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**(54) Remote monitoring system of cooling apparatus**

Fernüberwachungssystem für Kühlgerät

Système de surveillance à distance pour un dispositif de refroidissement

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## Description

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

**[0001]** The present invention relates to a remote monitoring system of a cooling apparatus, which selects/reports a content of an abnormal operation condition of either an air conditioner or a cooling apparatus (device) to a remote monitoring terminal unit for performing a concentration monitoring operation.

#### 2. Description of the Related Art

**[0002]** Fig. 13 is a schematic diagram for representing, for instance, the remote monitoring system of the air conditioner disclosed in Japanese Laid-open Patent Application No. 4-106359 opened in 1992. In this drawing, reference numerals 1A to 1C indicate indoor units; reference numbers 2A to 2C denote outdoor units; reference numeral 19 shows a control signal line connected among the respective indoor units and the respective outdoor units; reference numerals 17A to 17c indicate indoor control apparatus provided with each of the indoor units; reference numerals 18A to 18C show outdoor control apparatus provided with each of the outdoor units 2A to 2C; reference numeral 21 is a local monitoring apparatus installed near the air conditioner; and reference numeral 20 indicates a detection signal line provided for monitoring a condition of the air conditioner by the local monitoring apparatus 21. Also, reference numeral 22 shows a signal line such as RS232C used to connect a modem 23 to the local monitoring apparatus 21; reference numeral 27 indicates a remote monitoring apparatus for monitoring conditions in a remote manner; reference numeral 26 is a signal line such as RS232C used to connect another modem 25 to the remote monitoring apparatus 27; and reference numeral 24 shows a public line.

**[0003]** Now, a description is made of operations of this remote monitoring system. As indicated in Fig. 12, the local monitoring apparatus 21 acquires from the signal line 19, various abnormal signals flowing through the control signal line 19 connected between the indoor unit 1 and the outdoor unit 2 together with an exhausting temperature of a compressor corresponding to operation data. Then, the local monitoring apparatus 21 transmits the acquired data/signal via the modem 23, the public line 24, and the modem 25 to the remote monitoring apparatus 27. As a consequence, the operation data, the abnormal signal, and the like are monitored by the remote monitoring apparatus 27 so as to remote-monitor the operation conditions of the air conditioner.

**[0004]** It should be noted that the abnormal signal of the indoor unit and the outdoor unit of each air conditioner is reported by the local monitoring apparatus 21 to the remote monitoring apparatus 27 every time the

abnormal operation happens to occur.

**[0005]** As previously described, in the conventional remote monitoring system for the cooling apparatus, the abnormal signals of the indoor units and the outdoor units of the air conditioners are reported in combination with the data group indicative of the operation conditions monitored via the transfer line every time the abnormal operations happen to occur. Therefore, in particular, when continuous abnormal operation occurs, the transfer amount of the line is increased, and thus the workload of processing the information is increased. There is a problem that it is required to use the apparatus having the large capacity.

**[0006]** Also, since no clear discrimination is made between the temporal abnormal operation caused by changes in the natural environment conditions and the continuous abnormal operation, there is another problem that even such an abnormal operation which need not require repair services is transferred.

### SUMMARY OF THE INVENTION

**[0007]** The present invention has been made to solve these problems, and therefore, has an object to provide a remote monitoring system for a cooling apparatus, having a high reliability in low cost, and capable of correctly grasping an actual abnormal operation condition, while suppressing a report of troubleless abnormal operation frequently occurred so as to reduce a signal transfer amount of a line.

**[0008]** In accordance with an aspect of the present invention, a remote monitoring system of a cooling apparatus is comprised of: an operation monitoring apparatus connected via a transfer line to each of an indoor unit and an outdoor unit of a cooling apparatus, for reporting an operation condition of the indoor unit or the outdoor unit; and a remote monitoring terminal unit connected via a transfer path such as a public line to this operation monitoring apparatus, for monitoring the operation condition of the indoor unit or the outdoor unit based upon the reporting result of the operation monitoring apparatus; wherein: the operation monitoring apparatus includes: abnormal operation detecting means for detecting an abnormal operation content of the indoor unit or the outdoor unit; and report judging means for comparing the abnormal operation content detected by this abnormal operation detecting means with a past abnormal operation content to judge whether or not the detected abnormal operation content is identical to the past abnormal operation content; and when the detected abnormal operation content is identical to the past abnormal operation content, the operation monitoring apparatus does not report the detected abnormal operation content to the remote monitoring terminal unit.

**[0009]** Also, according to another aspect of the present invention, a remote monitoring system of a cooling apparatus is comprised of: an operation monitoring apparatus connected via a transfer line to each of an

indoor unit and an outdoor unit of a cooling apparatus, for reporting an operation condition of the indoor unit or the outdoor unit; and a remote monitoring terminal unit connected via a transfer path such as a public line to this operation monitoring apparatus, for monitoring the operation condition of the indoor unit or the outdoor unit based upon the reporting result of the operation monitoring apparatus; wherein: the operation monitoring apparatus includes: abnormal operation detecting means for detecting an abnormal operation content of the indoor unit or the outdoor unit; and report judging means for comparing the abnormal operation content detected by this abnormal operation detecting means with a past abnormal operation content to judge whether or not the detected abnormal operation content is identical to the past abnormal operation content as to the same unit; and when the detected abnormal operation content is identical to the past abnormal operation content as to the same unit, the operation monitoring apparatus does not report the detected abnormal operation content to the remote monitoring terminal unit.

**[0010]** Also, the above-described operation monitoring apparatus further comprises: detecting time judging means for judging as to whether or not the same abnormal operation occurrence times reach a preset abnormal operation occurrence time based upon the judgment result of the report judging means; and when the same abnormal operation occurrence times reach the preset abnormal operation occurrence time, this abnormal operation content is reported to the remote monitoring terminal unit.

**[0011]** Also, the above-described operation monitoring apparatus further comprises: a timer for notifying a time instant; and when it is so judged that the abnormal operation content is identical to the past abnormal operation content based on the time instant notified from the timer and the judgment result of the report judging means, report selecting means for judging as to whether or not the time when this same abnormal content is again produced is present preset report prohibiting time; if the time when this same abnormal content is again produced exceeds the preset report prohibiting time, this same abnormal content is reported to the remote monitoring terminal unit.

**[0012]** Also, the above-described operation monitoring apparatus further comprises: a timer for notifying a time instant; and clear judging means for judging as to whether or not time lapse of the abnormal operation content exceeds preset clear time based on the time instant notified from the timer; when the time lapse of the abnormal operation content exceeds the preset clear time, this exceeded abnormal operation content is deleted.

**[0013]** Also, according to another aspect of the present invention, a remote monitoring system of a cooling apparatus is comprised of: an operation monitoring apparatus connected via a transfer line to each of an indoor unit and an outdoor unit of a cooling apparatus, for reporting an operation condition of the indoor unit or

the outdoor unit; and a remote monitoring terminal unit connected via a transfer path such as a public line to this operation monitoring apparatus, for monitoring the operation condition of the indoor unit or the outdoor unit based upon the reporting result of the operation monitoring apparatus; wherein: the operation monitoring apparatus includes: a timer for notifying a time instant; abnormal operation detecting means for detecting an abnormal operation content of the indoor unit or the outdoor unit; report judging means for comparing the abnormal operation content detected by this abnormal operation detecting means with a past abnormal operation content to judge whether or not the detected abnormal operation content is identical to the past abnormal operation content; and when it is so judged that the abnormal operation content is identical to the past abnormal operation content based on the time instant notified from the timer and the judgment result of the report judging means, report selecting means for judging as to whether or not the time when this same abnormal content is again produced is present preset report prohibiting time; and clear judging means for judging as to whether or not time lapse of the abnormal operation content exceeds preset clear time based on the time instant notified from the timer; after the identical abnormal operation content is reported, this abnormal operation content is deleted.

**[0014]** Also, the above-described operation monitoring apparatus is further comprised of clear means for deleting the abnormal operation content, whereby the abnormal operation content can be deleted.

**[0015]** Also, the above-described remote monitoring terminal unit is further comprised of means for changing the preset report prohibit time of the report selecting means.

**[0016]** Also, the above-described remote monitoring terminal unit is further comprised of means for changing the preset clear time of the clear judging means.

**[0017]** Also, a plurality of the remote monitoring terminal units are provided; and depending on the abnormal condition of the operation conditions of the indoor unit and the outdoor unit, the abnormal operation conditions are reported from the operation monitoring apparatus to any one of the plural remote monitoring terminal units.

**[0018]** The above and other objects and features of the present invention will be more apparent from the following description taken in conjunction with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0019]**

Fig. 1 is a block diagram for showing a system arrangement of the present invention;

Fig. 2 is a block diagram for indicating an arrangement of a monitoring apparatus;

Fig. 3 is a diagram for representing a flow operation

after an abnormal operation is detected until this abnormal operation is reported, according to the present invention;

Fig. 4 is a block diagram of a monitoring apparatus according to an embodiment 1 of the present invention;

Fig. 5 is a diagram for representing a flow operation after an abnormal operation is detected until this abnormal operation is reported in an embodiment 2 of the present invention;

Fig. 6 is a block diagram of a monitoring apparatus according to an embodiment 3 of the present invention;

Fig. 7 is a diagram for representing a flow operation after an abnormal operation is detected until this abnormal operation is reported in the embodiment 3 of the present invention;

Fig. 8 is a diagram for showing a flow operation for deleting a temporarily stored abnormal operation content from storage means in the embodiments 3 and 4 of the present invention;

Fig. 9 is a block diagram of a monitoring apparatus according to an embodiment 5 of the present invention;

Fig. 10 is a diagram for representing a flow operation after an abnormal operation is detected until this abnormal operation is reported in the embodiment 5 of the present invention;

Fig. 11 is a block diagram of a monitoring apparatus according to an embodiment 6 of the present invention;

Fig. 12 is a diagram for showing an example of an arrangement of reporting destination designating means in the embodiment 6 of the present invention; and

Fig. 13 is the structural diagram for representing the conventional remote monitoring system.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0020]** Now, a description will be given in more details of preferred embodiments of the present invention with reference to the accompanying drawings.

(Embodiment 1)

**[0021]** Fig. 1 is a block diagram for showing an arrangement of a remote monitoring system according to embodiments 1 to 5 of the present invention. In this drawing, reference numerals 1A to 1C show each of indoor units, and reference numerals 2A to 2C indicate each of outdoor units. The operations of these indoor units and outdoor units are controlled by transmitting/receiving data via transfer lines 8A to 8E. Reference numeral 3 shows a monitoring apparatus connected via a transfer line 9 to the above-described air conditioners so as to establish communications with the respective

air conditioners, and capable of monitoring operation conditions of the air conditioners connected via a modem 4 to a public line 5.

**[0022]** Reference numerals 7A to 7C indicate remote monitoring computers connected via the public line 5 by way of the respective modems 6A to 6E to be communicated with an operation monitoring apparatus 3. The remote monitoring computers correspond to remote monitoring terminal units for displaying/editing the acquired information.

**[0023]** It should be noted that although 3 sets of the indoor units and the outdoor units are employed, the present invention is not limited to these quantities. Also, the total number of the remote monitoring terminal units is not limited to this embodiment.

**[0024]** Also, Fig. 2 is a block diagram for representing an internal arrangement of the monitoring apparatus according to this embodiment 1. A remote monitoring controller corresponding to the operation monitoring apparatus 3 for outputting operation conditions of the indoor units and the outdoor units of the air conditioners shown in this drawing is arranged by air conditioner communication means 12 for performing a data conversion so as to be communicated with the air conditioner; public line communication means 13 for performing a data conversion in order to be communicated via the public line with the remote monitoring terminal unit; clear means 14 for clearing an abnormal operation content stored in a storage means (will be explained later); and also a microcomputer 11 for controlling the monitoring apparatus.

