, e.g. to "00", thereby leaving the system ready for further use.

10 48. As a yet further development of the idea of providing digital information in the main alarm system control panel/unit to assist police or emergency response services, there could additionally be provided more information within the panel/unit to pass further useful data to the police or response services who may attend the building/premises, e.g. house number/name, alarm manufacturer's name, or messages of the nature of e.g. "room 01 entered", "crash and smash", "room 02 entered", etc. It may also be a useful add-on idea to
15 fit an electrical trace heater in the main alarm control panel/unit to keep the temperature slightly raised in extreme cold weather, as such conditions could affect the digital display. The box or panel itself could also be built with insulation inside.

Any of the foregoing features could furthermore be employed independently in their own right as one or more novel features of other alarms systems, including otherwise
20 known alarm systems.

 49. It may be possible for an embodiment system of the invention to have a "silent" alarm state, i.e. in which the system is monitoring movement in the building/premises even when the alarm is switched off or in its "disabled" mode. This could be useful for instance if cleaners or workmen etc were left alone in the property, and could prevent their "snooping
25 around" particular selected zones.

 50. Roaming pets may sometimes cause problems with known alarm systems, and the same may apply to some alarm systems within the scope of this invention, since it is known that some intruders may force entry into a property even if there are dogs or cats left free to move around inside it. In full alarm "set" or "enabled" conditions this movement by
30 the animal(s) could be picked up by e.g. sound or movement sensors and result in false information being given to an outside observer. Conventionally the only way round this is to use suitable types of detectors/sensors that are tuned to pick up sounds of a particular type, or volume level, or to use directional microphones - these can be fitted at a level that will not pick up movements of an average size pet, but will pick up human movement, door
35 movement, drawer and cupboards being opened, etc. Alternatively, it may be preferable to rely on under-floorcovering (e.g. under-carpet) switches, sound sensors and motion sensors linked together to pick up specifically human movement alone.

51. It may be possible with some embodiments of the new system to ascertain whether or not an intruder has left the building/premises. For instance, if the police, response service or property owner arrive(s), the intruder may sometimes decide to hide in the property rather than leave - this sometimes happens and the intruder may sometimes sit hidden for 5 hours or even days waiting for the owner to leave again. They then can escape undetected. To overcome this problem, in an embodiment of the new system information could be provided in the "secondary" confirmatory/validating (sub-)system to indicate which detection means has last picked up a trigger signal, and thereby give a fairly reliable indication of where the intruder may still to be found. For instance, if the indicated "last triggered" detector were 10 to be the main bedroom, say "zone 05", then the owner would know that other sensors on the way out had not been activated and the intruder must still be hiding away in that same area of the property. This means that it may be useful to fit auxiliary detectors or sensors in other places not usually protected, e.g. loft areas or basement/underfloor areas.

52. Alternatively or additionally to the feature of paragraph 51 above, it may be 15 beneficial to have a record of movements that can be replayed on the main system control panel/unit. This could give the police, other response service or property owner more information as to where the intruder has been, or could still in fact be hiding.

53. A list of devices, methods, sensors or actuators that could trigger a signal to the "secondary" confirmatory/validating (sub-)system in embodiments of the invention may 20 include any one or more of the following, by way of example only:

- In the case of an intruder alarm system: 24 hour tamper system (e.g. CCTV to protect the system), thermal imaging cameras, passive infra-red (PIRs) motion sensors, window and door contacts (e.g. magnetic), shock sensors, underfloor switches (activated by stepping-on), reed switches, object movement sensors (e.g. switches placed beneath objects 25 in the property, so that when an object is lifted it activates a switch), vibration sensors, sound sensors, panic/assistance required/emergency buttons or switches;

- In the case of a fire alarm system: heat sensors, IR sensors, smoke detectors, carbon monoxide (CO) escape sensors/detectors;

- In the case of a gas-leak or water-leak alarm system: gas escape/leak sensors, 30 water sensors (e.g. due to burst pipes);

Any actuations of any of the above detectors, once confirmed/validated by use of the system of this invention, could result in the sending of appropriate actuating signal(s) e.g. to an external visible display as the first and/or second alarm means, by way of e.g. different coloured lights, flashing, sequencing or otherwise changing of such lights, all 35 of which could be employed in many different combinations. Likewise, in the case of an audible sounder, changes to the sounder of a main or secondary alarm could be employed in any type or combination, including suitable pre-recorded messages that could be

broadcast.

54. It has been previously mentioned that internal cameras may be undesirable, as they would reveal to outsiders details of the interior of a building/premises, which may be unacceptable to many people, especially homeowners. However, thermal imaging cameras
5 could be employed instead of visible light-based cameras in order to counter this prejudice, and in this case the cameras could for example be situated in suitable places within the property, as is the case with PIRs etc., and a monitor or screen (as one example of the alarm means) could be placed in high visibility on the outside of the building. Such a system, when activated by movement from any of the above-mentioned detection means, could switch on
10 the monitor/screen, which would show the actual movement of a human being inside the property as a thermal image only, and not reveal in detail the décor, layout or any details of the surrounding rooms/interior. This could thus make this possibility a realistic option after all, if required.

55. With the advent and fast progress of mobile phone technology, it is now
15 possible to send most information of what is happening in a building/premises to one or more mobile phone holders, which in many cases could be the property owner. Some of the problems encountered and discussed above centre on the fact that the phone holder could at any time be located far from the relevant phone handset at the time of an occurrence, or the phone holder could be asleep, or the phone could be out of range of a signal, or the
20 phone's battery could be flat, etc. Yet another problem here is that some people do not have, or do not know how to operate, a high-tech mobile device such as a smartphone, for instance elderly people, and they would rather rely on a neighbour or other local or known person to inform the police or response service in the event of a verified break-in. Where smart technology is being used, it is known that the phone holder can operate an alarm system
25 remotely, so it may be an advantage here for them to send a signal from their phone that they have turned the alarm off, for instance, or that the police/response service have been informed. This message could appear on an outside panel (as one example of an alarm means) informing persons observing from the outside that the owner is aware of the situation, and has taken action.

56. Taking into consideration all of the above, it may be a further advantage to
30 allow the phone holder to have a camera installed on the outside of the property, actually observing or pointing to an exterior alarm means. This could give the phone holder an actual real-time image of what neighbours and the like can see on the outside of the property, further confirming and reinforcing the signals that they are receiving on their phone. Indeed it may
35 be a possibility to install an outside camera filming the alarm means alone. This could be a less expensive alternative than having multiple cameras on the inside of the property. In the event of a neighbour or passer-by witnessing the alarm sounding and alarm means

activating, they could not only inform the police or other response service, but they could be more ready and able to video any intruder who is trying to flee the building/premises, as most mobile phones now have video-capturing capabilities. These images would be useful to the police to help detect the intruder.

5 This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems.

57. To add to and clarify point 37 above (regarding the re-arming of the system): when a zone, or the complete system has been activated and then automatically locked out, it may be preferable that anybody re-entering the zone(s) will be picked up mainly by a PIR. 10 Normally this would not set off the alarm. However, if it is coupled with the picking up of sound, within a certain time (e.g. say about ~10 seconds), this may reactivate the alarm and set it off again, as opposed to a genuine false alarm by one of the detectors/sensors, which would presently trigger the alarm and then lock out that particular detector/sensor after e.g. 20 minutes of ringing. It may even be a possibility that the whole PIR system is activated in 15 this way, i.e. a PIR picks up movement, and, secondarily, the sound sensor picks up a noise made by the intruder and sets off the alarm. This could eliminate most false alarms picking up erroneous movements in that zone, i.e. a curtain blowing in, or, more commonly, balloons in the area setting off the alarm. Thus, for PIRs being activated by movement, this could only trigger the alarm means if followed by sound pick-up by the "secondary" (sub-)system sound 20 sensors. All of this could be programmable, and set up so it will only happen a certain number of times, i.e. 2 or 3 times, before it reverted back to PIR pick-up only. It may be undesirable to use the sound sensor(s) alone as an alarm trigger, as this could dramatically increase the incidents of false alarms.

Any of the foregoing features could furthermore be employed independently 25 in their own right as one or more novel features of other alarms systems, including otherwise known alarm systems.

58. While It is a known fact that some shops and superstores leave their frontal roller shutters open at night so the passing public can see inside to observe if any intruders are on the premises, this requires frontal glass to be left unprotected from vandalism, and 30 also necessitates the leaving on of internal lighting which wastes power, adding to running costs. Some shops use specially made shutters which, when pulled down, still offer inside viewing by way of perforations in the shutter, again enabling passers-by to see what is going on inside the shop, and if there is any activity, they know to call the police. These types of shutters are more expensive than solid un-perforated types. It is not beyond the wit of the 35 intruder to somehow cut the power to the internal lighting system and be left free to move around in the dark - passers-by would then see nothing. This is again where embodiment systems of this invention could prove useful: pick-up sensors placed in and around the store

could again send signals to an outside light unit or sounder, which would inform passers-by of the likelihood of somebody moving around inside the building. This system could again be an add-on to the main alarm system of the premises or a stand-alone system that operates the external indicator light(s) that are switched on when the shop is closed and left empty.

5 Unlike a domestic property, it would be obvious that the shop is indeed closed and no lights should be glowing on the visible panel/unit. The visible panel/unit on these type of buildings may need to be placed in a suitable area to prevent would-be intruders from tampering with it, as it is known that supermarket-type premises are generally easier to deal with by an intruder, since often there are no overlooking neighbours to worry about.

