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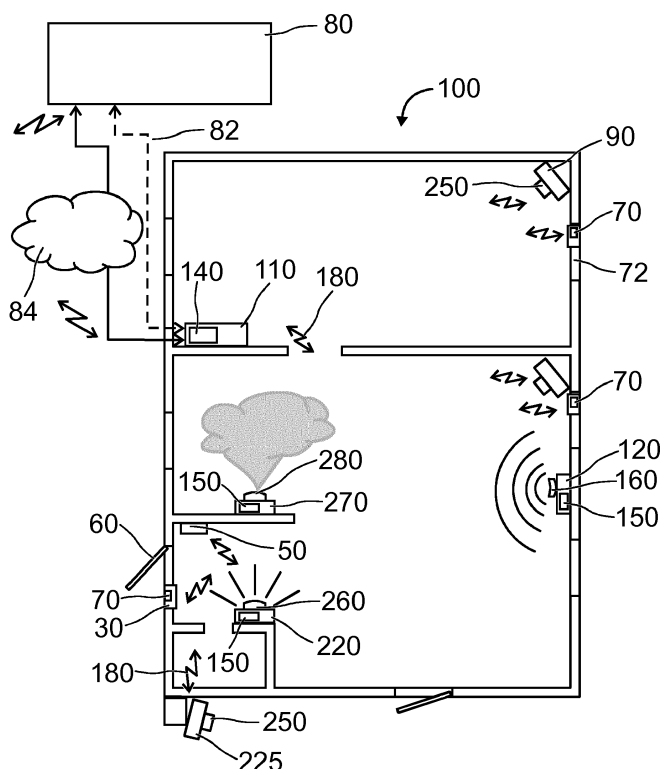
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(54) **AN ALARM SYSTEM AND A METHOD SUITABLE FOR MONITORING A HOME**

(57) An alarm system and method suitable for monitoring a home, the alarm system comprising: central unit and an alarm unit arranged remote from and arranged to communicate with the central unit; and, a detector arranged to communicate with the central unit and arranged to provide an alert signal upon detecting a pos-

sible but unconfirmed alarm event. The alarm system is configured, in response to an alert signal, to set the alarm unit to activate an alarm after a predetermined period of time has elapsed in the event that communication between the alarm unit and the central unit is lost during the predetermined period.



**Fig. 1**

## Description

### TECHNICAL FIELD

**[0001]** The invention relates to an alarm system suitable for monitoring a home. The invention also relates to a method suitable for monitoring of home.

### SUMMARY OF THE INVENTION

**[0002]** The present application discloses an alarm system in accordance with the independent system claim, and a method according to the independent method claim.

**[0003]** In various embodiments, the alarm system comprises a central unit (CU) supervising a plurality of peripheral units that are associated with the CU after a login procedure. Most peripheral units in the alarm system are detectors arranged to detect different kinds of intrusions or intrusion attempts and to send by wireless communication an alert signal to the CU when an alarm event occurs. The CU will send signals to some types of peripheral units, such as alarm units comprising a siren, a lamp and a smoke generating device for generating a local alarm signal. Such peripheral units can be referred to as alarm units. Some peripheral units are detectors arranged to provide an alert signal when there is a possible but unconfirmed alarm event, such as if a person opens a door monitored by a premises perimeter detector or enters an area monitored by an infrared (IR) detector. The CU also can send an alarm signal further on to a central monitoring system where different steps such as sending guards or watchmen to the site are initiated.

**[0004]** According to a first aspect, there is provided an alarm system suitable for monitoring of home, the system comprising:

a central unit and an alarm unit arranged remote from and arranged to communicate with the central unit; and, a detector arranged to communicate with the central unit and arranged to provide an alert signal upon detecting a possible but unconfirmed alarm event, the system being configured, in response to the alert signal, to set the alarm unit to activate an alarm after a predetermined period of time has elapsed in the event that communication between the alarm unit and the central unit is lost during the predetermined period.

**[0005]** In accordance with this aspect, alarms can be activated also in situations where the alarm unit does not receive a signal from the central unit directing it to activate the alarm. Such situations may occur if communication in the alarm system is exposed to jamming or radio disturbance measures. Intentional radio disturbance measures or interference can be caused by a radio jammer that is a device that deliberately blocks, jams or interferes

with authorized wireless communications. In some cases, jammers work by the transmission of radio signals that disrupt communications by decreasing the signal-to-noise ratio. A signal directing the alarm unit to activate the alarm can be prevented from being generated, for instance if the central unit is tampered with.