**[0025]** Also, the microcomputer 11 is equipped with abnormal operation detecting means 11a for detecting an abnormal operation of each of the air conditioners; report judging means 11d for judging as to whether or not the detection result of this abnormal operation detecting means is reported; reporting means 11b for reporting the judgment result of this report judging means 11d to the remote monitoring terminal unit 7; and storage means 11c for temporarily storing the content reported by this reporting means.

**[0026]** It should also be noted that the report judging means 11d reports the detection report of the abnormal operation detecting means when judging that the abnormal operation detection result is not equal to the same abnormal operation content of the same unit based upon the storage result of the storage means 11c, whereas the report judging means 11d does not report the detection report when judging that the abnormal operation detection result is equal to the same abnormal operation content of the same unit.

**[0027]** Next, operations of the operation monitoring apparatus will be described with reference to Fig. 1, Fig. 2, and Fig. 3. It should be understood that Fig. 3 is a diagram for representing an example of a flow operation of the abnormal operation reporting process executed in this embodiment 1.

**[0028]** First, when the operation monitoring apparatus 3 detects an abnormal operation condition of each of the

air conditioners under monitoring operation by the abnormal operation detecting means 11a (step S1), the report judging means 11d retrieves the abnormal operation content of this air conditioner from the storage results of the storage means 11c based on this detection result (step S2).

**[0029]** Next, the report judging means 11d compares this retrieved result with the content of the detection result to thereby judge as to whether or not this retrieved result is equal to the same abnormal operation content of the same unit (step S3).

**[0030]** If the retrieved result is not equal to the same abnormal operation content of the same unit, then this abnormal operation content is reported to the reporting means 11b and the storage means 11c. As a result, this abnormal operation content is transmitted via the public line to the remote monitoring terminal unit 7, and also is stored in the storage means 11c (steps S4 and S5).

**[0031]** Conversely, if the retrieved result is equal to the same abnormal operation content of the same unit, then the report judging means 11d does not report (output) this same abnormal operation content of the same unit to the reporting means 11b and the storage means 11c. As a consequence, this same abnormal operation content is not reported via the public line to the remote monitoring terminal unit 7, but also is not stored in the storage means 11c (step S6).

**[0032]** It should be noted that after the process operations defined at the steps S5 and S6 have been executed, this flow operation is returned to the first step S1.

**[0033]** As previously explained, since the same abnormal operation content of the same unit which has been once reported is not reported to the remote monitoring terminal unit, while the transfer amount of the transfer line can be reduced, the actual abnormal operation can be correctly grasped and monitored. Accordingly, such a low-cost remote monitoring system having high reliability for the cooling apparatus can be accomplished which is suitable for a building accommodated with a plurality of air conditioners.

**[0034]** In the case that the abnormal operation condition is solved by a serviceman, if the abnormal operation content stored in the storage means 11c can be cleared by the abnormal operation content clear means 14, then when the same abnormal operation subsequently happens to occur, the monitoring apparatus reports this same abnormal operation to the remote monitoring terminal unit. As a consequence, it is also possible to accomplish a high-reliable remote monitoring system with easy operation for the cooling apparatus, which can check as to whether or not the repair is completed, and whether or not the repair operation can give the good result.

(Embodiment 2)

**[0035]** Fig. 4 is a block diagram for representing an arrangement of an operation monitoring apparatus ac-

cording to an embodiment 2 of the present invention. In addition to the arrangement shown in the embodiment 1, the operation monitoring apparatus of the drawing is equipped with the reporting means 11b, the storage means 11c, and a timer 15 for producing a time instant to report selecting means 11e and the like (will be explained later). Also, the microcomputer 11 is equipped with, in addition to the arrangement shown in the embodiment 1, data rewriting means 11f, and report selecting means 11e. The data rewriting means 11f rewrites the data stored in the storage means every time preselected time has passed. When the report judging means 11d judges that the same abnormal operation of the same unit is present in the storage means, the report selecting means 11e further investigates time elapsed from the previous reporting time instant so as to judge as to whether or not preselected time has passed. Also, only when the preselected time has passed, this report selecting means 11e issues the report.

**[0036]** It should be noted that in addition to the abnormal operation contents, the reporting time instant produced from the timer 15 is stored into the storage means 11c according to this embodiment.

**[0037]** Referring now to Fig. 5, operations of the operation monitoring apparatus according to the embodiment 2 will be explained.

**[0038]** First, when the operation monitoring apparatus 3 detects an abnormal operation condition of each of the air conditioners under monitoring operation by the abnormal operation detecting means 11a (step S11), the report judging means 11d retrieves the abnormal operation content of this air conditioner from the storage results of the storage means 11c based on this detection result (step S12).

**[0039]** Next, the report judging means 11d compares this retrieved result with the content of the detection result to thereby judge as to whether or not this retrieved result is equal to the same abnormal operation content of the same unit (step S13).

**[0040]** If the retrieved result is not equal to the same abnormal operation content of the same unit, then this abnormal operation content is reported to the reporting means 11b and the storage means 11c. As a result, this abnormal operation content is transmitted via the report selecting means 11e and the public line to the remote monitoring terminal unit 7, and also is stored in the storage means 11c (steps S14 and S15).

**[0041]** It should be noted that at this time, since the time instant is produced from the timer 15 to be supplied to the reporting means 11b and the storage means 11c, the reporting means 11b also reports such a time instant when the abnormal operation happens to occur. Also, the storage means 11c stores therein the abnormal operation content and this time instant when the abnormal operation happens to occur.

**[0042]** Conversely, if the retrieved result is equal to the same abnormal operation content of the same unit, then the report judging means 11d does not report this

abnormal operation content to the reporting means 11b and the storage means 11c, but reports this abnormal operation content to the report selecting means 11e (step S16).

**[0043]** In response to this report, the report selecting means 11e calculates a time difference between the previous reporting time instant stored in the storage means 11c and the present time instant produced from the timer 15, and then compares this calculation result with preset report prohibit time "T1". When the time difference (recurrence time) between the previous reporting time instant and the present time instant exceeds the report prohibit setting time "T1", as a result of this comparison, the report selecting means 11e reports both the present time instant and the abnormal operation content to the reporting means 11b and the rewriting means 11f.

**[0044]** As a consequence, the reporting means 11b again sends the present time instant and the same abnormal operation content to the remote monitoring terminal unit 7.

**[0045]** Also, since the rewriting means 11f rewrites the previous time instant of the storage means 11c into the present time instant, the storage means 11c stores therein the present time instant, and such a fact that the previous abnormal operation content occurs at the present time instant (steps S17 and S18).

**[0046]** Also, if the time difference between the previous reporting time instant and the present time instant does not exceed the report prohibit setting time T1, then both the present time instant and the abnormal operation content are not reported to the reporting means 11b and the rewriting means 11f. Accordingly, both the previous time instant and the abnormal operation content are stored in the storage means 11c (step S19).

**[0047]** After the process operations defined at the steps S18 and S19 are completed, the flow operation is returned to the first step S1.

**[0048]** As previously explained, with respect to the abnormal operation once reported, this abnormal operation is reported after the time difference (recurrence time) between the previous reporting time instant and the previous time instant exceeds the report prohibit setting time T1. As a consequence, such temporal abnormal operations caused by changes in weather and environments (rain, wind, snow) are not reported to the remote monitoring terminal unit. That is, for instance, in particular, the temperature around the installation place of the outdoor units is increased due to some weather and environmental conditions. Thus, the heat radiation performance of the radiator plate of the outdoor unit is deteriorated, so that the operation of the outdoor unit is stopped under abnormal condition. Thereafter, the deteriorated heat radiation performance is improved due to changes in the succeeding weather and environmental conditions, so that the automatic recovery operation can be performed. Also, if the manual recovery operation can be performed, no abnormal operation is reported to the remote monitoring terminal unit. On the other

hand, the continuous abnormal operation is reported. As a consequence, it is possible to provide a low-cost remote monitoring system having high reliability for the cooling apparatus, which can correctly separate the temporal abnormal operation from the continuous abnormal operation and can correctly monitor this continuous abnormal operation, while reducing the total number of reporting the abnormal operations.

**[0049]** When the report prohibit setting time T1 may be set depending upon the content of the abnormal operation, this report prohibit setting time is variable depending upon the use conditions of the air conditioner, and the contents of the abnormal operations. Therefore, it is possible to obtain a more useful remote monitoring system for the cooling apparatus.

**[0050]** Also, if the report prohibit setting time T1 may be arbitrarily set by way of the remote monitoring terminal 7, then the use condition of the air conditioner and the content of the abnormal operation can be varied even when the operator goes to the installation place of the air conditioner. As a result, it is possible to provide a more useful remote monitoring system for the cooling apparatus.

(Embodiment 3)

**[0051]** Fig. 6 is a block diagram for indicating an arrangement of a monitoring apparatus according to an embodiment 3 of the present invention. Instead of the report selecting means employed in the arrangement of the embodiment 2, a clear judging means is provided, and furthermore, a clear means 11h is employed instead of the rewriting means 11f. The clear judging means 11g judges as to whether or not the difference between the previous reporting time instant stored in the storage means and the present reporting time instant has elapsed preset clear time T2. The clear means 11h automatically clears the content stored in the storage means 11c based on the judgment result of this clear judging means 11g when the time difference between the previous reporting time instant and the present reporting time instant exceeds the preset clear time T2.

**[0052]** Next, a description will now be made of operations of this embodiment 3 with reference to Fig. 7 and Fig. 8.

**[0053]** First, when the operation monitoring apparatus 3 detects an abnormal operation condition of each of the air conditioners under monitoring operation by the abnormal operation detecting means 11a (step S21), the report judging means 11d retrieves the abnormal operation content of this air conditioner from the storage results of the storage means 11c based on this detection result (step S22).

**[0054]** Next, the report judging means 11d compares this retrieved result with the content of the detection result to thereby judge as to whether or not this retrieved result is equal to the same abnormal operation content of the same unit (step S23).

**[0055]** If the retrieved result is not equal to the same abnormal operation content of the same unit, then this abnormal operation content is reported to the reporting means 11b and the storage means 11c. As a result, this abnormal operation content is transmitted via the public line to the remote monitoring terminal unit 7, and also is stored in the storage means 11c (steps S24 and S25).

**[0056]** It should be noted that at this time, since the time instant is produced from the timer 15 to be supplied to the reporting means 11b and the storage means 11c, the reporting means 11b also reports such a time instant when the abnormal operation happens to occur. Also, the storage means 11c stores therein the abnormal operation content and this time instant when the abnormal operation happens to occur.

**[0057]** Conversely, if the retrieved result is equal to the same abnormal operation content of the same unit, then the report judging means 11d does not report this same abnormal operation content of the same unit to the reporting means 11b and the storage means 11c (step S26).

**[0058]** It should be understood that the clear judging means 11g will check the time lapse of the abnormal operation content stored in the storage means 11c and detected by the detecting means based upon the time instant produced from the timer 15 every predetermined time.

**[0059]** In other words, as represented in Fig. 8, with respect to each of the abnormal operation contents of the respective air conditioners stored in the storage means 11c, the clear judging means 11g calculates a time difference (time lapse) between this reporting time instant and the time instant produced from the timer 15, and compares this calculation result with the preset clear time T2. Based on this comparison result, when the time difference exceeds the preset clear time T2, the clear judging means 11g reports the time up content to the clear means 11h (steps S31 and S32).

**[0060]** In response to this report, the clear means 11h clears the abnormal operation content thereof and the reporting time instant stored in the storage means 11c. That is to say, the clear means 11h deletes the abnormal operation content exceeding the preset clear time T2 from the storage means 11c, and the flow operation is returned to the first step (step S33).

**[0061]** It should be understood that when the time lapse (time difference) from the reporting time instant does not exceed the set clear time T2, since no time up content is reported to the clear means 11h, both the abnormal operation content and the reporting time instant are directly saved which have been stored in the storage means 11c and do not exceed this set clear time T2.

**[0062]** As previously explained, when the time lapse after the reporting time instant exceeds the set clear time T2 with respect to each of the abnormal operation contents of the air conditioner, since this abnormal operation content is deleted, the waste content is not stored. In particular, even when the temporal abnormal

operation with the less significant degree is changed into the abnormal operation with the significant degree, it is possible to provide a highly reliable remote monitoring system for the cooling apparatus, which can correctly grasp and monitor the abnormal operation.

