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(54) Audio reporting apparatus for wanderer detection, article-losing prevention, etc.

(57) An audio reporting apparatus for detection of an wanderer and prevention of losing or leaving behind an article, which comprises a radio communicating child and parent machines that respectively include communication means (1, 11) for receiving and transmitting a radio wave; power supply means (2, 12) for feeding power; signal processing means (3, 13) for processing a communication signal, stored data, and a speech output signal; memory means (4, 14) for storing accident-warning speech, a communication code number, a communication distance, and other data; speech outputting means (5, 15) for outputting speech according to an instruction from the signal processing means (3, 13); and setting means (16) for changing and specifying the setting of data stored in the memory means.

FIG. 2B

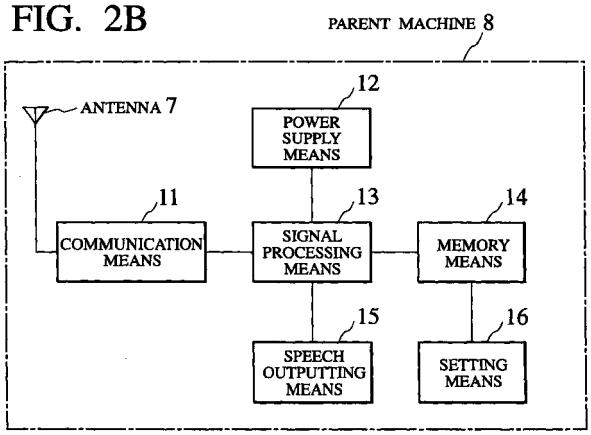
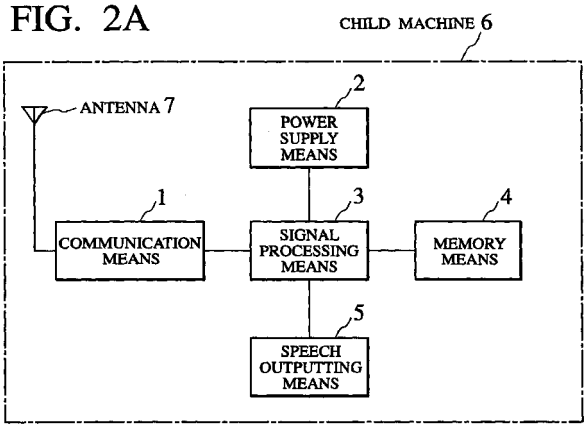


FIG. 2A



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an audio reporting apparatus for the detection of a demential person, a wanderer, a lost dog or cat and the prevention of losing or leaving of an article and thieving of a baggage, and it also relates to an audio reporting apparatus for reporting an accident by use of speech.

2. Description of the Related Art

[0002] Generally, such a wanderer-seeking system as a conventional type detecting apparatus for a demential person or wanderer has been put to practical use as the next-generation GIS (geographical information system) model project by the MITI (Ministry of Trade and Industry) that, as shown in Fig.11, combines a GIS 200 and a high-accuracy PHS (Personal Handyphone System)-utilizing position-searching system 300 as a wanderer searching/tracking system by use of a personal computer etc. in such a way that, with a wanderer carrying a PHS, a communication means 1 sends a radio wave over an ISDN line from a PHS antenna at a PHS base station, to look for the wanderer.

[0003] With this, there have been reported some cases where a wanderer can be located with an average error of 40-70 meters, taking an average time of two hours and six minutes to be found.

[0004] However, such a conventional type wanderer seeking-and-tracking system has a problem that his family member must look for him only after that member has noticed he was lost, thus taking too much of time for it. Too much of time taken for search may raise a possibility for the wanderer being involved in an accident.

[0005] Moreover, such an error of as much as 40-70 meters for locating has a problem that by the time the wandered is found after his position was known, he may have moved somewhere else, thus making it further more difficult to look for him.

[0006] Further, a personal computer used as the search system limits its operator and is rather inconvenient to carry, thus resulting in such inconvenience as to prevent one of his family members from easily looking for him.