10 59. Regarding thermal imaging options: where thermal imaging cameras and outside display monitors are employed, this could be particularly useful when the system is in a fire alarm condition. It could show the intense heat of the fire, and its whereabouts in the building/premises.

15 60. As an addition to point 24 above (regarding a neighbour having a remote fob to turn off the alarm): since a conventional alarm may be falsely ringing, e.g. when the property owner is away, and often during sleep time, and can thus cause great annoyance, by use of a system of this invention, if a trusted neighbour or other nominated person were left with such a remote switching device or fob to switch the system off or reset it in some way, the system could be configured such that this would not be possible if the interior
20 detectors/sensors had picked something up after the alarm had been last triggered, further reinforcing the message that an intruder is still in the building or has been in the premises. Other types of remote controlling may be possible, as long as it does not compromise the alarm system's real purpose - which is to protect the property.

25 61. As a further optional feature of an embodiment system of the invention, it may be advantageously designed and configured such that the system could give an indication of how many of plural intruders are inside the building/premises. For example, simultaneous triggerings of plural detectors in different rooms or areas within the building/premises may indicate plural intruders present, and a precise number of such simultaneous triggerings could be used to determine the precise number of intruders in such different rooms/areas.
30 This information could be used to display appropriate information via the alarm means, e.g. if two particular exterior lights are flashing simultaneously, this could indicate that there is more than one person inside.

This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems.

35 62. In some instances there could be an additional problem that if an alarm means sounded, even accidentally, when the property owner was in the building/premises, he or she would normally start to move around, thereby activating more detectors/sensors and

thus exacerbating the problem of the system thinking it had detected a genuine intruder. In order to address this possibility, an optional feature of the system could be to design/configure it so that the "secondary" confirmatory/validating (sub-)system has to be activated or enabled separately from the "primary" (sub-)system. This could be achieved for
5 example by using a simple key fob type device. On setting the "primary" (sub-)system upon exiting the building/premises, the user could then simply press the remote key fob switch, which would activate the "secondary" (sub-)system. Then, on re-entry to the building/premises, the entering of the code in the main system panel/unit could turn off (disable) both the "primary" and the "secondary" alarm (sub-)systems. As a further
10 alternative for activating (switching-on) the "secondary" (sub-)system separately from the "primary" (sub-)system, it could be arranged that that is accomplished via a remote signal fob on e.g. the owner's keyring so that when the owner's keys and signal fob were actually within the property, the "secondary" (sub-)system would not function. Other methods of such selective switching-on of the "secondary" (sub-)system may also be possible in other
15 embodiments.

63. There could be provided a digital timer within the system to indicate to an outsider or the police/response service for how long a particular alarm means has been activated and/or ringing/sounding/lit. This feature may be useful if someone attends the building/premises and they do not know when the alarm activation started. By having an
20 indicator to show for how long a particular alarm means has been activated, this may provide further information about where an intruder may still be or whether they are likely still to be inside the building/premises - for example, if such an indicator were to show that the alarm has been activated for merely one or two minutes, then it is highly likely that the intruder is still inside the building/premises.

25 Such a digital timer feature could alternatively or additionally provide an indication of at what time, or since what time, a particular alarm means has been activated and/or ringing/sounding/lit, to the same useful advantage.

As a further option for incorporating such a digital timer feature in other embodiment systems within the scope of the invention, in the case of a system which
30 incorporates a portable fob or even a portable panel intended to be held by a neighbour or the police or other response personnel (e.g. as an extension of paragraphs 23 or 59 above and below), that fob or panel could be arranged or programmed to display similar timing information as discussed above. In this manner, such a portable fob or panel could provide a ready indication of not only e.g. which zone in a building had been triggered, but how many
35 times and/or for how long or from what time. Such information may even be usefully stored or recorded by such a remote fob or panel, e.g. for future investigation by the police or other response personnel.

64. It may be a useful additional features to place external lights (as alarm means) in different places around the building/premises, e.g. over or around the window of a corresponding detector/sensor within. They could also be colour coded. Alternatively, when external lights (as alarm means) are clustered on a single external panel/unit, these could be colour coded to identify the room(s) showing human presence, and each window in the building/premises could have coloured identifying marks on the outside of the window frame, e.g. yellow light = kitchen, blue light = bedroom, red light = hallway, and so on. This could give any outside observers a more reliable idea of where an intruder was situated within the building/premises.

65. It may furthermore be possible for a system according to the invention to be adapted for use as a general monitoring system for buildings/premises, e.g. as an aid to staff at a public building to give information about anyone being left inside before locking up at the end of the day. Although cameras are presently employed to do this, cameras cannot be employed in certain areas, for example toilet areas and changing rooms cannot have cameras installed for obvious reasons of privacy. However, a simple detector/sensor could be employed in such areas, and a panel of indicator lights (as an alarm means of such an adapted system still within the scope of the invention) provided at, say, a reception or security point.

66. When using sound sensors to pick up movement/sound, they - or the system itself - may generally desirably have anti-jam technology incorporated therein. Intruders can be quite shrewd in overcoming such systems, for instance they may find that using a low level sound producing device (e.g. a whistle) may render the sound sensors useless. In this way they could roam around inside the property without activating the alarm means of such a system. Thus, in yet another embodiment the system may incorporate an anti-jam feature to circumvent such occurrences.

67. It may be possible to use sound sensors (as detection means) additionally to record sounds made inside the building/premises when the system is in a full alarm (enabled) condition. This may be an aid to the police or other response service to identify an intruder on the basis of e.g. nationality, accent, vocal timbre or pitch, or gender - assuming they speak or utter other sounds during a break-in.

68. The possibility has already been mentioned in paragraph 54 above of an embodiment system according to the invention having a screen (as a first or second alarm means) affixed to the outside of the building/premises. However, it may be possible to have internal cameras, when installed therein, giving out images to a small external screen, but to arrange for the image(s) to be pixelated. This may help to confirm movement within the building/premises yet not reveal in detail the images of the inside of the property, thereby maintaining privacy for the owner. Such pixelations could be gradual, and settable by the

owner/engineer, e.g. from full HD-type images down to highly pixelated images, in order to tailor the system to any particular desired level of privacy.

69. It should be noted that any embodiments systems according to the invention may be used or operated in conjunction with an alarm receiving centre (ARC) or other response service, whether connected by telephone, mobile or even an internet connection.

70. As yet another optional variant, it may be possible to employ something other than lights or audible sounders as the first and/or second alarm means. For example, a device that provides an alarm signal by movement of a mechanical apparatus could be used instead. This feature could be useful in the case of bright daylight, which could make visual indicator alarm lights difficult to see.

71. As yet another optional variant, in the case of a panic button being pressed inside the building/premises as a first detection means, this may typically happen for either of two reasons. One reason is that the occupant may be in need of emergency assistance, e.g. as a result of suddenly becoming ill, or having had a fall or an accident, or they cannot move, or suchlike. A second reason, which typically applies in the case of commercial premises such as jewellers shops, banks, post offices, etc, it is known that armed hold-ups can sometimes take place, and in such premises panic/alarm buttons exist for the staff to depress in the case of e.g. armed robbery. That then sounds the alarm on the outside of the building. However, as with known domestic alarm systems, passers-by again often ignore such activated alarms even in those type of premises, again because of the commonality of false alarms occurring. Accordingly, by use of an alarm system of this invention, if a "confirmatory" external alarm means based on a visual indicator, e.g. a screen or display, were to be placed outside the premises and was able to announce some kind of confirmatory message that a robbery was indeed underway, as a result of a panic/emergency/alarm button being pressed, then that could be a significant advantage to the police or other response service in attending quickly and taking the right action to apprehend the robbers. Although it is known that such a system could, if desired, automatically alert the police, it would be a good back-up actually at the premises, just in case the auto-alert to the police failed for some reason, or there might be a police officer nearby who would be able to see what going on and take action directly and immediately. Furthermore, if such an intruder(s) were armed and had fired off a gun, a gunshot sound detector could be employed in a system installed in such premises (as previously mentioned in principle in paragraphs 31 and 46 above), thereby confirming to the police or response service that the intruder(s) was/were armed and they should exercise extra caution and to call in specialist firearms officers.

72. As yet another optional variant of an alarm system within the scope of the invention, in the case of the system being designed with an audible alarm-sounding time-out period, e.g. of around 20 minutes (in order to satisfy industry legal requirements), after which

an audible alarm is automatically switched off or even locked-out (in a similar manner to that mentioned in paragraph 37 above), the electronics of the system may be designed such that at least one visual alarm indicator means, e.g. one or more visible lights, remain lit even after such a 20 minutes time-out period has elapsed, in order to provide an extended indication or record of precisely which detection means (e.g. in which room or zone within the building/premises) or type of detection means has been triggered, reported and validated/confirmed. This extended or persisting visual indicator may then remain "on" until the system is completely reset by the user.

This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems.

73. As yet another optional variant of an alarm system within the scope of the invention, in the case of the system being designed such that a first detection means (e.g. a PIR sensor) is "locked-out" once it has been triggered, the electronics of the system may be designed such that the triggering of a second detection means (e.g. a sound sensor) - which in accordance with the invention would normally be used for the novel validating/confirming purpose in accordance with the invention - may instead be used to re-activate (or "un-lock") the first detection means that has been initially locked out, and then that re-activated first detection means may be used as the, or part of the, second reporting means and/or actuation means which then serves to validate/confirm the veracity of the initial triggering of that first detection means.