**[0063]** Also, when the clear time T2 of the clear judging means 11g can be set, this clear time is variable depending upon the use conditions of the air conditioner, and the contents of the abnormal operations. Therefore, it is possible to obtain a more useful remote monitoring system for the cooling apparatus.

**[0064]** Also, if the preset clear time T2 may be arbitrarily set by way of the remote monitoring terminal 7, then this preset clear time T2 can be varied based on the use condition of the air conditioner and the content of the abnormal operation even when the operator goes to the installation place of the air conditioner. As a result, it is possible to provide a more useful remote monitoring system for the cooling apparatus.

(Embodiment 4)

**[0065]** As previously described in the embodiment 3, in accordance with this embodiment 4, instead of the report selecting means 11e employed in the embodiment 2, a clear judging means 11g is employed. This clear judging means 11g judges as to whether or not the time lapse after the abnormal operation stored in the storage means has been reported passes through the preset clear time "T2". In addition to the arrangement of the embodiment 2, both the clear judging means 11g and the clear means 11h are merely added. However, such a clear means 11h is not employed instead of the rewriting means. This clear means 11h automatically clears the storage content of the storage means 11c when the time lapse after the report exceeds the preset clear time T2 based on the judgment result of this clear judging means 11g.

**[0066]** At this time, operations of this embodiment 4 are given as follows. That is, in such a case that the report judging means 11d judges that the time lapse after the report is located within judging time "T3" set longer than, or equal to the report prohibit time T1 and shorter than, or equal to the clear time T2, and also the content of this report is identical to the same content of the same unit, the report judging means 11d reports to the report selecting means 11e. The subsequent operation is identical to the operation as explained with reference to the embodiment 2. Also, when the time after the report exceeds the judging time T3, the report judging means 11d reports to the clear judging means 11g. Thereafter, the subsequent operation is identical to the operation as described with reference to the embodiment 3.

**[0067]** It should be understood that since the preceding operation has been explained in the embodiment 2, no further explanation thereof is made in this specification.

**[0068]** As previously explained, when the report judg-

ing means judges that the time after the report is located within the judging time T3, and also the content of this report is the same content of the same unit, this report judging means reports to the report selecting means. When the report judging means judges that the time after the report exceeds the judging time T3, this report judging means reports to the clear judging means. In particular, when the continuous abnormal operation with the significant degree happens to occur, this continuous abnormal operation is firmly reported and then deleted, so that the remote monitoring system with higher reliability can be obtained.

**[0069]** It should be noted that when the clear time T2 is merely set longer than the report prohibit time T1, a similar effect may be apparently achieved without providing the judging time T2.

(Embodiment 5)

**[0070]** Fig. 9 schematically indicates an arrangement of an operation monitoring apparatus according to an embodiment 5 corresponding to "3" of the present invention. The arrangement of this embodiment 5 is made by adding to the arrangement of the embodiment 3, a detecting time judging means 11i for judging as to whether or not a detecting time is reached to a preset time "N". This preset time "N" is retrieved from the storage region of the storage means 11c, while this storage means 11c temporarily stores the same abnormal operation content of the same unit and the detecting time thereof.

**[0071]** Next, operations in this embodiment 5 will now be described with reference to Fig. 10. When the abnormal operation detecting means 11a detects an abnormal operation condition of each of the air conditioners under monitoring operation (step S41), the report judging means 11d retrieves the abnormal operation content of this air conditioner from the storage results of the storage means 11c based on this detection result (step S42).

**[0072]** Next, the report judging means 11d compares this retrieved result with the content of the detection result to thereby judge as to whether or not this retrieved result is equal to the same abnormal operation content of the same unit. If the retrieved result content is equal to the same abnormal operation content, then the report judging means 11d instructs a rewriting means (not shown) of the storage means to increment this detecting time of the storage means, and further instructs the detecting time judging means 11i to execute the judgment (step S43 and S44).

**[0073]** At this time, the report judging means 11d judges as to whether or not the detection result content is equal to the same abnormal operation content of the same unit. If not, then the report judging means 11d instructs the rewriting means to store the abnormal operation content of this air conditioner, the detecting time "1", and also the abnormal operation detecting time in-

stant into the storage means 11c (step S45).

**[0074]** Next, in response to the instruction issued from the report judging means 11d, the detecting time judging means 11i confirms the detecting time of this abnormal operation content from the storage result of the storage means 11c. When the report judging means 11d judges that this confirmed detecting time is reached to a preset time "N", the report judging means 11d instructs the reporting means 11b to report this abnormal operation content to the remote monitoring terminal unit 7 (steps S46, S47 and S48).

**[0075]** At this time, the detecting time judging means 11i instructs the clear means 11h to delete this abnormal operation content from the storage means 11c (step S49).

**[0076]** It should be noted that when the detecting time of this abnormal operation is not reached to the preset time "N", the detecting time judging means 11i does not report (step S50).

**[0077]** As previously explained, after the occurrence times of the same abnormal operation are reached to the preset times, the abnormal operation is reported to the remote monitoring terminal unit. As a consequence, such a temporal abnormal operation with a less significant degree is not reported, which suddenly and not periodically occurs due to changes in weather conditions. However, only the continuous abnormal operation content is reported. As a consequence, it is possible to provide a low-cost remote monitoring system having high reliability for the cooling apparatus, which can correctly separate the temporal abnormal operation from the continuous abnormal operation and can correctly monitor this continuous abnormal operation, while reducing the total number of reporting the abnormal operations.

**[0078]** Also, when the occurrence times of the same abnormal operation contents are reached to the preset times, the detecting time judging means deletes the abnormal operation content thereof from the storage means. As a result, since no useless content is stored, it is possible to obtain such a low-cost remote monitoring system for the cooling apparatus, in which the storage capacity of the storage means is reduced.

**[0079]** Also, as another example of this embodiment 5, when the detecting time judging means judges that the occurrence time of the abnormal operation is reached to a preset detecting time within preselected time (preset time T4) based upon the time instant produced from the timer 15, the abnormal operation content thereof is reported to the remote monitoring terminal unit 7. Since the detecting time judging means discriminates the temporal abnormal operation from the continuous abnormal operation based on the detecting times within the predetermined time, and then reports, it is possible to obtain such a remote monitoring system with high reliability for the cooling apparatus, for correctly judging and reporting the abnormal operation.

**[0080]** As another example of this embodiment 5, in such a case that the report judging means 11d judges



based on the time instant produced from the timer 15 that the time lapse after the first abnormal operation has been detected exceeds a preset time "T4", as represented in Fig. 8, this report judging means 11d may instruct the clear means 11h to clear this abnormal operation content from the storage means 11c.

**[0081]** With this alternative example, when the same abnormal operation does not occur within preselected time, this abnormal operation content is deleted from the storage means. As a consequence, it is also possible to obtain such a low-cost remote monitoring system for the cooling apparatus, while unnecessary abnormal operation contents are not stored, and the storage capacity of the memory means is reduced.

**[0082]** Also, if the report prohibit setting time T1 may be arbitrarily set by way of the remote monitoring terminal 7, then the use condition of the air conditioner and the content of the abnormal operation can be varied even when the operator goes to the installation place of the air conditioner. As a result, it is possible to provide a more useful remote monitoring system for the cooling apparatus.

(Embodiment 6)

**[0083]** Fig. 11 is a diagram for showing an arrangement of an embodiment 6 according to the present invention. A microcomputer 11 of this embodiment 6 is equipped with an abnormal operation detecting means 11a for detecting an abnormal operation content of each of the air conditioners, a reporting destination selection means 11j, and a reporting means 11b for reporting to any one of the remote monitoring terminal units based upon the selection result of this reporting destination selecting means 11j. The reporting destination selecting means 11j compares the detection result of this abnormal operation detecting means 11a with an abnormal operation of each of the air conditioners in a reporting destination designation table, and selects any one of these remote monitoring terminal units to be reported based on this comparison result. Also, the arrangement other than a timer 15 instead of the clear means 11h employed in the embodiment 1 is the same as that of the embodiment 1.

**[0084]** Next, operations will now be described.

**[0085]** First, when an abnormal operation content of any of the air conditioners is detected by the abnormal operation detecting means 11a, this abnormal operation content is transmitted to the reporting destination designating means 11j.

**[0086]** Next, the reporting destination designating means 11j compares this transmitted abnormal content of the air conditioner with, for instance, the abnormal operation contents of the respective air conditioners contained in the reporting destination designation table shown in Fig. 12. Based on this comparison result, the reporting destination designating means 11j selects any one of these remote monitoring terminals, and then

transmits this selection result to the reporting means 11b.

**[0087]** Subsequently, the reporting means 11(b) transmits (reports) the abnormal operation content of the air conditioner detected by the abnormal operation detecting means 11a to the remote monitoring terminal unit selected by the reporting destination designating means 11j.

**[0088]** It should also be noted that as to the contents of the reporting destination designation table, a plurality of reporting destinations may be designated, and otherwise, no reporting destination may be designated, depending upon the importance/significant degrees of the abnormal operation contents, or the occurrence time instants of the abnormal operations. In other words, as to a certain abnormal operation, it is possible to designate that no report is made.

**[0089]** As previously explained, since the abnormal operation content is reported from the operation monitoring apparatus to any of the plural remote monitoring terminal units, depending upon the abnormal operation contents of the operation conditions of the indoor units and the outdoor units, this abnormal operation content is reported to the remote monitoring terminal unit suitable for this abnormal operation content based on the importance/significant degree of the abnormal operation content, or the occurrence time instant of the abnormal operation. As a consequence, it is possible to obtain a very useful remote monitoring system for the cooling apparatus, capable of providing very quick services.

**[0090]** Also, when the timer 15 transmits the time instant to the reporting destination designating means 11j, the reporting destination designating means 11j may detect the occurrence time instant of the abnormal operation content sent from the abnormal operation detecting means 11a. As a result, since it is also possible to select any of these remote monitoring terminal units to be reported based on the occurrence time instant other than the contents of the reporting destination designation table, a further useful remote monitoring system for the cooling apparatus may be accomplished.

**[0091]** The above-explained embodiments 1 to 6 have described the abnormal operation contents of the respective air conditioners, assuming that the respective air conditioners of the building and the like are monitored. Alternatively, it is apparent to apply the present invention to monitoring operations for air conditioners installed in offices and homes, and also to monitoring operations for abnormal operations of cooling apparatus.

**[0092]** In the above-explained embodiments 1 to 6, the same abnormal operation of the same unit has been employed as the report judging basis of the report judging means. If an abnormal operation content is not repaired even in a plurality of air conditioners installed in an office, a home, or a building, then this abnormal operation content of this model is not changed. As a consequence, only the condition for judging whether or not

the detected abnormal operation content is equal to the same abnormal content may be provided.

**[0093]** It should be understood that if the condition for judging whether or not the detected abnormal operation content is equal to the same abnormal content is introduced, then the once reported same abnormal operation content is not reported to the remote monitoring terminal unit. Therefore, it is possible to provide a low-cost and high reliable remote monitoring system for the cooling apparatus, while the transfer amount of the transfer line can be reduced, and the actual abnormal operation can be correctly grasped and monitored.

**[0094]** Since the present invention has been arranged as explained above, the present invention can achieve the below-mentioned effects.

**[0095]** Since the same abnormal operation content which has been once reported is not reported to the remote monitoring terminal unit, while the transfer amount of the transfer line can be reduced, the actual abnormal operation can be correctly grasped and monitored. Accordingly, such a low-cost remote monitoring system having high reliability for the cooling apparatus can be accomplished.

**[0096]** As previously explained, since the same abnormal operation content of the same unit which has been once reported is not reported to the remote monitoring terminal unit, while the transfer amount of the transfer line can be reduced, the actual abnormal operation can be correctly grasped and monitored. Accordingly, such a low-cost remote monitoring system having high reliability for the cooling apparatus can be accomplished which is suitable for a building accommodated with a plurality of air conditioners.