[0007] To make the situation worse, some wanderers go around at night when his family members are sleeping, thus taking longer time than otherwise for them to notice the wandering. If they notice earlier, a wanderer can be found easily. Further, although the conventional search systems require that the potential wanderer himself should carry a PHS telephone, most people have it fixed at his waist but not when going to bed. Most of them sleep with it placed at his bed side. This is because the PHS telephone is too big to do so.

[0008] Furthermore, the conventional wanderer-seeking system is too large-scaled, so that it is not economical when the wanderer is going around near his house, although it is convenient to fin him when he is wandering far away.

[0009] For preventing people from leaving his articles, conventionally a chime has been attached to a car key holder etc., in which case, however, not many people do that because when they are driving a car, it is noisy from car vibration. Still, if they lost a car key behind, they will be very troubled. They may be troubled also in other cases where they left behind their wallet, baggage on a train rack, or belonging otherwise.

SUMMARY OF THE INVENTION

[0010] In view of the above, it is an object of the present invention to provide such an audio reporting apparatus smaller and lighter than the conventional PHS telephone and carried by a potential wanderer that when he is lost, it may be reported to his family and, at the same time, he may himself make an announcement to that effect so that people around him can report it to his family to detect it.

[0011] Also, there is such a problem that people may lose their car key or wallet and cannot know where they did. There is also another problem that people may leave their baggage on a train rack and get off the train without noticing it. With this, it is another object of the present invention to provide such an audio reporting apparatus that, if someone has lost or left their article, would audibly report it to him.

[0012] There is still another problem that some oversea travelers off their guard may be robbed of their bag etc. placed beside them and may not have their baggage again at the destination airport. To guard against such cases, it is further another object of the present invention to provide such an audio reporting apparatus that may announce in English the robbery or losing or the finding of articles, thus reporting it to the surrounding people.

[0013] It is further another object of the present invention to provide such an audio reporting apparatus that may be attached not only to a potential wanderer but also to a potential lost dog or cat, thus detecting them.

[0014] It is further another object of the present invention to provide such an economical and easy-to-carry audio reporting apparatus that also incorporates the functions of the cellular phone etc.

[0015] To achieve the above objects, according to an aspect of the present invention, there is provided an audio reporting apparatus comprising: a child machine carried by a potential-wanderer, the child machine including: communication means for transmitting a radio wave for communication with a parent machine; power supply means for feeding power; signal processing means for processing a communication signal, stored

data and a speech output signal; and memory means for storing accident-warning speech, a communication code, a communication distance and other data; and the parent machine held by the wanderer's family, the parent machine including: communication means for receiving a radio wave from the child machine to return a response signal to the child machine; power supply means for feeding power; signal processing means for processing a communication signal, stored data, and a speech output signal; memory means for storing accident-warning speech, a communication code number, a communication distance and other data; speech outputting means for outputting speech according to an instruction from the signal processing means if there is provided no communication signal from the child machine to the communication means; and setting means for changing and specifying setting of data stored in the memory means.

[0016] In a preferred embodiment of the present invention, the child machine further comprises speech outputting means for outputting speech in response to an instruction from the signal processing means of the child machine if no response signal is returned from the parent machine to the communication means of the child machine.

[0017] According to the present invention, the audio reporting apparatus is capable of detecting a wanderer and preventing a person from losing or leaving of belongings. Unlike a conventional large apparatus, the audio reporting apparatus of present invention is economical, portable and convenient in handling. Further it is speedy and accurate. Furthermore it can be applied to detection of lost child, dog and cat.

[0018] In a preferred embodiment of the present invention, the speech outputting means comprises a speaker and a battery power supply.

[0019] In a preferred embodiment of the present invention, the child machine is a non-contact type IC card.

[0020] In a preferred embodiment of the present Invention, the parent machine is housed in a cellular phone and shares all or a part of the communication means, the power supply means, the signal processing means, the memory means, the speech outputting means, and the setting means with the cellular phone.