This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems.

74. As yet another optional variant of an alarm system within the scope of the invention, again in the case of the system being designed such that a first detection means (e.g. a PIR sensor) is "locked-out" once it has been triggered, the electronics of the system may be designed such that if a second detection means (or a secondary, validating/confirming sub-system) does not detect a validating/confirming triggering within that lock-out period (or other suitable "waiting" period), then the first detection means may automatically be unlocked or reset by the system in order to put it back into its initial, unlocked, "fully armed", state.

This feature could furthermore be employed independently in its own right as a novel feature of other alarms systems, including otherwise known alarm systems.

75. In another embodiment system it may be possible to fit or mount an external alarm indicator panel so that it can be viewed alternatively or additionally from above, i.e. the sky. This could be an aid to helicopters or other aircraft who may be called to the scene of a burglary and arrive before ground-based police, and who would thus be able to relay to the ground-based police or other personnel the whereabouts of any intruder(s) within the

property.

76. In another embodiment system it may be possible to design or configure the system to enable authorised personnel, e.g. the police or other response service, to switch the alarm system on, or to arm it, from outside the building/premises, even if the alarm system were not already set/armed or it did not activate for some reason. This would enable the police or other personnel then to see if an intruder was in the building/premises, even though the system had not already been set/armed or had failed to be activated. This feature could also prove useful where a building was on fire, so as to provide to emergency fire or rescue personnel an indication of the presence of people inside the building and/or their whereabouts therein.

77. As yet another optional variant of an alarm system within the scope of the invention, in the case of such a system comprising plural sensors (i.e. plural detection means) which are of at least two different types, it may be possible for the system to be designed or configured such that a user can select, or programme, or "mix & match" according to any desired combination, which one or ones of the sensors (detection means), once triggered, actuate which one of a plurality of alarm indicator means which are also provided in the system. For example, one or more specific ones of the sensors (detection means) may be arranged to actuate (once it/they have been triggered) a visual alarm indicator means (e.g. one or more lights), whilst one or more other ones of the sensors (detection means) may be arranged to actuate (once they have been triggered) an audible alarm means (e.g. a sounder), or even one or more of any of the sensors (detection means) may be arranged to actuate (once they have been triggered) both. For instance, where a given practical system has a total of eight sensors (detection means), e.g. identified as 01, 02, 03, 04, 05, 06, 07 & 08, the system may be configured so that e.g. sensors 03, 05 and 07 are programmed to actuate the main audible alarm sounder once they have been triggered, whereas sensors 01, 02, 04, 06 and 08 are programmed to actuate the warning indicator light(s) on an internal or external panel, optionally in addition to actuating the audible sounder as well.

78. As yet another optional variant of an alarm system within the scope of the invention, the system may be designed or configured such that any given alarm indicator means increases or otherwise changes its output, e.g. pitch or volume (or decibels output) of an audible sounder or visible brightness, flashing rate or colour of one or more visual warning lights, in dependence on the total number of sensors that have been independently triggered once a first sensor (first detection means) has been triggered and validated/confirmed by the triggering of at least one further sensor (second or subsequent detection means). Optionally, in the case of plural alarm indicator means being actuated, both or all of them may be so modified simultaneously. In this manner, the total number of sensor triggerings that have resulted in the overall alarm system being actuated may be

conveyed to an observer outside a building/property simply by their observing the nature, e.g. pitch, volume or visual character, of the one or more alarm indicator means that have been actuated. An advantage of this feature is not only that such alarm sounder/lights modulations can provide a ready indicator to an observer of the extent of any intrusion into the building/premises and to which an intruder e.g. may be moving around, but it may also enable an observer to discern between a spurious "false alarm" and a genuine alarm condition typical of plural triggerings of plural sensors which exceed the minimum necessary for the basic validation/confirmation functionality.

As a further extension of this feature, the system may additionally or alternatively be arranged or configured such that instead of a modulated signal output from the one or more alarm indicator means, the duration of the signal output from that/those one or more alarm indicator means may be incrementally increased upon each new sensor triggering occurring, so that the overall duration of a given alarm indicator means provides an observer with a similar ready indicator of the extent of any intrusion into the building/premises and to which an intruder e.g. may be moving around, together with a better indicator of the actuated alarm condition being genuine as opposed to a possible false alarm.

Within the scope of this application it is envisaged that the various aspects, embodiments, examples and alternatives, and in particular the individual features thereof, set out in any of the foregoing text or numbered paragraphs, in the claims and/or in the following description and drawings, may be taken independently or in any combination. For example, features described in connection with one particular embodiment are applicable to all embodiments, and may be used either singly or together in any combination, unless expressly stated otherwise or such features are incompatible.

25

BRIEF DESCRIPTION OF THE DRAWINGS

One or more embodiments of the invention will now be briefly described, by way of non-limiting schematic example only, with reference to the accompanying drawings, in which:

30 FIGURE 1 is a schematic representation of a typical domestic dwelling into which has been installed a first, relatively simple, alarm system according to one embodiment of the invention;

FIGURE 2 is a schematic representation of a typical layout and interconnection diagram of the alarm system of the embodiment of FIG. 1;

35 FIGURE 3 is a simplified schematic logic diagram illustrating the basic algorithm according to which the alarm system of the embodiment of FIG. 1 operates;

FIGURE 4 is a schematic representation of a typical domestic dwelling into which has

been installed a second, more complex, alarm system according to another embodiment of the invention;

FIGURE 5 is a schematic simplified flowchart showing the basic algorithm according to which the alarm system of the embodiment of FIG. 4 operates;

5 FIGURE 6 is a schematic simplified flowchart showing the basic algorithm according to which the lights on the display panel of the embodiment alarm system of FIG. 4 operate and are actuatable; and

FIGURE 7 is a schematic simplified flowchart showing the basic algorithm according to which the bell sounder of the embodiment alarm system of FIG. 4 operates and is
10 actuatable.

DETAILED DESCRIPTION OF EMBODIMENTS

It is to be understood that the embodiment alarm system according to the invention as
15 illustrated in FIGS. 1 to 3 is a mere schematic representative example only, presented to illustrate the basic layout and operation of many embodiment alarm systems within the general scope of the invention.

As shown in FIG. 1, a domestic house or other dwelling 10 has installed therein an alarm
20 system 12 which in this example embodiment is an intruder/burglar alarm which monitors the various rooms or zones within the house 10 for attempted or actual break-in and/or for movement therewithin of an intruder who may have already entered. Mounted on an outside wall of the house in a prominent position, so as to easily visible and audible by neighbours, passers-by, or the police or persons of a response service, is a main alarm indicator box 20,
25 which in this example incorporates a combination of an audible sounder 24, e.g. a bell or siren, and an array of visual warning lights 26.

FIG. 2 illustrates schematically and in a simplified representative fashion one arrangement or configuration in which the various components of the alarm system 12 may be installed
30 and operate. In this illustrated simplified system, wall-mounted in one downstairs room Room1 in the house 10 is a PIR (passive infra-red) movement sensor 40a for the purpose of detecting movement in that room Room1 when the alarm system 12 is set, i.e. enabled, into its active state. Another such PIR 40b is wall-mounted in an upstairs room Room2 for detecting movement in that room Room2. Each of the PIRs 40a, 40b may thus constitute a
35 primary detector for detecting a primary alarm condition, which in this case is the fact that an intruder/burglar has entered the house 10 and is moving around in a respective one of those rooms Room1 or Room2, or may be even moving around within the house 10 from one of

those rooms to the other.

In one alternative arrangement to that illustrated in FIG. 2, by way of just one of many alternative examples, instead of a PIR sensor in either of the rooms Room1, Room2 there may instead be provided a shock sensor on one or more of the doors and/or windows, especially at least one of which is an external door or window to the house 10, in order to detect as an alternative primary alarm condition the fact that an intruder or burglar has attempted to enter or has even succeeded in entering the house 10 by e.g. breaking a window or forcing a door or a lock thereon.

Also located in each of the rooms Room1, Room2 is a respective sound sensor 60a, 60b, which are designed to pick up sounds from an intruder/burglar once they are inside the house and have already triggered a respective PIR 40a, 40b. Thus, the ability of either one of the sound sensors 60a, 60b to pick up evidence of movement in a respective room Room1, Room2 acts as a secondary - or confirmatory or validating - pick-up or detection that the already-triggered respective PIR in that room has been genuinely triggered by an intruder/burglar, and is not for example a result of a false-alarm-triggering event such as a curtain moving in a draught or some other motion within the respective room that might otherwise trigger a false alarm.

For announcing to neighbours, passers-by, or the police or persons of a response service that the detected primary alarm condition (detection of movement in a room Room1 and/or Room2) is a genuine - and not a false - alarm condition, as confirmed by the secondary detection of sounds within the respective room Room1, Room2, the system is designed and configured such that a main alarm indicator box 20 is actuated to display a characteristic "genuine alarm" warning signal, which may for instance be the audible sounder 24, e.g. a bell or siren, in combination with one or more of the visual warning lights 26. Those warning lights 26 may in some example arrangements be designed to flash, or light in sequence to provide a unique visual signal that the audible alarm is a real one, not a false alarm, so it is immediately apparent to the relevant observer that the alarm condition is genuine.