**[0097]** Also, after the occurrence times of the same abnormal operation are reached to the preset times, the abnormal operation is reported to the remote monitoring terminal unit. As a consequence, such a temporal abnormal operation with a less significant degree is not reported, which suddenly and not periodically occurs due to changes in weather conditions. However, only the continuous abnormal operation content is reported. As a consequence, it is possible to provide a low-cost remote monitoring system having high reliability for the cooling apparatus, which can correctly separate the temporal abnormal operation from the continuous abnormal operation and can correctly monitor this continuous abnormal operation, while reducing the total number of reporting the abnormal operations.

**[0098]** Also, with respect to the abnormal operation once reported, this abnormal operation is reported after the time difference (recurrence time) between the previous reporting time instant and the previous time instant exceeds the report prohibit setting time T1. As a consequence, such temporal abnormal operations caused by changes in weather and environments (rain, wind, snow) are not reported to the remote monitoring terminal unit. That is, for instance, in particular, the temperature around the installation place of the outdoor units is in-

creased due to some weather and environmental conditions. Thus, the heat radiation performance of the radiator plate of the outdoor unit is deteriorated, so that the operation of the outdoor unit is stopped under abnormal condition. Thereafter, the deteriorated heat radiation performance is improved due to changes in the succeeding weather and environmental conditions, so that the automatic recovery operation can be performed. Also, if the manual recovery operation can be performed, no abnormal operation is reported to the remote monitoring terminal unit. On the other hand, the continuous abnormal operation is reported. As a consequence, it is possible to provide a low-cost remote monitoring system having high reliability for the cooling apparatus, which can correctly separate the temporal abnormal operation from the continuous abnormal operation and can correctly monitor this continuous abnormal operation, while reducing the total number of reporting the abnormal operations.

**[0099]** Also, when the time lapse after the reporting time instant exceeds the set clear time T2 with respect to each of the abnormal operation contents of the air conditioner, since this abnormal operation content is deleted, the waste content is not stored. In particular, even when the temporal abnormal operation with the less significant degree is changed into the abnormal operation with the significant degree, it is possible to provide a highly reliable remote monitoring system for the cooling apparatus, which can correctly grasp and monitor the abnormal operation.

**[0100]** Also, since the clear time T2 is set to be longer than the report prohibit time T1, in particular, when the continuous abnormal operation with the significant degree happens to occur, this continuous abnormal operation with the significant degree can be surely reported, and thereafter can be deleted by such a high reliable remote monitoring system.

**[0101]** Also, since the clear means for deleting the abnormal operation content is employed, in particular, when the abnormal operation is cleared and the abnormal operation content is deleted by the serviceman, even if the same abnormal operation subsequently happens to occur, this same abnormal operation can be firmly reported. As a consequence, it is also possible to accomplish a high-reliable remote monitoring system with easy operation for the cooling apparatus, which can check as to whether or not the repair is completed, and whether or not the repair operation can give the good result.

**[0102]** Also, since such a means is employed which may arbitrarily set the preset clear time T2 by way of the remote monitoring terminal 7, then the use condition of the air conditioner and the content of the abnormal operation can be varied even when the operator goes to the installation place of the air conditioner. As a result, it is possible to provide a more useful remote monitoring system for the cooling apparatus.

**[0103]** Also, when the clear time T2 of the clear judg-

ing means 11g can be set, this clear time is variable depending upon the use conditions of the air conditioner, and the contents of the abnormal operations. Therefore, it is possible to obtain a more useful remote monitoring system for the cooling apparatus.

**[0104]** Also, since the abnormal operation content is reported from the operation monitoring apparatus to any of the plural remote monitoring terminal units, depending upon the abnormal operation contents of the operation conditions of the indoor units and the outdoor units, this abnormal operation content is reported to the remote monitoring terminal unit suitable for this abnormal operation content based on the importance/significant degree of the abnormal operation content, or the occurrence time instant of the abnormal operation. As a consequence, it is possible to obtain a very useful remote monitoring system for the cooling apparatus, capable of providing very quick services.

**[0105]** The foregoing description of the preferred embodiments of the invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed, and modifications and variations are possible in light of the above teachings or may be acquired from practice of the invention. The embodiments were chosen and described in order to explain the principles of the invention and its practical application to enable one skilled in the art to utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the claims appended hereto, and their equivalents.

## Claims

1. A remote monitoring system for a cooling apparatus, comprising:

an operation monitoring apparatus (3) connected via a transfer line (9) to each of an indoor unit (1A to 1A) and an outdoor unit (2A to 2C) of the cooling apparatus, for reporting an operation condition of said indoor unit or said outdoor unit; and  
a remote monitoring terminal unit connected via a transfer path such as a public line (5) to said operation monitoring apparatus (3), for monitoring the operation condition of said indoor unit (1A to 1C) or said outdoor unit (2A to 2C) based upon the reporting result of said operation monitoring apparatus (3);

wherein:

said operation monitoring apparatus (3) includes:

abnormal operation detecting means (11a) for detecting an abnormal operation content of one of said indoor unit (1A to 1C) and said outdoor unit (2A to 2C); and  
report judging means (11d) for comparing the abnormal operation content detected by said abnormal operation detecting means (11a) with a past abnormal operation content to judge whether or not said detected abnormal operation content is identical to said past abnormal operation content; and  
when said detected abnormal operation content is identical to said past abnormal operation content, said operation monitoring apparatus (3) does not report said detected abnormal operation content to said remote monitoring terminal unit.

2. A remote monitoring system for a cooling apparatus as claimed in claim 1,  
wherein said operation monitoring apparatus further comprises time judging means (11i) for judging as to whether or not said same abnormal operation occurrence times reach a preset abnormal operation occurrence time based upon the judgment result of said report judging means (11d); and  
wherein when said same abnormal operation occurrence times reach the preset abnormal operation occurrence time, this abnormal operation content is reported to said remote monitoring terminal unit.
3. A remote monitoring system for a cooling apparatus as claimed in claim 1 wherein said operation monitoring apparatus further comprises: a timer (15) for notifying a time instant; and  
wherein when it is so judged that said abnormal operation content is identical to the past abnormal operation content based on the time instant notified from said timer (15) and the judgment result of said report judging means (11d), report selecting means (11e) for judging as to whether or not the time when this same abnormal content is again produced is present preset report prohibiting time;  
if the time when this same abnormal content is again produced exceeds the preset report prohibiting time, this same abnormal content is reported to said remote monitoring terminal unit.
4. A remote monitoring system for a cooling apparatus as claimed in any one of claims 1 to 2  
wherein:

said operation monitoring apparatus (3) further comprises:

a timer (15) for notifying a time instant; and  
clear judging means (11g) for judging as to

whether or not time lapse of said abnormal operation content exceeds preset clear time based on the time instant notified from said timer (15);

when the time lapse of said abnormal operation content exceeds the preset clear time, this exceeded abnormal operation content is deleted. 5

5. A remote monitoring system for a cooling apparatus as claimed in claim 1:  
wherein said operation monitoring apparatus (3) includes:

a timer (15) for notifying a time instant; 15

wherein when it is so judged that said abnormal operation content is identical to the past abnormal operation content based on the time instant notified from said timer (15) and the judgment result of said report judging means (11d), report selecting means (11e) for judging as to whether or not the time when this same abnormal content is again produced is present preset report prohibiting time; and clear judging means (11g) for judging as to whether or not time lapse of said abnormal operation content exceeds preset clear time based on the time instant notified from said timer (15);  
after said identical abnormal operation content is reported, this abnormal operation content is deleted. 20 25 30

6. A remote monitoring system for a cooling apparatus as claimed in any one of claims 1 to 3 wherein:

said operation monitoring apparatus (3) comprises clear means (14) for deleting said abnormal operation content to detect said abnormal operation content. 35 40

7. A remote monitoring system of a cooling apparatus as claimed in claim 3 wherein:

said remote monitoring terminal unit is further comprised of means for changing said preset report prohibit time of said report selecting means (11e). 45

8. A remote monitoring system of a cooling apparatus as claimed in claim 4 wherein:

said remote monitoring terminal unit is further comprised of means for changing said preset clear time of said clear judging means (11g). 50 55

9. A remote monitoring system of a cooling apparatus as claimed in any one of claims 1 to 3 wherein:

a plurality of said remote monitoring terminal units are provided; and  
depending on the abnormal condition of the operation conditions of said indoor unit (1A to 1C) and said outdoor unit (2A to 2C), said abnormal operation conditions are reported from said operation monitoring apparatus (3) to any of said plural remote monitoring terminal units.

## Patentansprüche

1. Fernüberwachungssystem für ein Kühlgerät, welches aufweist:

eine Operationsüberwachungsvorrichtung (3), die über eine Übertragungsleitung (9) mit jeweils einer Innenraumeinheit (1A bis 1C) und einer Außeneinheit (2A bis 2C) des Kühlgeräts verbunden ist, um einen Operationszustand der Innenraumeinheit oder der Außeneinheit zu melden; und  
eine Fernüberwachungs-Endgeräteeinheit, die über einen Übertragungsweg wie eine öffentliche Leitung (5) mit der Operationsüberwachungsvorrichtung (3) verbunden ist, zum Überwachen des Operationszustands der Innenraumeinheit (1A bis 1C) oder der Außeneinheit (2A bis 2C) auf der Grundlage des Meldeergebnisses der Operationsüberwachungsvorrichtung (3);

bei dem:

die Operationsüberwachungsvorrichtung (3) enthält:

eine Erfassungsvorrichtung (11a) für anomale Operationen zum Erfassen eines anomalen Operationsinhalts von der Innenraumeinheit (1A bis 1C) oder der Außeneinheit (2A bis 2C); und  
eine Meldungsbeurteilungsvorrichtung (11d) zum Vergleichen des von der Erfassungsvorrichtung (11a) für anomale Operationen erfassten anomalen Operationsinhalts mit einem vergangenen anomalen Operationsinhalt, um zu beurteilen, ob der erfasste anomale Operationsinhalt identisch mit dem vergangenen anomalen Operationsinhalt ist oder nicht; und  
wenn der erfasste anomale Operationsinhalt mit dem vergangenen anomalen Operationsinhalt identisch ist, meldet die Operationsüberwachungsvorrichtung (3) den erfassten anomalen Operationsinhalt nicht zu der Fernüberwachungs-Endgeräteeinheit.