**[0006]** In various embodiments, there is provided an alarm system wherein the detector is a premises perimeter detector arranged to provide the alert signal when an entrance door is opened. In various embodiments, the detector is a radio frequency signal to noise ratio (S/N) meter arranged to provide an alert signal when radio frequency signal to noise ratio drops below a predetermined threshold.

**[0007]** There is provided also an alarm system wherein the detector is a presence detector arranged to monitor an alert area, and wherein the presence detector is arranged to provide an alert signal when intrusion in the alert area is detected. The alarm system can comprise a plurality of similar or different detectors and combinations of detectors.

**[0008]** In various embodiments, there is provided an alarm system wherein the alarm unit is arranged to provide at least one of an audible alarm, a visible alarm, or to provide smoke as the alarm.

**[0009]** According to a further aspect, there is provided a method suitable for monitoring of home, comprising:

generating an alert signal indicating a possible but unconfirmed alarm event, communicating the alert signal to a central unit, and setting an alarm unit to activate an alarm after a predetermined period of time has elapsed in the event that communication between the alarm unit and the central unit is lost during the predetermined period.

**[0010]** In various embodiments, there is provided an alarm method wherein the alert signal is provided after detecting opening of an entrance door. In various embodiments, there is provided an alarm method wherein the alert signal is provided after detecting a radio frequency signal to noise ratio drop below a predetermined threshold value.

**[0011]** There is also provided an alarm method wherein the alert signal is provided after detecting intrusion in an alert area.

**[0012]** Additional advantages will be set forth in part in the description which follows or may be learned by practice. The advantages will be realized and attained by means of the elements and combinations particularly pointed out in the appended claims.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0013]** The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments and together with the description, serve to explain the principles of the systems and meth-

ods. In the drawings,

Fig. 1 is a schematic diagram of a wireless alarm system having a central unit, at least one detector and at least one alarm unit, and

Fig. 2 is a flowchart showing steps of a method of an alarm system according to Fig. 1.

#### DETAILED DESCRIPTION

**[0014]** The CU and an alarm unit are in communication and the CU is arranged to prevent the alarm unit from triggering an alarm. This is by repeatedly resetting the alarm unit before it reaches triggering of an alarm, when the alarm would otherwise be triggered. However, if the communication is broken then the resetting function cannot happen. As a consequence, the alarm is triggered. Thus, this approach pre-empts future jamming and tampering activities that might interfere with or prevent the communication between the CU and the alarm unit.

**[0015]** Fig.1 shows a schematic diagram of a wireless alarm system 100 having a central unit, CU, 110. The alarm system 100 covers premises, such as a building with a plurality of rooms. The central unit 110 comprises wireless radio communication means arranged to communicate with corresponding wireless radio communication means in peripheral units provided within or adjacent to the premises. Peripheral units comprise detectors and alarm units. The central unit 110 is connected to a central monitoring station 80 either by wire, such as a telephone line as indicated in Fig. 1 with a dashed line 82, or by a wireless telecommunications system such as GSM or other radio frequency systems. The connection also can be through an internet connection 84. When a detector detects a confirmed alarm event, an alert signal is sent to the central unit 110. The central unit 110 communicate a signal to available alarm units to produce an alarm signal, and to the central monitoring system 80.

**[0016]** A first peripheral unit 90 comprises a presence detector such as an IR detector 250 and is arranged to monitor a first monitored area, such as an area where the central unit 110 is arranged. In various embodiments, the central unit 110 is provided with a signal-to-noise meter 140 configured to output an alert signal signal based on the signal-to-noise ratio of a wireless communication 180 between the central unit 110 and peripheral units, falling below a predetermined threshold.

**[0017]** The alarm system 100 can be turned on and off by means of a keypad 50 arranged close to an entrance door 60. Keypad 50 is connected to the central unit 110 through wireless communication means. At the entrance door 60 there is provided a second peripheral unit 30 comprising a premises perimeter detector, such as a magnet sensor 70. The second peripheral unit is connected to the central unit 110 through wireless communication means. The magnet sensor will generate an alert signal indicating a possible but unconfirmed alarm event when entrance door 60 is opened. Further premises pe-

rimeter detectors 70 are arranged at windows 72.

**[0018]** In various embodiments, the central unit 110 is connected also to a third peripheral unit 225 comprising a presence detector provided with an IR detector 250, for monitoring an alert area in the vicinity of an area the alarm system is intended to protect. The third peripheral unit 225 is configured to generate and communicate by wireless connection 180, an alert signal indicating a possible but unconfirmed alarm event based on a detection made by the IR detector 250.