If desired, in one particular implemented version of this illustrated system, different ones of the visual warning lights 26 may be coloured and arranged to light selectively according to exactly which PIR sensor has been primarily triggered in the house 10. This may therefore provide a direct visual indicator of where the intruder/burglar is, or has recently been, within the house 10, thereby making it easier and more efficient to tailor a police or other response to the break-in.

For operation of the alarm system, a main alarm control panel or unit 80 may be provided - akin to that of a conventional intruder alarm system - e.g. wall-mounted adjacent the front door of the house to facilitate its setting (arming or enabling) and unsetting (disarming or disabling) when the homeowner is leaving or re-entering the house 10. However, as one useful additional feature of this illustrated system, there may additionally be provided, wall-mounted at a separate location within the house (e.g. in a bedroom or some other living space) a secondary panel or unit 90 which likewise may incorporate one or more visual indicators, e.g. selectively illuminatable lights, in order to indicate to the homeowner a triggered state of the system in the event of a "genuine" alarm condition having been detected and confirmed/verified. That secondary panel or unit 90 may thus provide a useful remote diagnostic facility by which the homeowner may ascertain the status of a suspected break-in without having to risk entering a part of the house 10 where the intruder/burglar may actually still be present.

15

FIG. 3 illustrates schematically the basic logic algorithm by which the alarm system 12 operates. The respective primary PIR sensors 40a, 40b are represented as D1 and the respective secondary sound sensors 60a, 60b are represented as D2. R1 and R2 represent the respective reporting means which form part of the overall control system and which operate to report the existence of the respective detected primary and secondary alarm conditions and pass an appropriate output signal to the actuation means ACT only when both those primary and secondary alarm conditions have been detected and reported, i.e. in which case the existence of the primary alarm condition (the PIR-detected movement) can be considered to be a real and genuine alarm condition, having been confirmed as such by the detection and reporting of the sound sensor-detected sound of the intruder/burglar within the house 10. Upon such a confirmed or validated primary alarm condition having been actuated, the relevant alarm indicator means 24 and/or 26 are thus actuated to provide the appropriate "genuine" alarm warning signal.

30

As illustrated by way of example by the dashed lines in FIG. 3 linking each of the reporting means R1, R2 and the alarm indicator means AL, if desired or appropriate it may be arranged that a respective one of the audible bell or siren 24 and the visual warning lights 26 is/are controlled directly in response to the primary and/or secondary alarm conditions having been detected and reported, in order to provide greater opportunities and flexibility for selectively reporting those specific alarm conditions to an outside observer, and/or tailoring specification alarm indicators to an indication of specification sensors having been triggered. Still, the alarm indicator means AL will in any event only be actuated upon both the primary and

35

secondary alarm conditions having been detected and reported, as implemented by the overriding actuation means ACT which is central to the system.

FIG. 4 illustrates, again by way of schematic example only, another embodiment of alarm system according to the present invention, this one being of a more complex nature. It comprises: three passive IR motion detectors (P1, P2, P3), three sound sensors (S1, S2, S3), one bell sounder (B), a main control panel (inside the building) (CP), a display panel (outside the building) (DP), two door contacts (front and back) (DCF, DCB) and one detection counter (C). The exterior display panel (DP) comprises three indicator lights (IL1, IL2, IL3).

10

The basic operating algorithm by which the overall system of FIG. 4 operates is illustrated in FIG. 5.

The possible states of the various active components may be summarised as follows:

15

- 0 = Inactive
- 1 = Active
- P1, P2 and P3 – 0 at first
- S1, S2 and S3 – set to 0, 1 when matching P is 1

20

The basic operating algorithm by which the indicator lights (IL1, IL2, IL3) on the display panel (DP) are operable and actuatable is illustrated in FIG. 6. Thus:

25

- If P1 is triggered then S1 will become active
- If S1 is active AND triggered then IL1 will flash
- If P2 is triggered then S2 will become active
- If S2 is active AND triggered then IL2 will flash
- If P3 is triggered then S3 will become active
- If S3 is active AND triggered then IL3 will flash

30

The basic operating algorithm by which the bell sounder (B) is operable and actuatable is illustrated in FIG. 7. Thus:

35

- Human sets alarm using CP
- If DCF is triggered, 10 secs to enter code to disarm
- If code not entered correctly then bell will sound
- If DCB is triggered then bell will sound
- If P1 is triggered then S1 will become active
- If S1 is active AND triggered then bell will sound
- If P2 is triggered then S2 will become active

- If S2 is active AND triggered then bell will sound
- If P3 is triggered then S3 will become active
- If S3 is active AND triggered then bell will sound

5 It will be appreciated from the foregoing general schematic descriptions of the embodiment alarm system of FIGS. 1 to 3 and 4 to 7, taken in conjunction with the remainder of this specification, and in particular from the various definitions, descriptions and discussions hereinabove, that many variations and optional additional or alternative features and/or functionalities may be incorporated into either of these or other example systems according
10 to a wide variety of other embodiments of the invention.

Throughout the description and claims of this specification, the words “comprise” and “contain” and linguistic variations of those words, for example “comprising” and “comprises”, mean “including but not limited to”, and are not intended to (and do not) exclude other
15 moieties, additives, components, elements, integers or steps.

Throughout the description and claims of this specification, the singular encompasses the plural unless expressly stated otherwise or the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating
20 plurality as well as singularity, unless expressly stated otherwise or the context requires otherwise.

Features, components, elements, integers, characteristics, properties, compounds, chemical moieties or groups described in conjunction with a particular aspect, embodiment or example
25 of the invention are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith or expressly stated otherwise.

CLAIMS

1. An alarm system for monitoring an environment on one or more security criteria, the system comprising:

5 first detection means for detecting the existence of a first alarm condition in the environment being monitored;

first reporting means, operable in response to the first detection means having detected the existence of the said first alarm condition, for providing an output reporting the detected existence of the said first alarm condition;

10 at least one second detection means for detecting the existence of at least one respective second alarm condition in the environment being monitored;

at least one second reporting means, operable in response to the or a respective said second detection means having detected the existence of the or a respective said second alarm condition, for providing an output reporting the detected existence of the or the

15 respective second alarm condition;

actuation means, operable in response to the outputs of the first reporting means and the or the respective second reporting means, for providing an actuating output only when both of the outputs of the first reporting means and the or the respective second reporting means have each reported the detected existence of their respective first and second or

20 respective second alarm conditions; and

alarm indicator means, operable in response to the actuating output of the said actuation means, for indicating that the existence of the said first and/or the said second alarm condition(s) has/have been detected by the first and/or the second detection means.

25 2. An alarm system according to claim 1, wherein the one or more security criteria on which the system monitors the environment comprises intruder or burglar detection, the said first alarm condition, and optionally also the said second alarm condition, comprising a condition that an intruder or burglar has been detected in the environment being monitored, and the first, and optionally also second, detection means is independently selected from
30 any of one or more of the following: motion detectors, shock detectors, PIR (passive infrared) sensors, heat or IR sensors, microwave-based sensors, sound sensors, mechanical disturbance detectors, reed-type switches, magnetic sensors, switch mats or pads, panic or personal attack or emergency call buttons or switches and cameras.

35 3. An alarm system according to claim 1 or claim 2, wherein the one or more security criteria on which the system monitors the environment comprises:

(i) fire and/or smoke detection, wherein the said first alarm condition, and optionally

also the said second alarm condition, comprises a condition that fire, or an unusual or concentrated heat source, or smoke has been detected in the environment being monitored, and the first, and optionally also second, detection means is independently selected from any of one or more of the following: heat sensors, IR (infra-red radiation) sensors, smoke
5 sensors, noxious gas detectors; and/or

(ii) tamper detection of the system or a component or element thereof.

4. An alarm system according to any one of claims 1 to 3, wherein:

at least the first detection means and the first reporting means form or constitute, or
10 are provided as parts of or features, components or elements of, a first sub-system; and
at least the second detection means and the second reporting means form or constitute, or are provided as parts of or features, components or elements of, a second sub-system;

and wherein the first and the second sub-systems are at least partially dependent on
15 each other in their respective contributions to the overall operation of the overall system.

5. An alarm system according to claim 4, wherein the second sub-system is only enabled or active or powered, so as to be operational and the second detection means and/or the second reporting means to be activatable, once the first sub-system has already detected
20 and/or reported the existence of the first alarm condition.

6. An alarm system according to claim 4, wherein the first and the second sub-systems are both normally on or enabled or powered when the overall alarm system is in its armed state, so that both the first and the second sub-systems are on or enabled or powered into
25 their respective armed states, ready for detection and reporting of their respective alarm conditions, during the normal operation of the armed system.

7. An alarm system according to any one of claims 4 to 6, wherein at least some of the components or elements of the first sub-system are provided or constituted by components,
30 elements or features of an existing alarm system, optionally a known alarm system pre-installed in a building or premises, with the components, elements or features of the second sub-system constituting an additional feature or functionality that enables the existing alarm system to be transformed into an alarm system according to the present invention.

35 8. An alarm system according to any one of claims 4 to 6, wherein the components, elements or features of both the first and the second sub-systems are provided together in an overall new alarm system, for installation *ab initio* into the building or premises to be

monitored.

9. An alarm system according to any preceding claim, wherein the actuation means is configured and operable such that it provides an actuating output only when both of the
5 outputs of the first reporting means and the or the respective second reporting means have each reported the detected existence of their respective first and second (or respective second) alarm conditions, and those reportings of the detected existence of the respective first and second (or respective second) alarm conditions by the first and second reporting means have occurred either (i) substantially simultaneously, or (ii) sequentially or spaced
10 apart in time, and in either order, relative to each other.