2. Fernüberwachungssystem für ein Kühlgerät nach Anspruch 1,  
bei dem die Operationsüberwachungsvorrichtung weiterhin eine Zeitbeurteilungsvorrichtung (11i) aufweist für die Beurteilung, ob die Auftrittzeiten für dieselbe anomale Operation eine voreingestellte Auftrittszeit für eine anomale Operation erreichen oder nicht, auf der Grundlage des Beurteilungsergebnisses der Meldebeurteilungsvorrichtung (11d); und  
bei dem, wenn die Auftrittzeiten für dieselbe anomale Operation die voreingestellte Auftrittszeit für eine anomale Operation erreichen, dieser anomale Operationsinhalt der Fernüberwachungs-Endgeräteeinheit gemeldet wird.
3. Fernüberwachungssystem für ein Kühlgerät nach Anspruch 1, bei dem die Operationsüberwachungsvorrichtung weiterhin aufweist: ein Zeitglied (15) zum Anzeigen eines Zeitpunktes; und bei dem, wenn festgestellt wird, dass der anomale Operationsinhalt identisch mit dem vergangenen anomalen Operationsinhalt ist, auf der Grundlage des von dem Zeitglied (15) angezeigten Zeitpunktes und des Beurteilungsergebnisses der Meldebeurteilungsvorrichtung (11d), eine Meldeauswahlvorrichtung (11e) zum Beurteilen, ob die Zeit, wenn derselbe anomale Inhalt wieder erzeugt wird, vorhanden ist oder nicht, eine Meldeverhinderungszeit voreinstellt;  
wenn die Zeit, wenn derselbe anomale Inhalt wieder erzeugt wird, die voreingestellte Meldeverhinderungszeit überschreitet, derselbe anomale Inhalt zu der Fernüberwachungs-Endgeräteeinheit gemeldet wird.
4. Fernüberwachungssystem für ein Kühlgerät nach einem der Ansprüche 1 oder 2, bei dem:  
die Operationsüberwachungsvorrichtung (3) weiterhin aufweist:  
ein Zeitglied (15) zum Anzeigen eines Zeitpunktes; und  
eine Freigabebeurteilungsvorrichtung (11g) zum Beurteilen, ob der Zeitablauf des anomalen Operationsinhalts eine voreingestellte Freigabezeit überschreitet oder nicht, auf der Grundlage des von dem Zeitglied (15) angezeigten Zeitpunktes; wobei, wenn der Zeitablauf des anomalen Operationsinhalts die voreingestellte Freigabezeit überschreitet, dieser überschrittene anomale Operationsinhalt gelöscht wird.
5. Fernüberwachungssystem für ein Kühlgerät nach Anspruch 1, bei dem die Operationsüberwachungsvorrichtung (3) enthält:

ein Zeitglied (15) zum Anzeigen eines Zeitpunktes;

worin, wenn festgestellt wird, dass der anomale Operationsinhalt identisch mit dem vergangenen anomalen Operationsinhalt ist, auf der Grundlage des von dem Zeitglied (15) angezeigten Zeitpunktes und des Beurteilungsergebnisses der Meldebeurteilungsvorrichtung (11d), eine Meldeauswahlvorrichtung (11e) zum Beurteilen, ob die Zeit, zu der derselbe anomale Inhalt wieder erzeugt wird, die gegenwärtige voreingestellte Meldeverhinderungszeit ist oder nicht; und  
eine Freigabebeurteilungsvorrichtung (11g) zum Beurteilen, ob der Zeitablauf des anomalen Operationsinhalts eine voreingestellte Freigabezeit überschreitet oder nicht, auf der Grundlage des von dem Zeitglied (15) angezeigten Zeitpunktes; wobei, nachdem der identische anomale Operationsinhalt gemeldet ist, dieser anomale Operationsinhalt gelöscht wird.

6. Fernüberwachungssystem für ein Kühlgerät nach einem der Ansprüche 1 bis 3, bei dem:

die Operationsüberwachungsvorrichtung (3) weist eine Freigabevorrichtung (14) zum Löschen des anomalen Operationsinhalts auf, um den anomalen Operationsinhalt zu erfassen.

7. Fernüberwachungssystem für ein Kühlgerät nach Anspruch 3, bei dem:

die Fernüberwachungs-Endgeräteeinheit weist weiterhin eine Vorrichtung zum Ändern der voreingestellten Meldeverhinderungszeit der Meldeauswahlvorrichtung (11e) auf.

8. Fernüberwachungssystem für ein Kühlgerät nach Anspruch 4, bei dem:

die Fernüberwachungs-Endgeräteeinheit weist weiterhin eine Vorrichtung zum Ändern der voreingestellten Freigabezeit der Freigabebeurteilungsvorrichtung (11g) auf.

9. Fernüberwachungssystem für ein Kühlgerät nach einem der Ansprüche 1 bis 3, bei dem:

es sind mehrere der Fernüberwachungs-Endgeräteeinheiten vorgesehen; und abhängig von dem anomalen Zustand der Operationszustände der Inneneinheit (1A bis 1C) und der Außeneinheit (2A bis 2C) werden die anomalen Operationszustände von der Operationsüberwachungsvorrichtung (3) zu jeder der mehreren Fernüberwachungs-Endgeräteeinheiten gemeldet.

## Revendications

1. Système de surveillance à distance pour un dispositif de refroidissement, comprenant :

un dispositif de surveillance de fonctionnement (3) connecté via une ligne de transfert (9) à chacune des unités intérieures (1A à 1C) et des unités extérieures (2A à 2C) du dispositif de refroidissement, pour signaler un état de fonctionnement desdites unités intérieures ou desdites unités extérieures ; et  
une unité terminale de surveillance à distance connectée via un circuit de transfert tel qu'une ligne publique (5), audit dispositif de surveillance de fonctionnement (3), pour surveiller l'état de fonctionnement desdites unités intérieures (1A à 1C) ou desdites unités extérieures (2A à 2C) d'après le résultat signalé par ledit dispositif de surveillance de fonctionnement (3) ;

dans lequel :

ledit dispositif de surveillance de fonctionnement (3) comprend :

un moyen de détection de fonctionnement anormal (11a) pour détecter un contenu de fonctionnement anormal de l'une desdites unités intérieures (1A à 1C) et desdites unités extérieures (2A à 2C) ; et  
un moyen de jugement de signalement (11d) pour comparer le contenu de fonctionnement anormal détecté par ledit moyen de détection de fonctionnement anormal (11a) à un contenu de fonctionnement anormal antérieur pour juger si oui ou non ledit contenu de fonctionnement anormal détecté est identique audit contenu de fonctionnement anormal antérieur ; et  
lorsque ledit contenu de fonctionnement anormal détecté est identique audit contenu de fonctionnement anormal antérieur, ledit dispositif de surveillance de fonctionnement (3) ne signale pas ledit contenu de fonctionnement anormal détecté à ladite unité terminale de surveillance à distance.

2. Système de surveillance à distance pour un dispositif de refroidissement selon la revendication 1,

dans lequel ledit dispositif de surveillance de fonctionnement comprend en outre un moyen de jugement de temps (11i) pour juger si oui ou non les temps d'occurrence desdits mêmes fonctionnements anormaux atteignent un temps d'occurrence de fonctionnement anormal prédéfini d'après le résultat du jugement dudit moyen de jugement de signalement (11d) ; et

dans lequel, lorsque les temps d'occurrence desdits mêmes fonctionnements anormaux atteignent le temps d'occurrence de fonctionnement anormal prédéfini, ce contenu de fonctionnement anormal est signalé à ladite unité terminale de surveillance à distance.

3. Système de surveillance à distance pour un dispositif de refroidissement selon la revendication 1 dans lequel ledit dispositif de surveillance de fonctionnement comprend en outre : un temporisateur (15) pour notifier un instant de temps ; et

dans lequel, lorsqu'il est jugé qu'un contenu de fonctionnement anormal est identique au contenu de fonctionnement anormal antérieur d'après l'instant de temps notifié par ledit temporisateur (15) et le résultat du jugement dudit moyen de jugement de signalement (11d), un moyen de sélection de signalement (11e) pour juger si oui ou non le temps pendant lequel ce même contenu anormal est de nouveau produit est le temps d'interdiction de signalement prédéfini présent ;

si le temps pendant lequel ce même contenu anormal est de nouveau produit dépasse le temps d'interdiction de signalement prédéfini, ce même contenu anormal est signalé à ladite unité terminale de surveillance à distance.

4. Système de surveillance à distance pour un dispositif de refroidissement selon l'une quelconque des revendications 1 ou 2, dans lequel :

ledit dispositif de surveillance de fonctionnement (3) comprend en outre :

un temporisateur (15) pour notifier un instant de temps ; et un moyen de jugement d'effacement (11g) pour juger si oui ou non la durée de temps dudit contenu de fonctionnement anormal dépasse le temps d'effacement prédéfini d'après l'instant de temps notifié par ledit temporisateur (15) ; lorsque la durée de temps dudit contenu de fonctionnement anormal dépasse le temps d'effacement prédéfini, ce contenu de fonctionnement anormal dépassé est supprimé.

5. Système de surveillance à distance pour un dispositif de refroidissement selon la revendication 1 :

dans lequel ledit dispositif de surveillance de fonctionnement (3) comprend :

un temporisateur (15) pour notifier un instant de temps ; et

dans lequel, lorsqu'il est jugé qu'un contenu de fonctionnement anormal est identique au conte-

nu de fonctionnement anormal antérieur d'après l'instant de temps notifié par ledit temporisateur (15) et le résultat du jugement dudit moyen de jugement de signalment (11d), un moyen de sélection de signalment (11e) pour juger si oui ou non le temps pendant lequel ce même contenu anormal est de nouveau produit est le temps d'interdiction de signalment prédéfini présent ; et

un moyen de jugement d'effacement (11g) pour juger si oui ou non la durée de temps dudit contenu de fonctionnement anormal dépasse le temps d'effacement prédéfini d'après l'instant de temps notifié par ledit temporisateur (15) ;

après que ledit contenu de fonctionnement anormal identique a été signalé, ce contenu de fonctionnement anormal est supprimé.

6. Système de surveillance à distance pour un dispositif de refroidissement selon l'une quelconque des revendications 1 à 3, dans lequel :

ledit dispositif de surveillance de fonctionnement (3) comprend un moyen d'effacement (14) pour supprimer ledit contenu de fonctionnement anormal pour détecter ledit contenu de fonctionnement anormal.

7. Système de surveillance à distance pour un dispositif de refroidissement selon la revendication 3, dans lequel :

ladite unité terminale de surveillance à distance comprend en outre un moyen pour changer ledit temps d'interdiction de signalment prédéfini dudit moyen de sélection de signalment (11e).

8. Système de surveillance à distance pour un dispositif de refroidissement selon la revendication 4, dans lequel :

ladite unité terminale de surveillance à distance comprend en outre un moyen pour changer ledit temps d'effacement prédéfini dudit moyen de jugement d'effacement (11g).

9. Système de surveillance à distance pour un dispositif de refroidissement selon l'une quelconque des revendications 1 à 3, dans lequel :

une pluralité desdites unités terminales de surveillance à distance est proposée ; et selon l'état anormal des états de fonctionnement desdites unités intérieures (1A à 1C) et desdites unités extérieures (2A à 2C), lesdits états de fonctionnement anormaux sont signalés par ledit dispositif de surveillance de fonctionnement (3) à n'importe laquelle des unités

terminales de surveillance à distance multiples.