**[0019]** The wireless alarm system further comprises at least one peripheral unit being an alarm unit and arranged to produce an alarm. The central unit 110 is arranged to control triggering of the alarm based on signals from different detectors. The central unit 110 is also arranged to set the alarm unit to activate an alarm after a predetermined period of time has elapsed from the signal from the detector. When there is a possible but unconfirmed alarm event, the central unit prevents the alarm from triggering. This is by repeatedly resetting the alarm before the predetermined period of time has elapsed, when the alarm would otherwise be triggered.

**[0020]** However, if communication between the central unit 110 and the alarm unit is broken then the resetting function cannot happen. The communication can be broken for different reasons, such as a result of jamming measures preventing or disturbing radio communication, or as a result of tampering measures, such as destroying the central unit. In various embodiments, the alarm units are provided with a countdown timer 150. The central unit 110 is configured to restart, repeatedly, the countdown timer of the alarm units before it expires. In the embodiment shown in Fig. 1 there is provided a first alarm unit 120 configured to produce an audible alarm signal, triggered by the countdown timer, with the aid of a siren 160.

**[0021]** The central unit 110 is further configured to communicate with the countdown timer 150 of a second alarm unit 220, to start to count down from a predetermined time, triggered by the output of the alert signal. The second alarm unit 220 is further configured to produce a visible alarm signal, triggered by the countdown timer, with the aid of a flashing light 260.

**[0022]** A third alarm unit 270 comprises a smoke generating device, such a smoke bomb 280. The third alarm unit 270 comprises also a countdown timer 150, and the central unit 110 is further configured to communicate with the third alarm unit 270, to start to count down from a predetermined time, triggered by the output of the alert signal. The central unit is configured to restart, repeatedly, the timer of the third alarm unit 270 before it expires.

**[0023]** In various embodiments, a single peripheral unit provides the functionality of both the alarm unit and the detector. For instance, a peripheral unit comprising a presence detector provided with an IR detector 250 could be combined with an alarm unit configured to produce an audible alarm signal, triggered by the countdown timer, with the aid of a siren 160.

**[0024]** The method of the alarm system as shown in Fig. 2 comprises the following steps:

- generating 310 an alert signal indicative of sign(s) of a possible but unconfirmed alarm event,
- receiving 320 the alert signal by a central unit;
- starting 330 a count-down timer in an alarm unit, the alarm unit also being capable of producing an alarm signal;
- restarting 340 repeatedly the count-down timer before it counts down to zero;
- producing 360 a perceivable audio alarm signal upon detecting 350 the count-down timer counting down to zero.

**[0025]** Generation of the alert signal can be based on a detector output of a detector unit, such as a premises perimeter detector or an infrared detector.

**[0026]** It will be apparent to those skilled in the art that various modifications and variations can be made without departing from the inventive concept. Other embodiments will be apparent to those skilled in the art from consideration of the specification and practice disclosed herein. It is intended that the specification and examples be considered as exemplary only.

## Claims

1. An alarm system suitable for monitoring a home, the alarm system comprising: central unit and an alarm unit arranged remote from and arranged to communicate with the central unit; and, a detector arranged to communicate with the central unit and arranged to provide an alert signal upon detecting a possible but unconfirmed alarm event, the system being configured, in response to an alert signal, to set the alarm unit to activate an alarm after a predetermined period of time has elapsed in the event that communication between the alarm unit and the central unit is lost during the predetermined period.
2. The alarm system of claim 1, wherein the detector is a premises perimeter detector arranged to provide the alert signal when an entrance door is opened.
3. The alarm system of claim 1, wherein the detector is presence detector arranged to monitor an alert area, and wherein the presence detector is arranged to provide an alert signal when intrusion in the alert area is detected.
4. The alarm system of claim 1, wherein the detector is a radio frequency signal to noise ratio (S/N) meter arranged to provide an alert signal when radio frequency signal to noise ratio drops below a predetermined threshold value.

5. The alarm system of any of the preceding claims, wherein the alarm unit comprises a countdown timer set at the predetermined period of time and wherein the central unit is configured to reset the countdown timer at time intervals that are shorter than the predetermined period of time.

6. The alarm system of any of the preceding claims, wherein the alarm unit comprises a siren.

7. The alarm system of any of the preceding claims, wherein the alarm unit is arranged to produce a visible alarm signal.

8. The alarm system of any of the preceding claims, wherein the alarm unit is arranged to produce a smoke as an alarm signal.