10. An alarm system according to any preceding claim, wherein the first detection means constitutes a primary or master detection means responsible for triggering a detection of a primary security condition that warrants an alarm state, and the at least one second detection
15 means constitutes a or a respective secondary or subsidiary detection means responsible for confirming or verifying the detection of whatever security condition has been detected by the first, primary, detection means as being a genuine security condition warranting an alarm state,

whereby the first and second reporting means and actuation means are provided and
20 operable in combined response to the outputs of both the first and the second (or respective second) reporting means, such that the alarm indicator means is only actuated upon both of the outputs of the first and the second (or respective second) reporting means having each reported the existence of their respective first and second (or respective second) alarm conditions, with the first reporting means having reported the existence of the primary
25 security condition and the second reporting means having reported the existence of the secondary or confirmatory security condition.

11. An alarm system according to any preceding claim, wherein either:
(i) the second alarm condition is a same alarm condition as the first alarm condition,
30 or
(ii) the second alarm condition is a different alarm condition from the first alarm condition.

12. An alarm system according to any preceding claim, wherein each of the first and the
35 second alarm conditions are each independently selected from any of the following:

(i) a condition that an intruder or burglar is in the process of breaking into or forcing entry into the building/premises, optionally as a result of the triggering of a shock sensor,

reed-type switch or magnetic sensor as the first and/or second detection means;

(ii) a condition that an intruder or burglar is in the building/premises, optionally as a result of movement or the presence thereof being detected by a relevant movement or motion sensor, heat sensor, sound sensor, switch mat or camera as the first and/or second detection means;

(iii) a condition that a panic or personal attack or emergency situation exists within the building/premises, optionally as a result of a panic, personal attack or emergency button or switch, as the first and/or second detection means, being activated by a person within the building/premises;

(iv) a condition that there is a fire, smoke or noxious gas or fumes in the building/premises, optionally as a result of that being detected by a heat or IR sensor, smoke detector or noxious gas sensor as the first and/or second detection means.

13. An alarm system according to any preceding claim, wherein any one or more of the following conditions is/are satisfied:

(i) The first alarm condition detected by the first detection means is a first security condition that warrants an alarm state, and the second alarm condition detected by the second detection means is a same or a different security condition that also warrants an alarm state.

(ii) The first and the second detection means are each of the same type, and the first and second alarm states whose existence is detected by the respective first and second detection means are each warranted by the same security condition, optionally an intruder/burglar being within the building/premises, further optionally such that the first detection means initially detects movement of an intruder/burglar within the building/premises, and the second detection means then detects the same presence of the same intruder/burglar but for a second time, which therefore acts as a confirmatory detection which validates the first detection by the first detection means.

(ii) The first and the second detection means are each of a different type to the other, and the first and second alarm states whose existence is detected by the respective first and second detection means are each warranted by the same security condition, optionally an intruder/burglar being in the process of breaking into the building/premises, further optionally such that one of the first and second detection means detects an initial breaking-in of an intruder/burglar through a door or window of the building/premises, and the other of the first and second detection means then detects movement of the intruder/burglar moving about within the building/premises, which second detection then acts as a confirmatory detection which validates the first detection by the first detection means.

(iii) The first and the second detection means are each be of a different type to the

other, and furthermore the first and second alarm states whose existence is detected by the respective first and second detection means are each warranted by a different security condition, optionally such that there is a fire in the building/premises and there is/are also one or more persons therewithin who need to be rescued, further optionally such that one of the first and second detection means is a fire or smoke detector within the building/premises and detects a fire or potential fire therein, whereas the other of the first and second detector means detects movement of a person in the building/premises.

(iv) The first and the second detection means are one and the same single detection means, optionally a panic, personal attack or emergency button or switch, whose activation by an occupant of the building/premises has been to signal that help is required or that an emergency condition exists that needs responding to, optionally wherein whilst the first detection means detects the activation of the panic or emergency button or switch and the first reporting means thus reports that activation, the second detection means is in effect the already detected fact that it was the panic button or switch itself that was activated, whereby the second reporting means automatically reports that fact without the need for any further discrete detection of any other alarm condition by the second detection means.

14. An alarm system according to any one of claims 1 to 13, wherein the alarm indicator means, which is operable in response to the actuating output of the said actuation means, is constructed and/or configured for indicating solely that the existence of said first alarm condition has been detected by the first detection means, whereby the confirmed or validated first alarm condition is indicated as having been detected by the actuation of the alarm indicator means.

15. An alarm system according to any one of claims 1 to 13, wherein the alarm indicator means, which is operable in response to the actuating output of the said actuation means, is constructed and/or configured for indicating solely that the existence of the or the respective second alarm condition has been detected by the or the respective second detection means, whereby the confirming or validating second alarm condition is indicated as having been detected by the actuation of the alarm indicator means.

16. An alarm system according to any one of claims 1 to 13, wherein the alarm indicator means, which is operable in response to the actuating output of the said actuation means, is constructed and/or configured for indicating that the existence of both the first and the or the respective second alarm conditions have both been detected by the respective first and the or the respective second detection means, whereby both the confirmed or validated first alarm condition and the confirming or validating second alarm condition are both indicated

as having been detected by the actuation of the alarm indicator means.

17. An alarm system according to any one of claims 1 to 16, wherein the alarm indicator means, which are operable in response to the actuating output of the actuation means actually signifying that both the outputs of the first and the second reporting means have each reported the existence of their respective first and second alarm conditions, comprises first alarm means which is the only alarm indicator means, whereby the said first alarm means serves exclusively to indicate that the first - and/or the second, as the case may be - alarm condition that has been detected has been both detected and confirmed or validated as being a real or genuine alarm condition.

18. An alarm system according to any one of claims 1 to 16, wherein the alarm indicator means, which are operable in response to the actuating output of the actuation means actually signifying that both the outputs of the first and the second reporting means have each reported the existence of their respective first and second alarm conditions, comprises first and second alarm means, the first alarm means being actuatable to signify that the first alarm condition has been detected by the first detection means as existing, and the second alarm means being actuatable to signify that the or the respective second alarm condition has been detected by the or the respective second detection means as existing.

19. An alarm system according to claim 18, wherein the first and second alarm means are different or distinct from each other, optionally in terms of a visual and/or audible or other sensory signal they emit to indicate their respective alarm conditions, whereby a first alarm signal is emittable to indicate a particular primary alarm state subsisting, and another, different alarm signal is emittable to indicate a particular secondary alarm state subsisting.

20. An alarm system according to any preceding claim, wherein the alarm indicator means comprises at least one visual alarm indicator, optionally one or more lights, lamps, LEDs, lasers or combinations of two or more lights, lamps, LEDs or lasers, which optionally may be configured to flash or pulse and/or or emit a predetermined colour, and wherein the said alarm indicator means is provided mounted on or in or in close proximity to the environment being monitored.

21. An alarm system according to any preceding claim, wherein the alarm indicator means comprises at least one audible alarm indicator, optionally one or more audible sounders, bells, sirens, klaxons, sirens, recorded verbal messages or warnings, which optionally may be configured to vary or modulate, and wherein the said alarm indicator

means is provided mounted on or in or in close proximity to the environment being monitored.

22. An alarm system according to any one of claims 1 to 19, wherein at least one alarm indicator of the alarm indicator means is provided at a location remote from the environment
5 being monitored.

23. An alarm system substantially as any described herein, or as described in any one or more of numbered paragraphs 1 to 74 hereinabove, or as illustrated in any of FIGS. 1 to 3 or 4 to 7 of the accompanying drawings.
10

24. An environment which is in need of or is susceptible to monitoring on one or more security criteria, the environment having installed or mounted therein or applied thereto an alarm system, or at least some of the components or features of an alarm system, according to any one of claims 1 to 23.
15

25. An environment according to claim 24, wherein the components of the alarm system which are installed or mounted in the environment to be monitored comprise at least the first and the second detection means.

20 26. An environment according to claim 24 or claim 25, wherein the said environment is a building or premises which is any of: a domestic dwelling, an office, business premises, retail premises, storage premises, industrial premises, leisure or sports premises or facilities, an exterior or open-air or part-open-air environment, car park, sports venue, or an agricultural, horticultural or forestry environment.

25 27. A method of monitoring an environment on one or more security criteria, the method comprising:

(i) providing an alarm system according to any one of claims 1 to 23; and
(ii) operating the system according to its protocol to monitor the environment for
30 existence of a first alarm condition and at least one second alarm condition;

wherein, in the event that both of the outputs of the first reporting means and the or the respective second reporting means have each reported the existence of their respective first and respective second alarm conditions, the alarm indicator means is actuated by the actuation means to indicate that the said first and/or second alarm condition(s) has/have
35 been detected by the first and/or second detection means.