FIG. 1

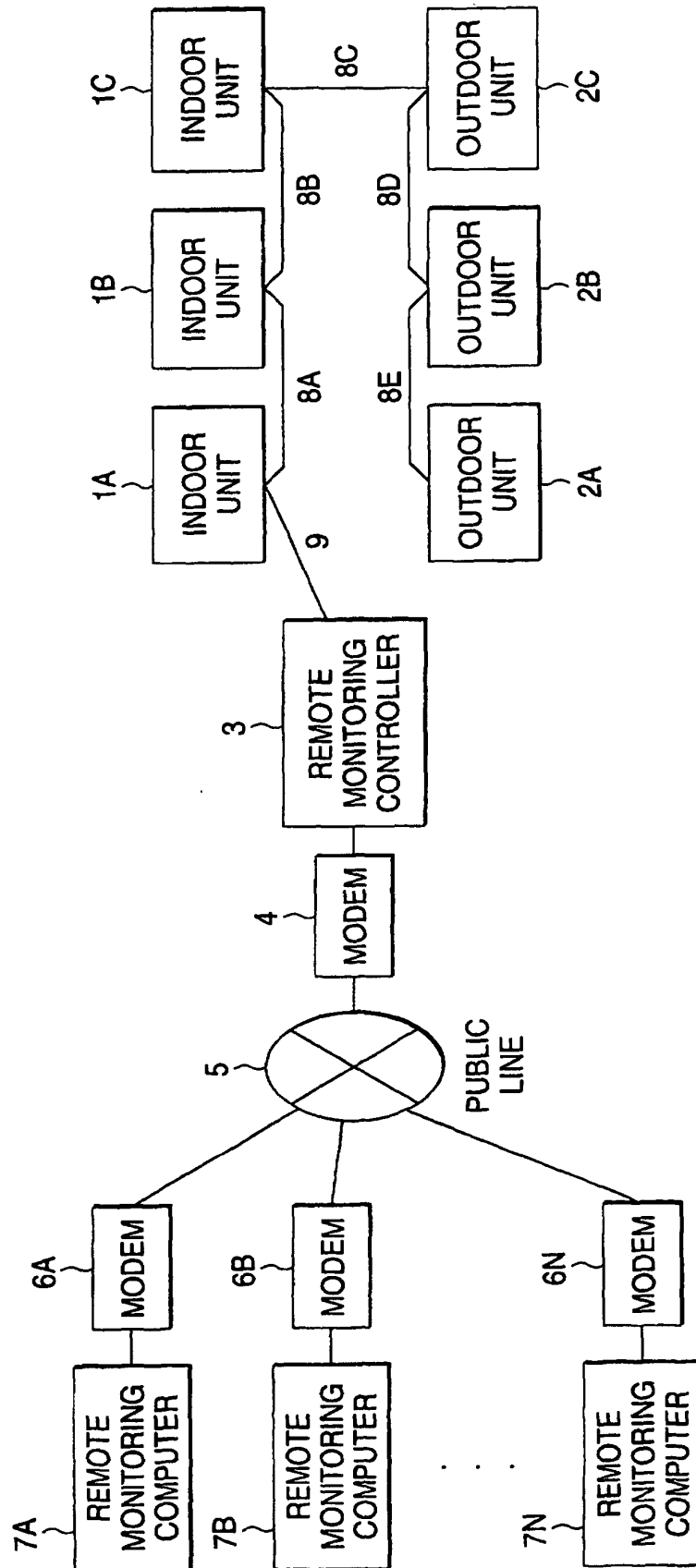




FIG. 2

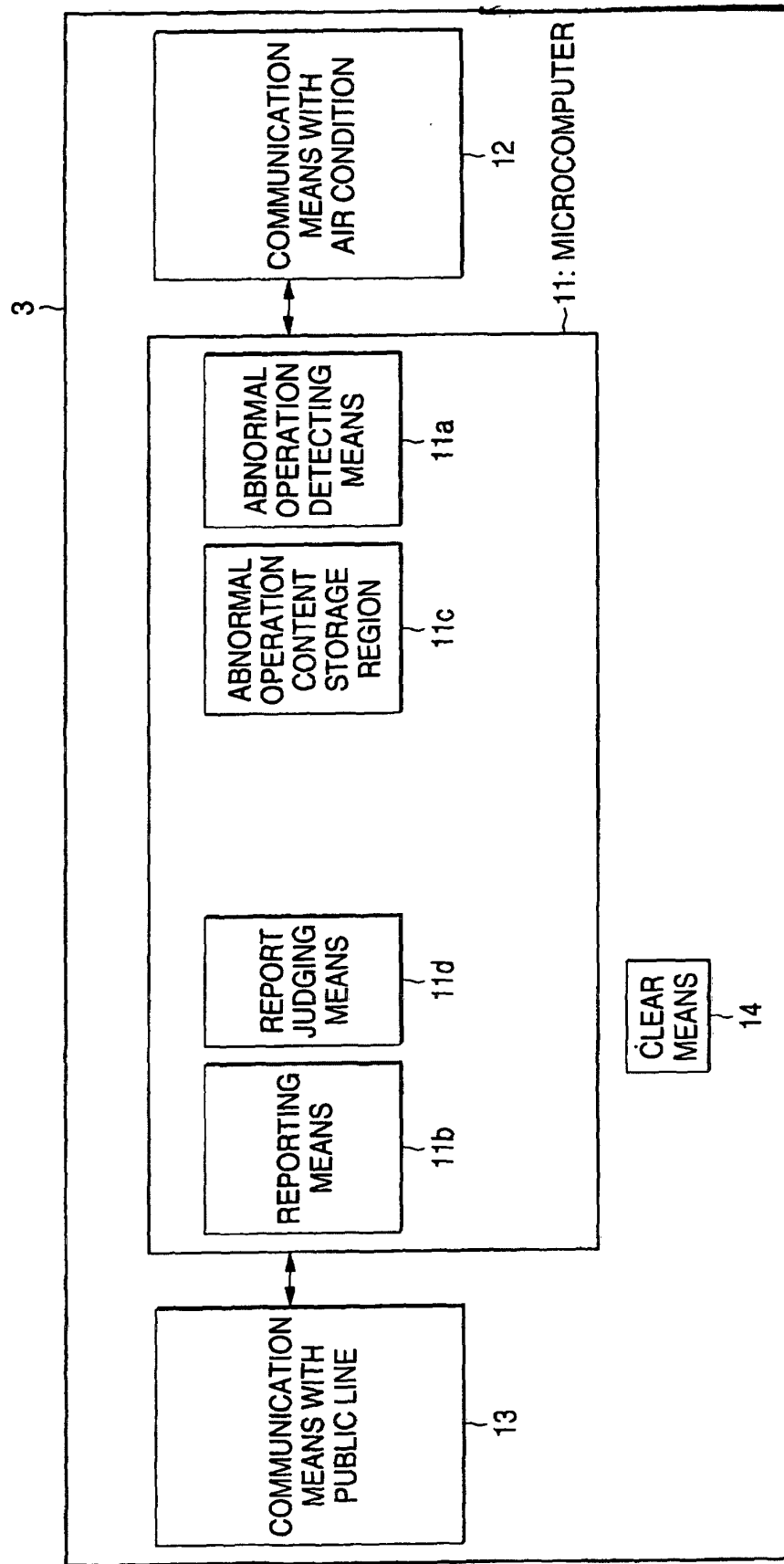


FIG. 3

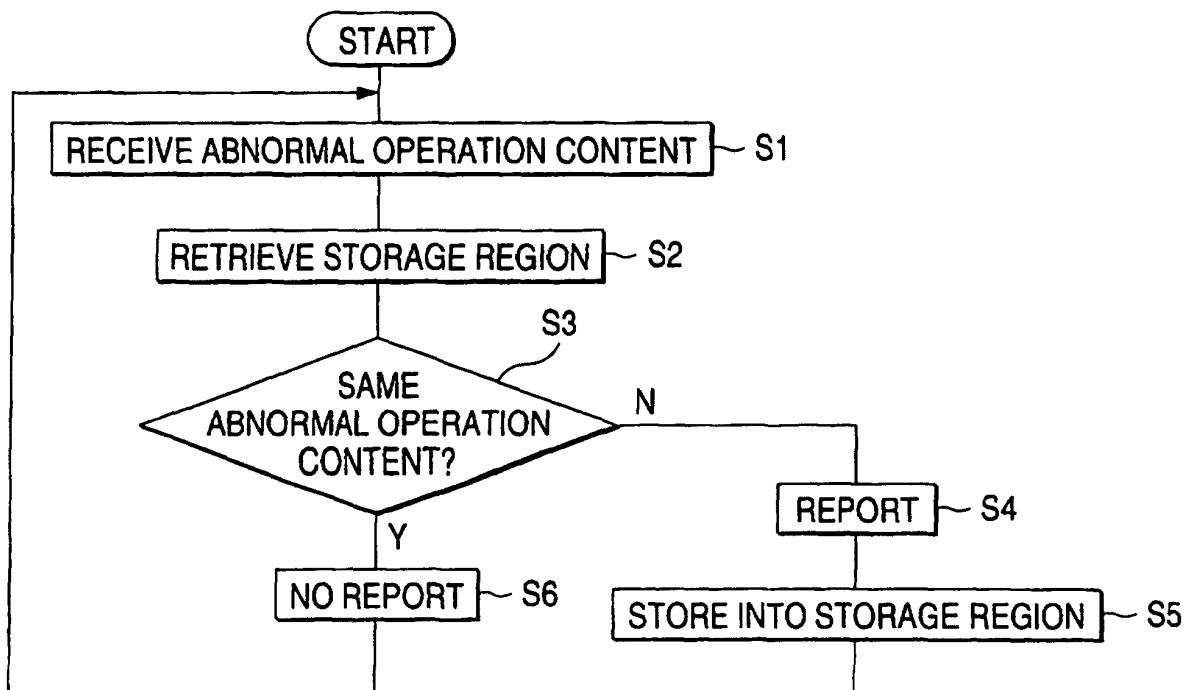


FIG. 4

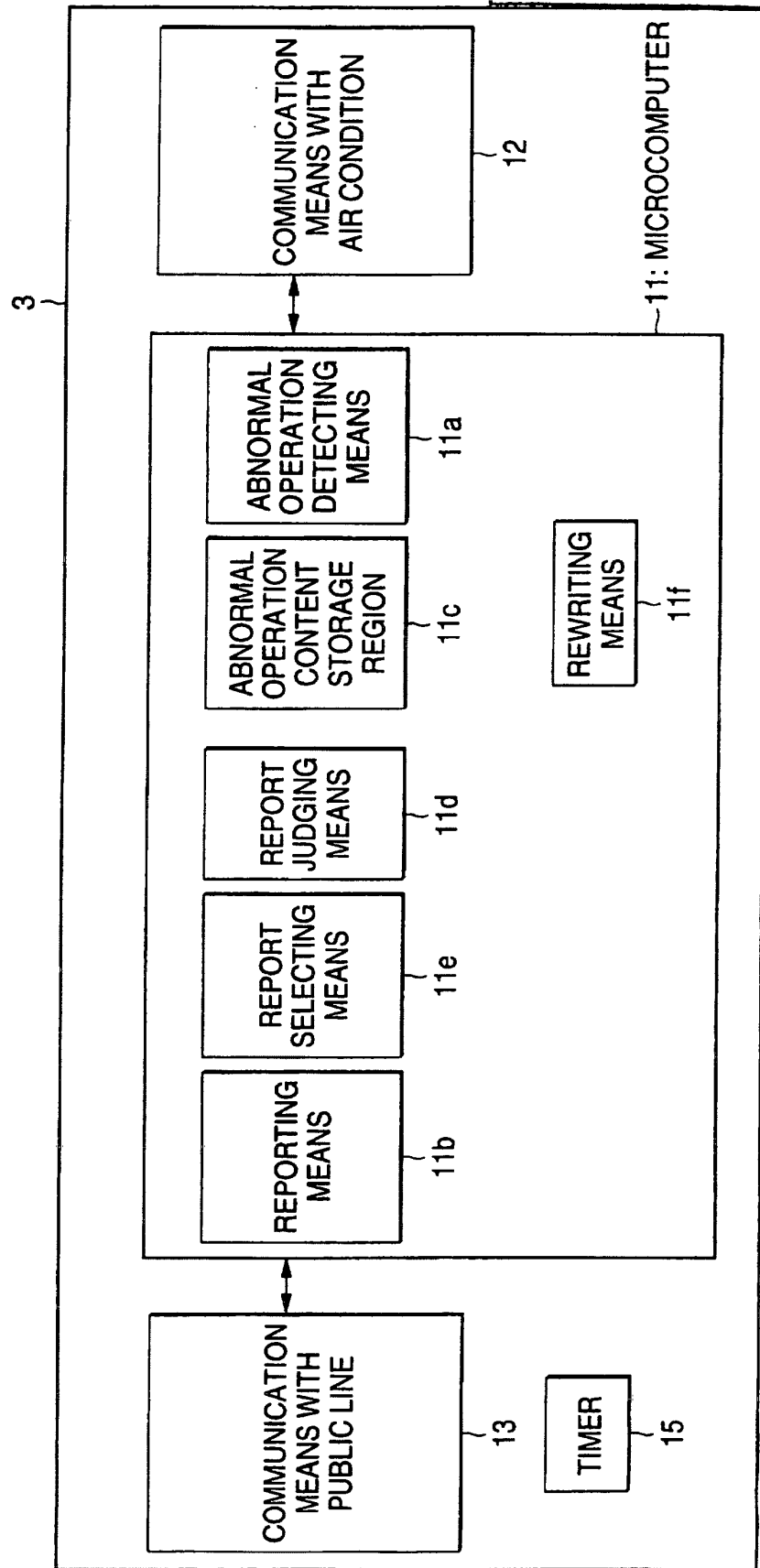


FIG. 5

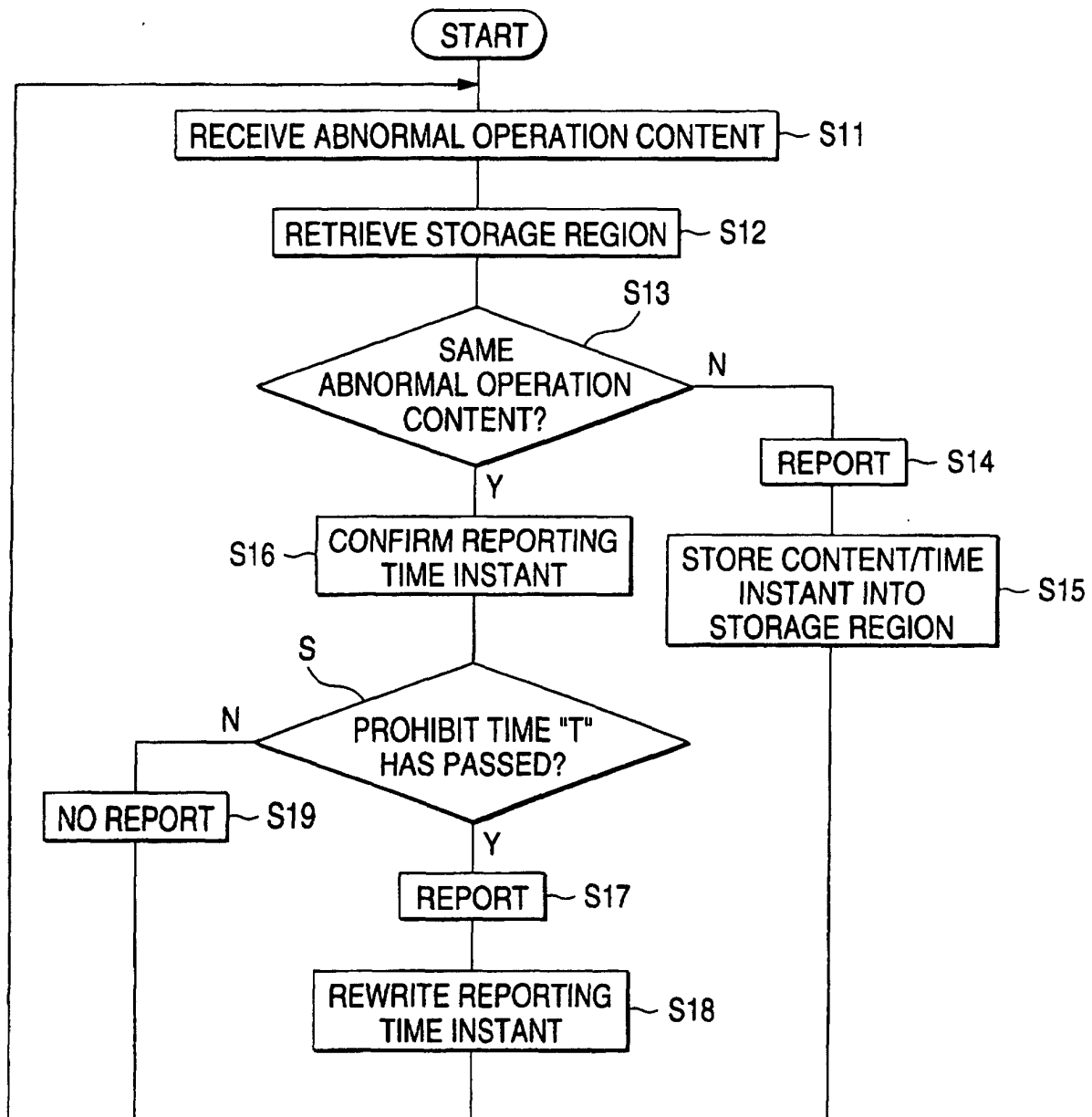