9. A method suitable for monitoring a home, comprising:

generating an alert signal indicating a possible but unconfirmed alarm event, communicating the alert signal to a central unit, and setting an alarm unit to activate an alarm after a predetermined period of time has elapsed in the event that communication between the alarm unit and the central unit is lost during the predetermined period.

10. The method of claim 9, further comprising generating the alert signal after detecting the opening of a door.

11. The method of claim 9, further comprising generating the alert signal after detecting intrusion in an alert area.

12. The method of claim 9, further comprising generating the alert signal after detecting drop of a radio frequency signal to noise ratio below a predetermined threshold value.

13. The method of claim 9, further comprising counting down a timer in the alarm unit and communicating a reset signal from the central unit to the alarm unit at time intervals that are shorter than the predetermined period of time.

14. The method of claim 9, further wherein the alarm signal is a sound signal.

15. The method of claim 9, further wherein the alarm signal is a light signal.

16. The method of claim 9, further wherein the alarm signal is generation of smoke.

17. The method of claim 9, further comprising sending

information associated with the alert signal to a central monitoring station.

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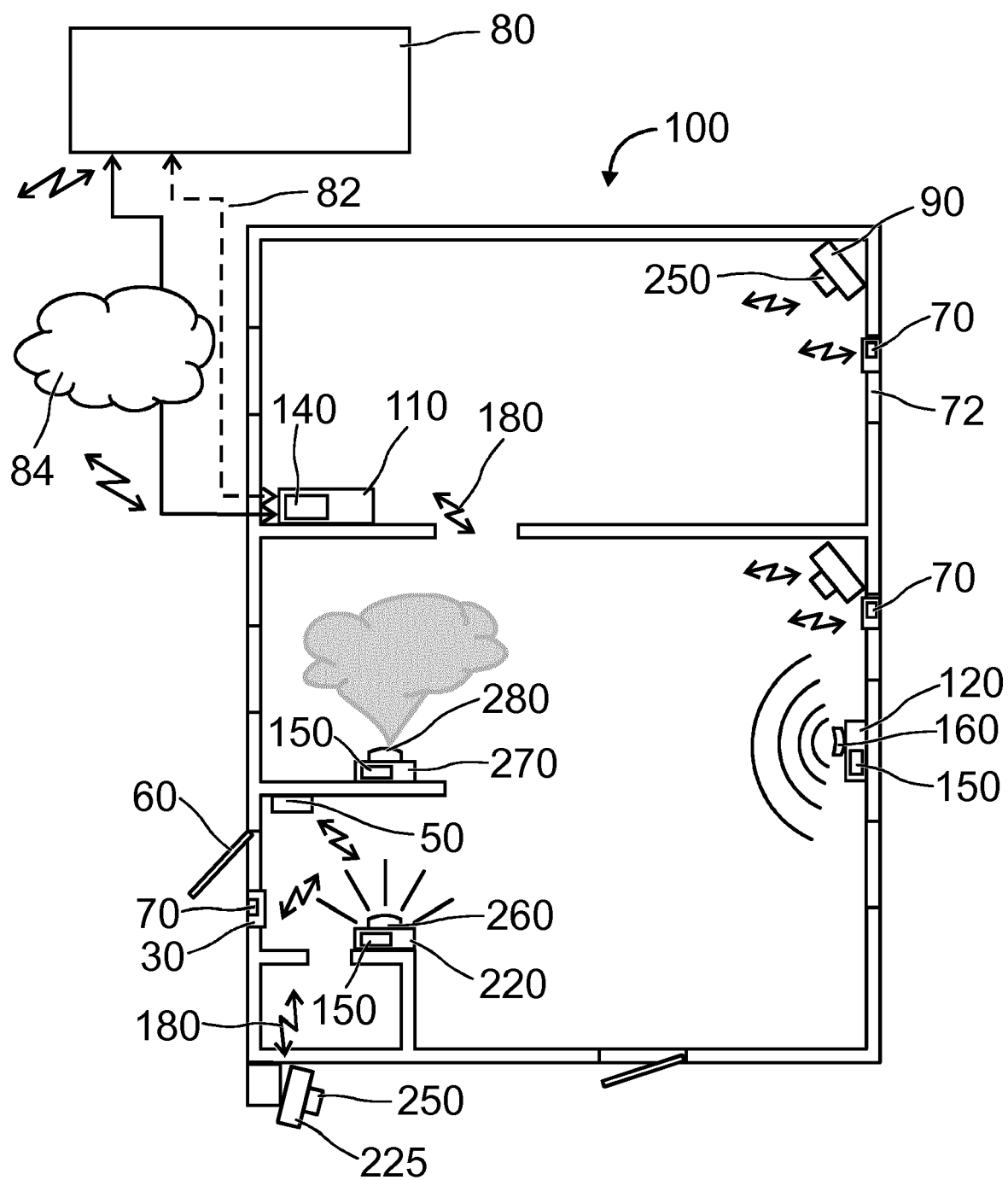
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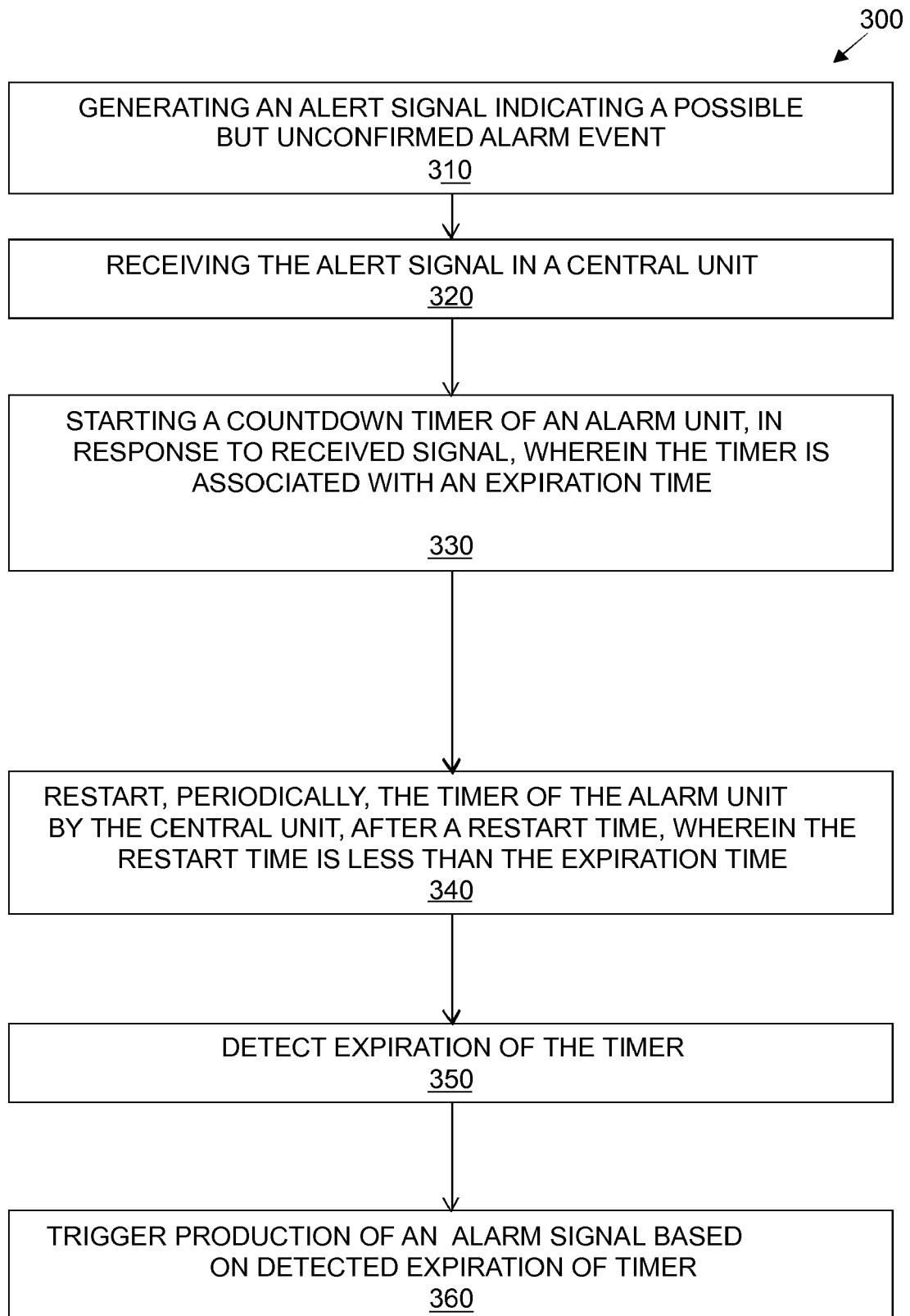
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*Fig. 1*

*Fig. 2*



## EUROPEAN SEARCH REPORT

Application Number  
EP 18 16 0264

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The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>2 August 2018</b>	Examiner <b>Dascalu, Aurel</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03/82 (P04C01)



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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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