1/7

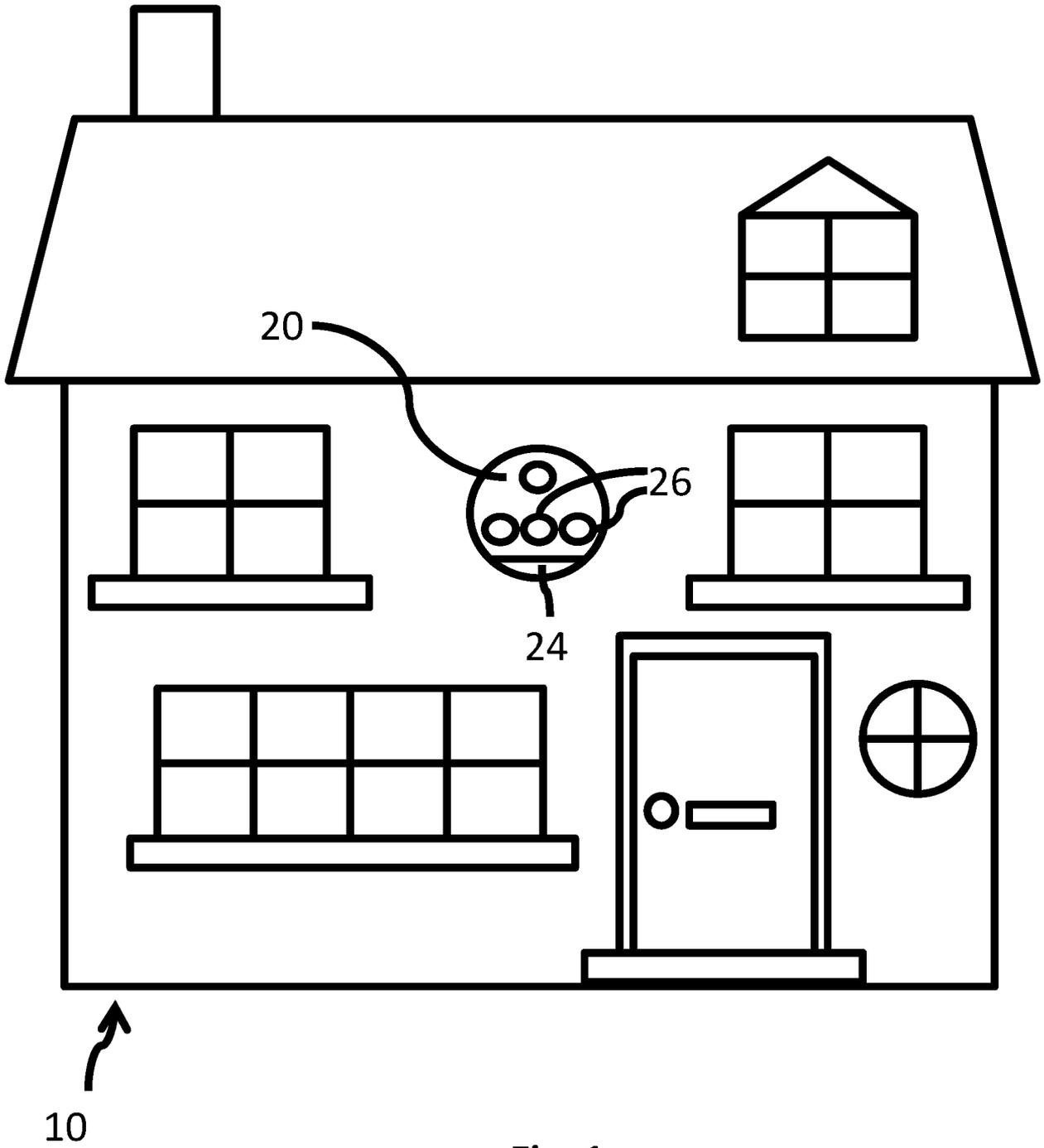


Fig. 1

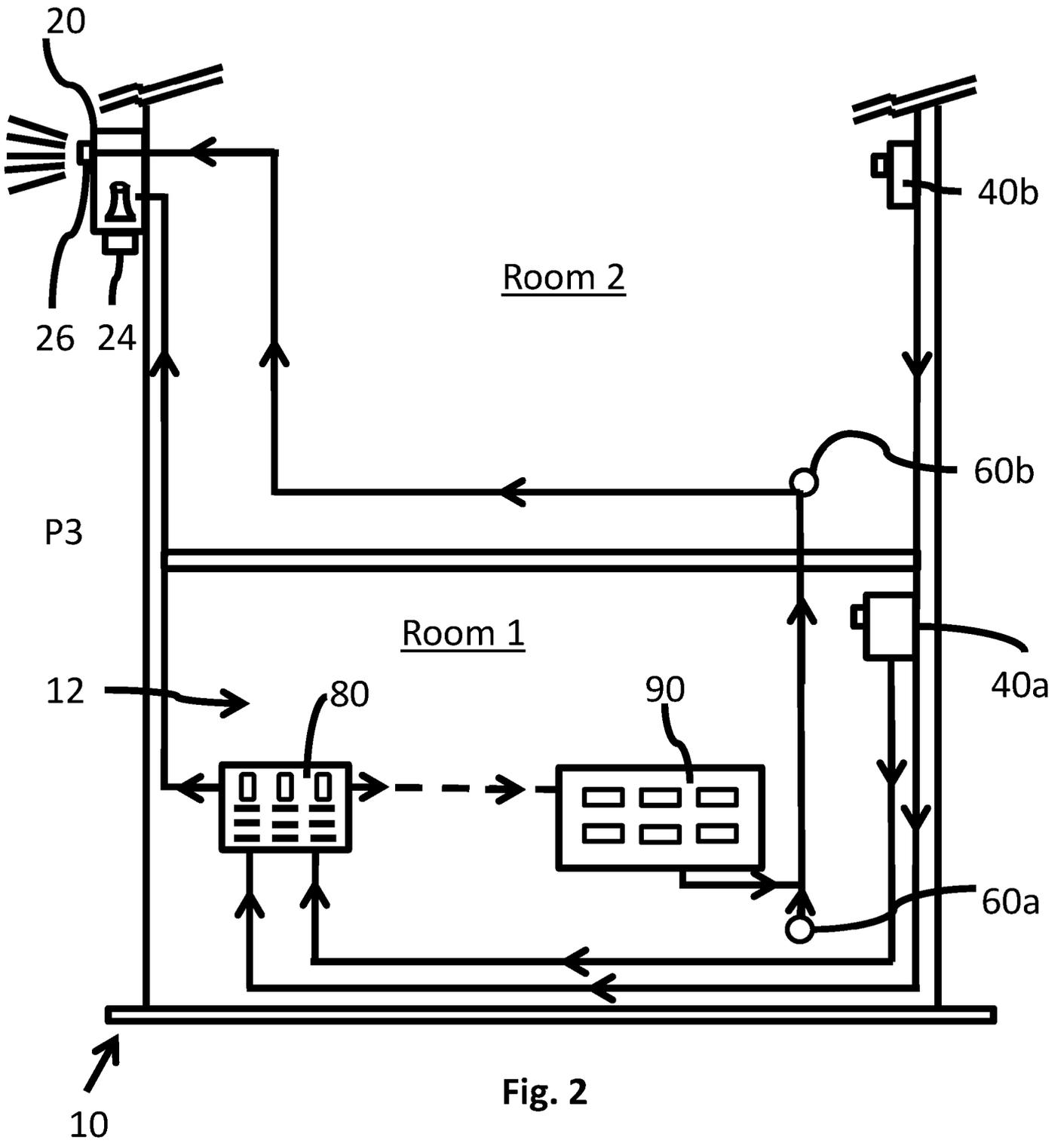


Fig. 2

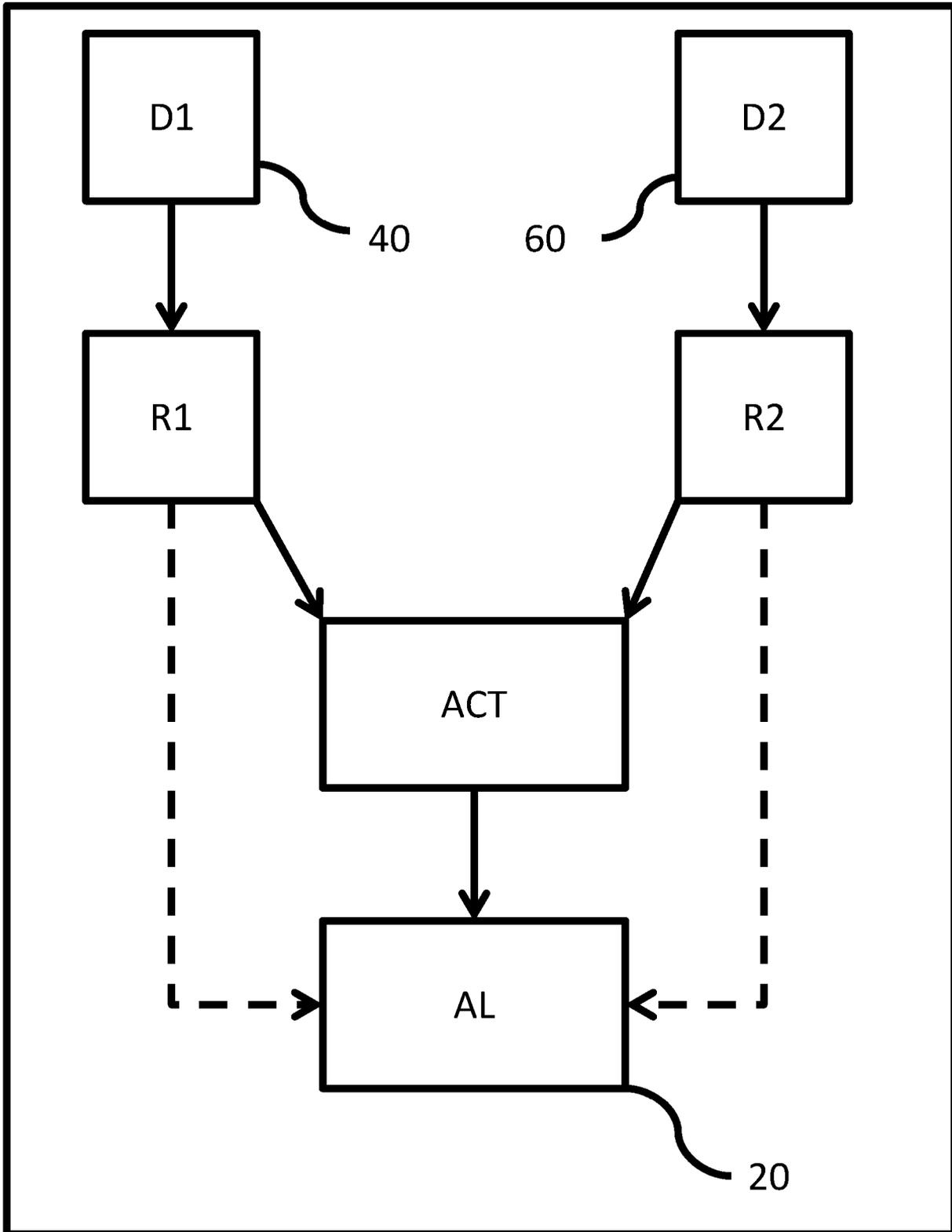