FIG. 6

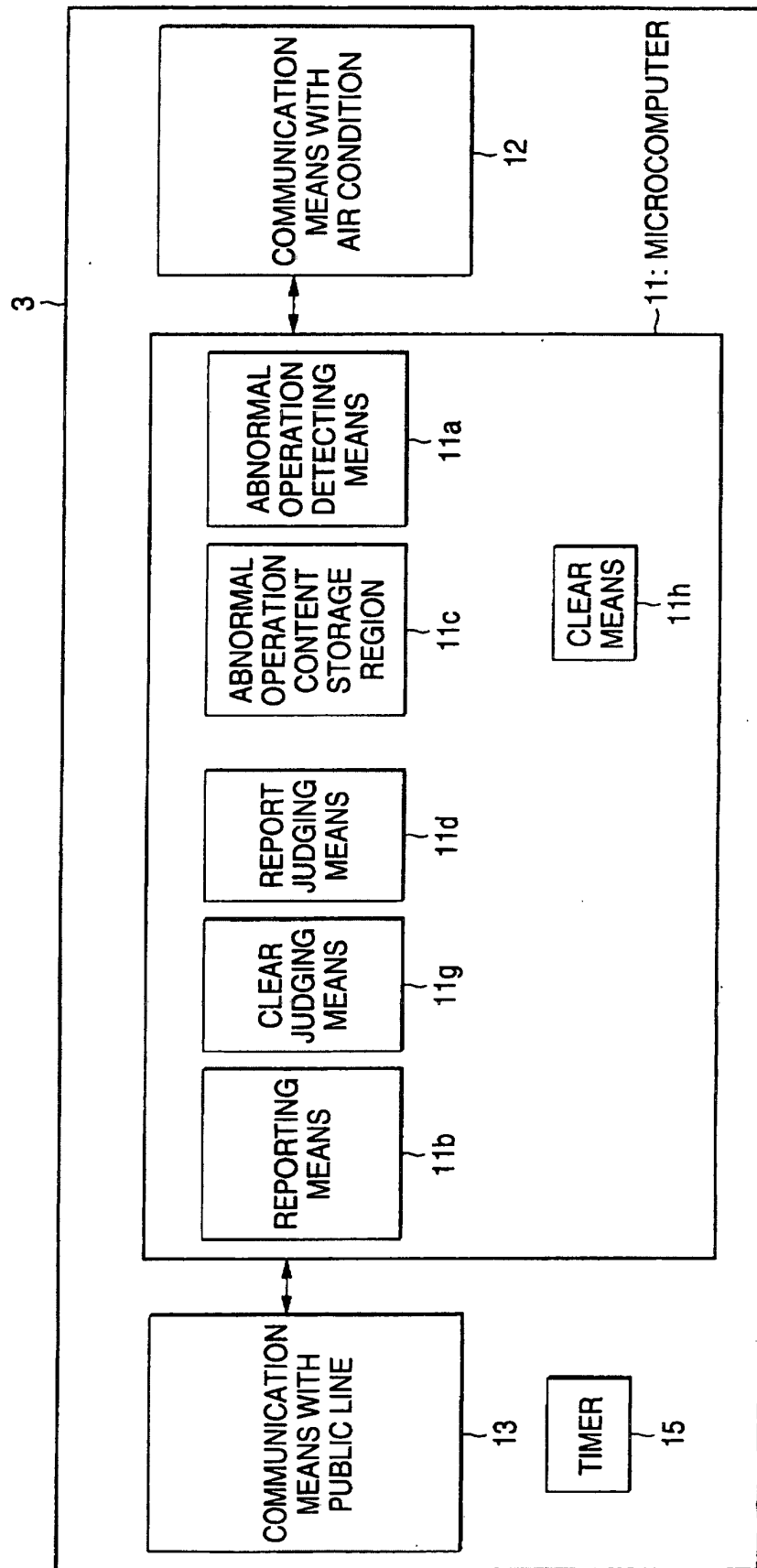


FIG. 7

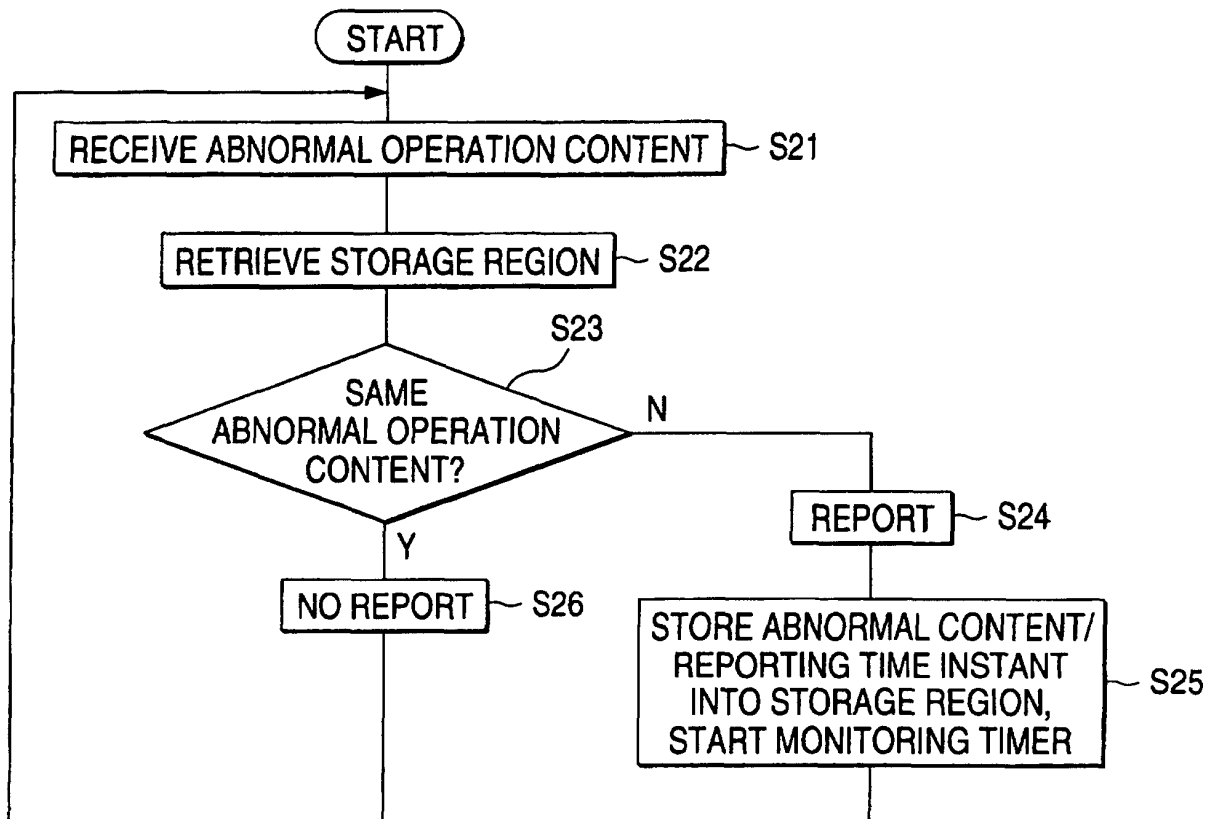


FIG. 8

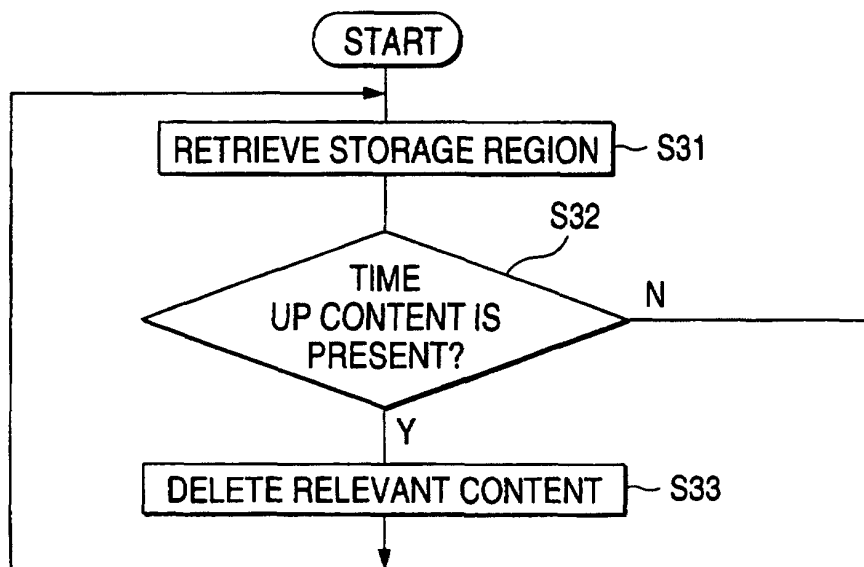


FIG. 9

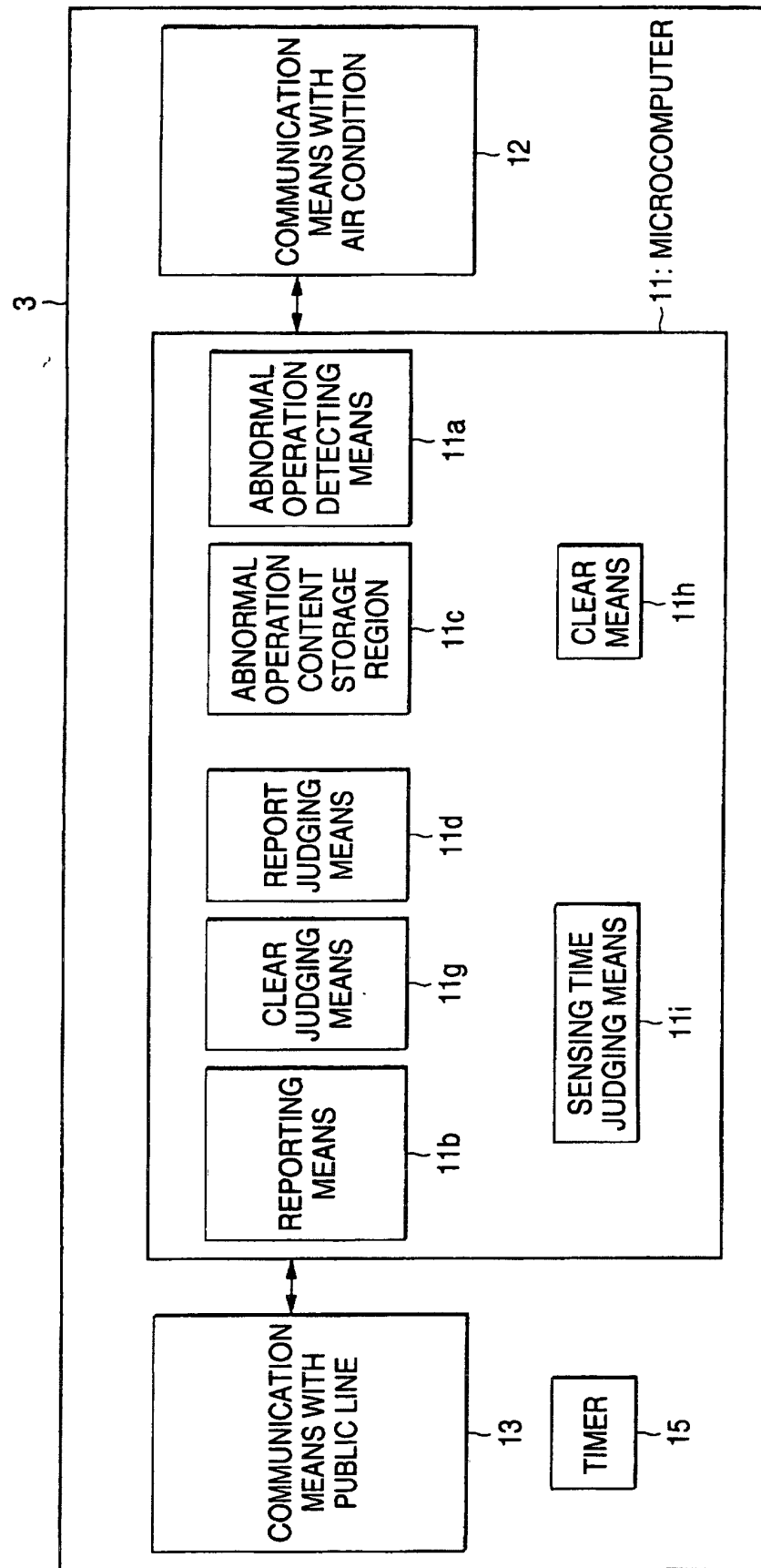


FIG. 10

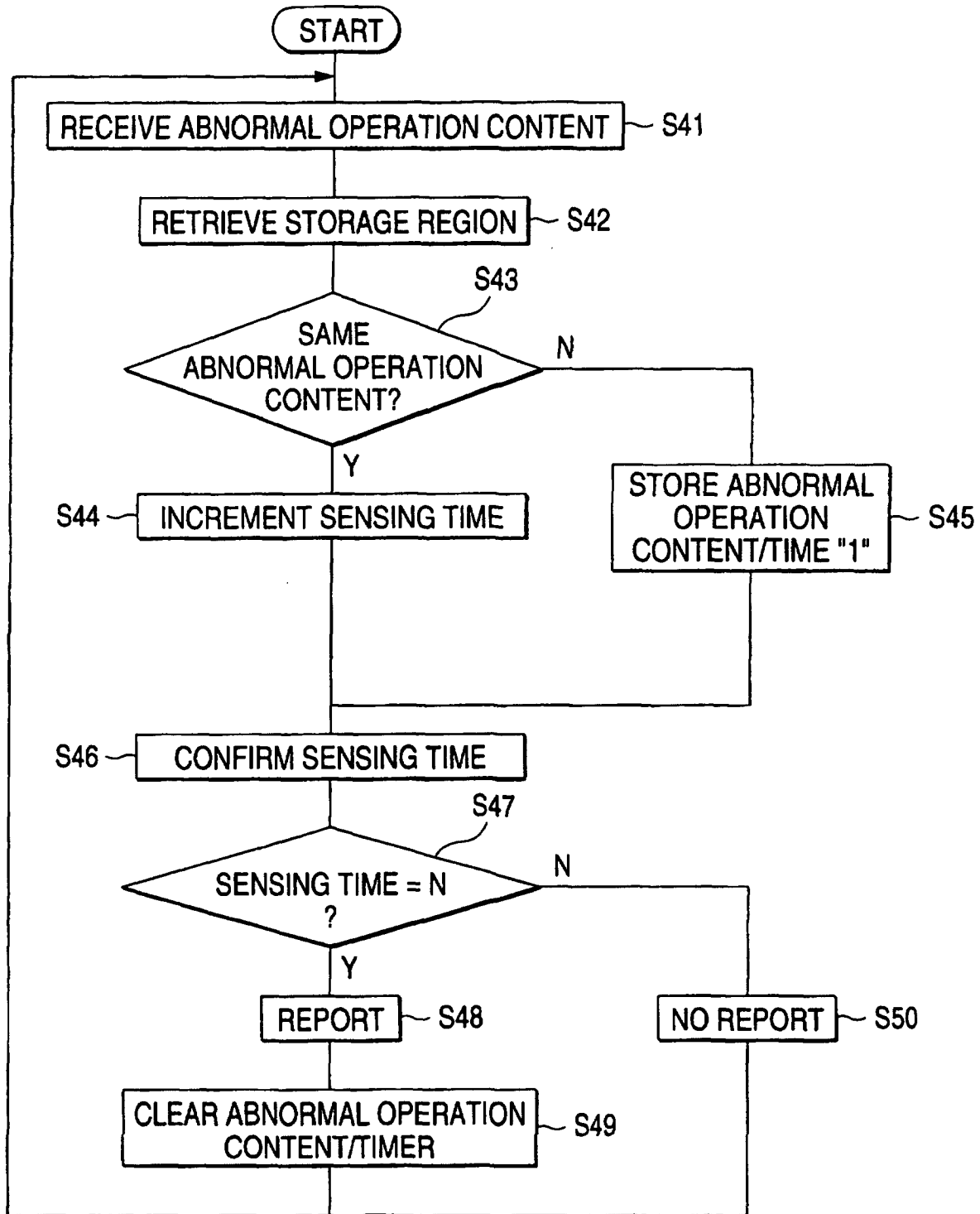