Fig. 3

4/7

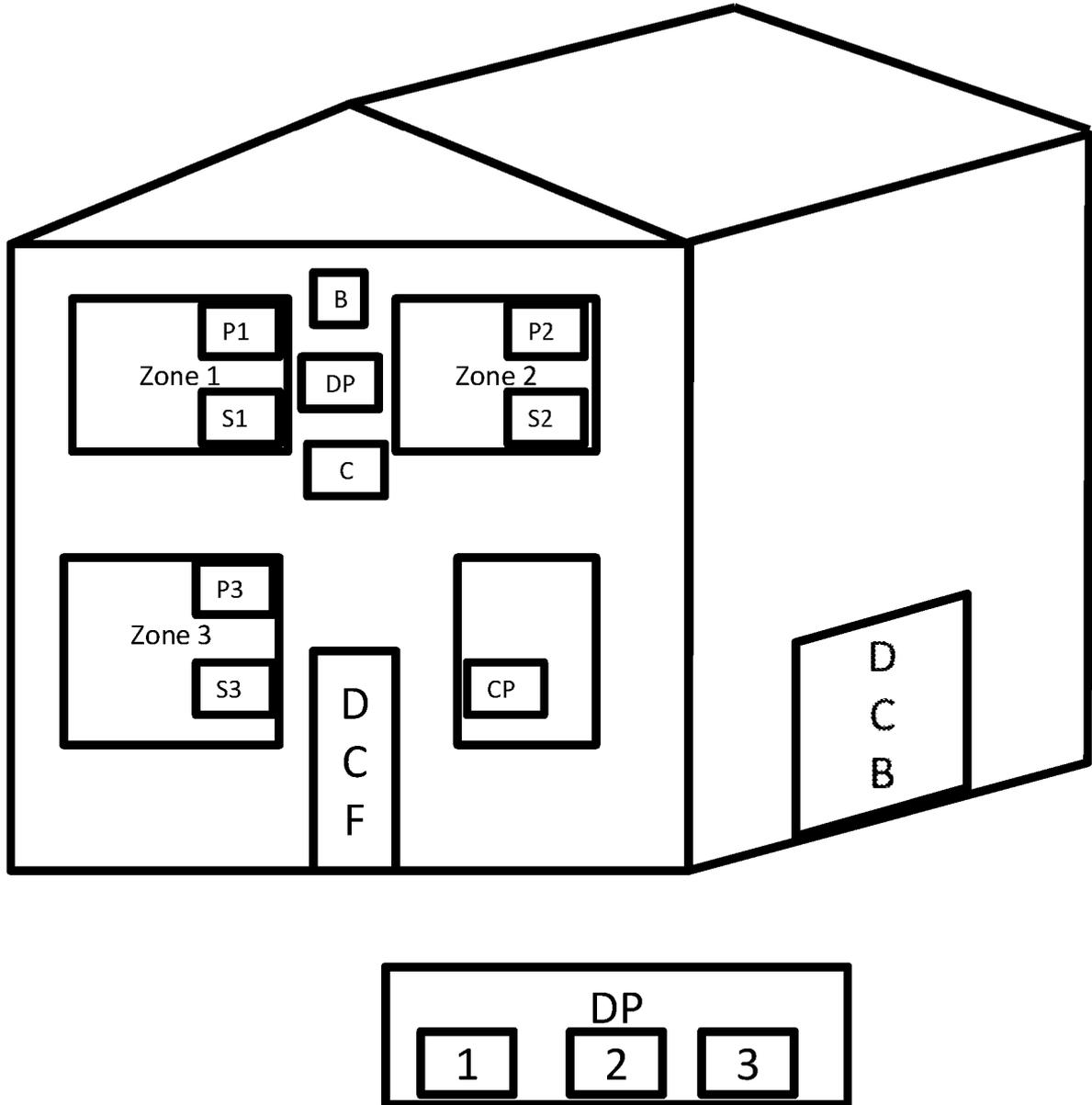


Fig. 4

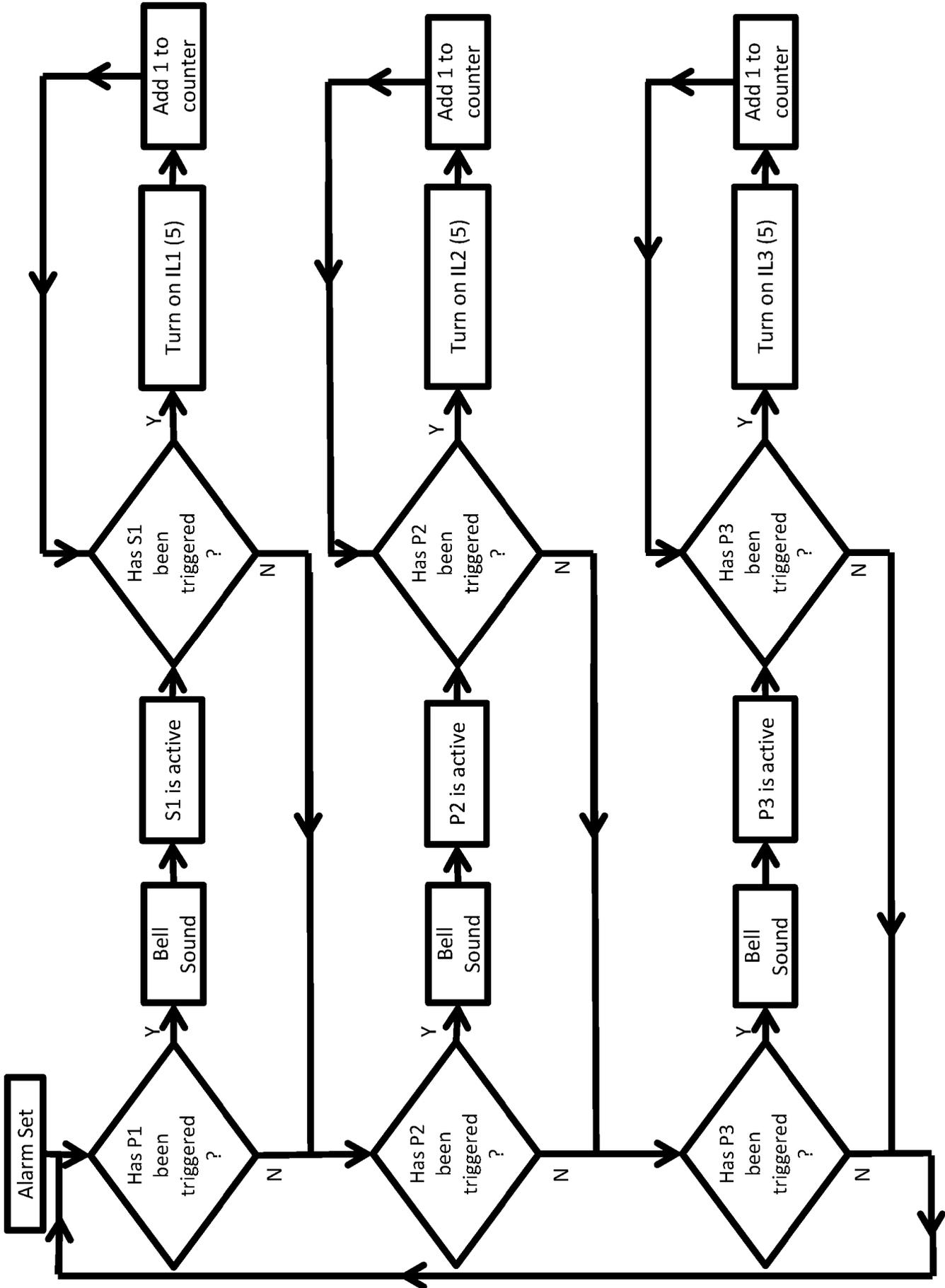
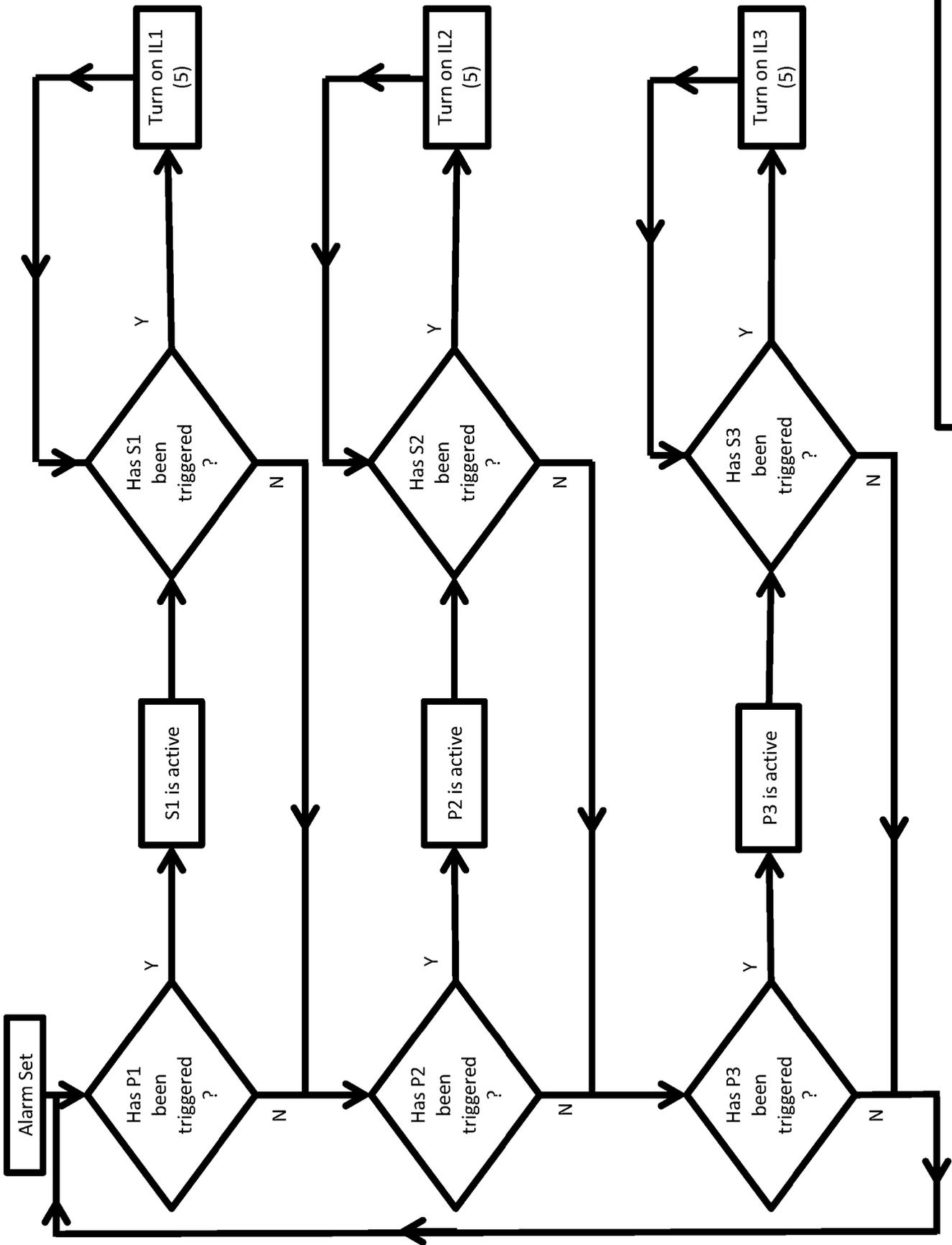


Fig. 5

6/7



Flow chart for the Lights on DP

Fig. 6

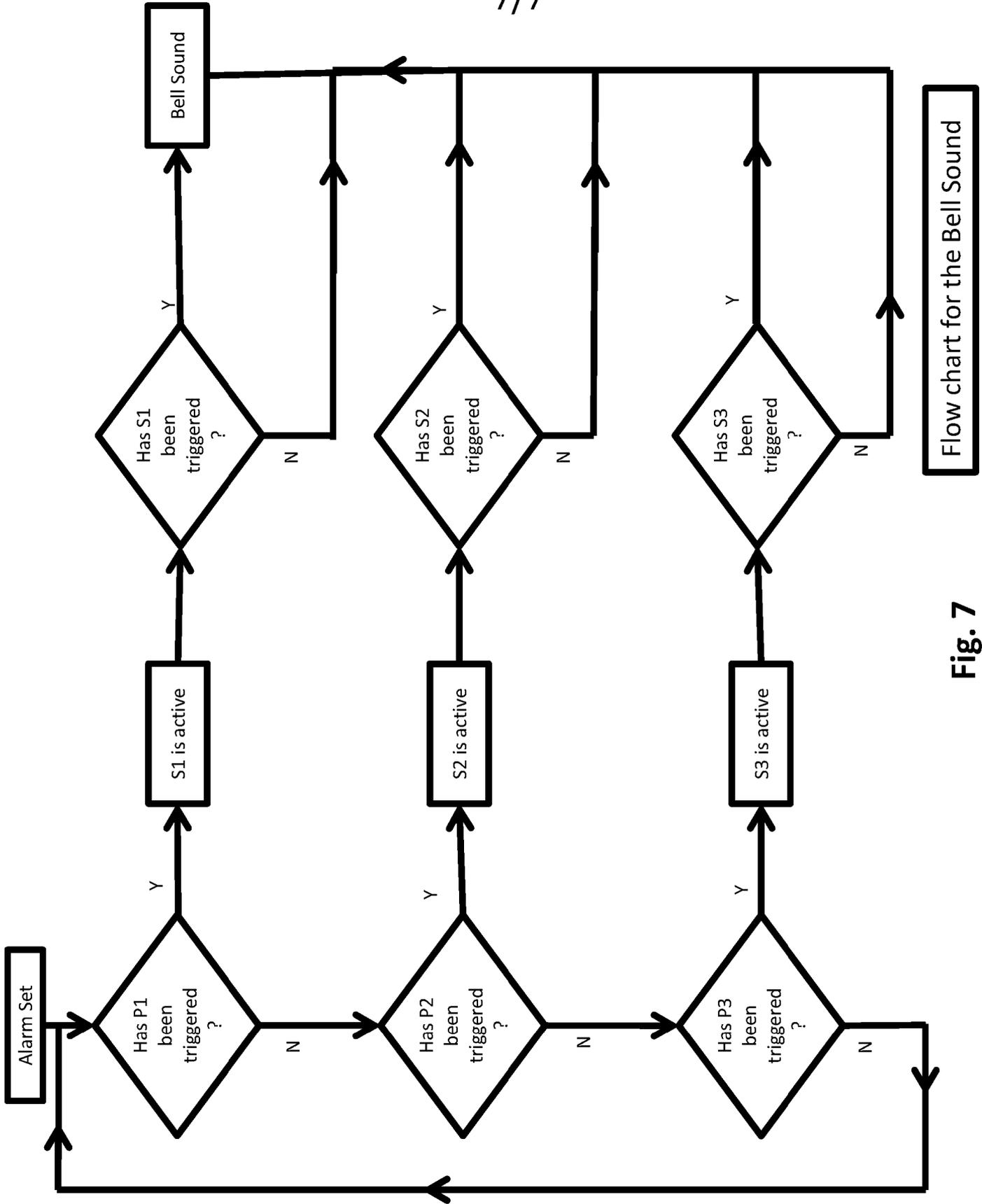


Fig. 7

Flow chart for the Bell Sound

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2017/052878

A. CLASSIFICATION OF SUBJECT MATTER
INV. G08B13/22
ADD. G08B13/16

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)
G08B

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 practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2015/254972 A1 (PATTERSON HAP [US] ET AL) 10 September 2015 (2015-09-10) paragraph [0021] paragraph [0024] - paragraph [0038]; figures 2-4	1-22, 24-27
X	EP 1 107 204 A2 (BARKER CHARLES HAROLD [GB]) 13 June 2001 (2001-06-13) abstract paragraph [0017] - paragraph [0018]; figure 1	1-22, 24-27

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search 18 January 2018	Date of mailing of the international search report 26/01/2018
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Heß, Rüdiger

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2017/052878

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>GB 2 088 107 A (SHORROCK SECURITY SYSTEMS LTD) 3 June 1982 (1982-06-03)</p> <p>abstract page 1, left-hand column, line 29 - right-hand column, line 65; figure 1 page 1, right-hand column, line 79 - line 119</p> <p style="text-align: center;">-----</p>	<p>1,2, 4-22, 24-27</p>
X	<p>US 2005/264413 A1 (ESKILDSEN KENNETH G [US]) 1 December 2005 (2005-12-01)</p> <p>abstract paragraph [0014]; figure 1 paragraph [0017] - paragraph [0021]</p> <p style="text-align: center;">-----</p>	<p>1-22, 24-27</p>

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2017/052878

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2015254972	A1	10-09-2015	EP 3117413 A1 18-01-2017
			US 2015254972 A1 10-09-2015
			US 2016343244 A1 24-11-2016
			WO 2015138284 A1 17-09-2015

EP 1107204	A2	13-06-2001	NONE

GB 2088107	A	03-06-1982	NONE

US 2005264413	A1	01-12-2005	CN 1993719 A 04-07-2007
			EP 1759365 A2 07-03-2007
			US 2005264413 A1 01-12-2005
			WO 2005116949 A2 08-12-2005