FIG. 11

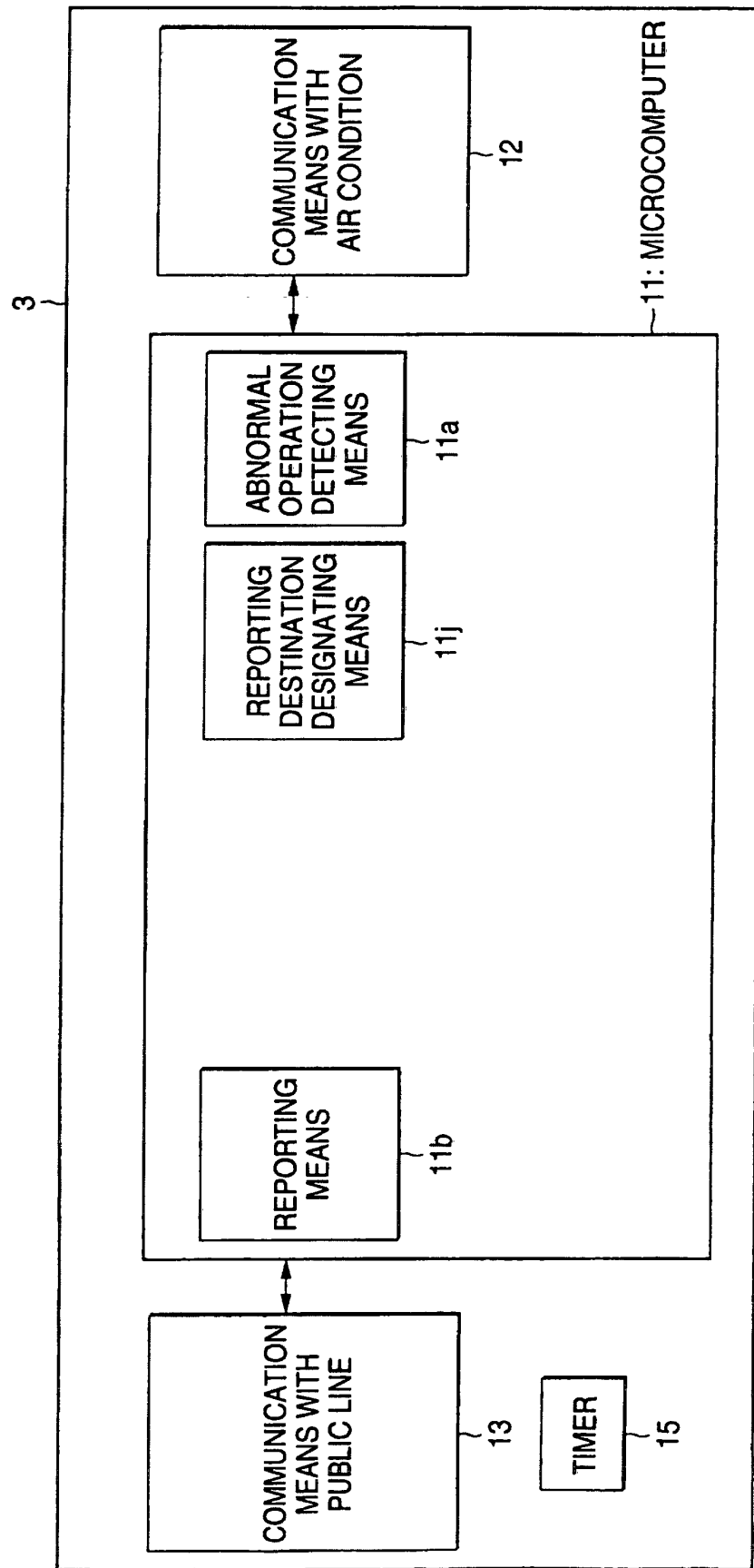


FIG. 12

CONTENT OF ABNORMAL OPERATION	REPORT DESTINATION
ABNORMAL EXHOUSTING OPERATION OF COMPRESSOR	7A
ABNORMAL OPERATION OF INVERTER	7A
ABNORMAL TRANSFER OPERATION	7B AND 7C
.	.
.	.
.	.

FIG. 13