[0021] According to this embodiment, it is economical and can be used together with a function of a phone.

[0022] To achieve the above objects, according to another aspect of the present invention, there is provided an audio reporting apparatus comprising: a child machine carried by a potential wanderer, the child machine including: communication means for receiving a radio wave from a parent machine to return a response signal to the parent machine; power supply means for feeding power; signal processing means for a communication signal, stored data and a speech output signal; and memory means for storing accident-warning speech, a communication code number, a communication distance and other data; and the parent machine held by the wanderer's family, the parent machine including: communication means for transmitting a radio wave to communicate with the child machine; power supply means for feeding power; signal processing means for processing a communication signal, stored data and a speech output signal; memory means for storing accident-warning speech, a communication code number, a communication distance and other data; speech outputting means for outputting speech according to an instruction from the signal processing means if no response signal is returned to the communication means from the child machine; and setting means for changing and specifying setting of data stored in the memory means.

[0023] In a preferred embodiment of the present invention, the child machine further comprises speech outputting means for outputting speech according to an instruction from the signal processing means of the child machine if there is provided no communication signal from the parent machine to the communication means of the child machine.

[0024] In a preferred embodiment of the present invention, the speech outputting means comprises a speaker and a battery power supply.

[0025] In a preferred embodiment of the present invention, the child machine is a non-contact type IC card.

[0026] In a preferred embodiment of the present invention, the parent machine is housed in a cellular phone and shares all or a part of the communication means, the power supply means, the signal processing means, the memory means, the speech outputting means, and the setting means with the cellular phone.

[0027] To achieve the above objects, according to still another aspect of the present invention, there is provided an audio reporting apparatus comprising: a child machine attached to each of belongings of a person, the child machine including: communication means for receiving a robbery-warning radio wave from a parent machine; power supply means for feeding power; signal processing means for a communication signal, stored data and a speech output signal; memory means for storing robbery-warning speech, a communication code number, a communication distance and other data; and speech outputting means for outputting the robbery-warning speech according to an instruction from the signal processing means if the communication means receives the robbery-warning radio wave from the parent machine; and the parent machine held by the person, the parent machine including: communication means for transmitting the robbery-warning wave to the child machine if each of the belongings is robbed; power supply means for feeding power; signal processing means for processing a communication signal, stored data and a speech output signal; memory means for storing a communication code number, a communication distance and other data; and setting means for

changing and specifying setting of data stored in the memory means.

[0028] In a preferred embodiment of the present invention, the speech outputting means comprises a speaker and a battery power supply.

[0029] In a preferred embodiment of the present invention, the child machine is a non-contact type IC card.

[0030] In a preferred embodiment of the present invention, the parent machine is housed in a cellular phone and shares all or a part of the communication means, the power supply means, the signal processing means, the memory means, and the setting means with the cellular phone.

[0031] The nature, principle and utility of the invention will become more apparent from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] In the accompanying drawings:

Fig.1 is a diagram showing an example of a configuration of a conventional audio reporting apparatus for detecting a wanderer;

Figs.2A and 28 are block diagrams showing configurations of a child machine and a parent machine of an audio reporting apparatus for detecting a wanderer according to an embodiment of the present invention;

Figs.3A and 3B are block diagrams showing configurations of a child machine and a parent machine of an audio reporting apparatus for prevention of losing or leaving of an article, etc., according to an embodiment of the present invention;

Fig.4 is a flowchart for explaining operations of the child machine shown in Fig.2A, for transmitting a radio wave from the child machine to the parent machine;

Fig.5 is a flowchart for explaining operations of the parent machine shown in Fig.2B, for receiving a radio wave sent by the child machine;

Fig.6 is a flowchart for explaining operations of Fig.2A about the child machine that receives a radio wave sent from the parent machine;

Fig.7 is a flowchart for explaining operations of the parent machine of Fig.2B, in which a radio wave is transmitted from the parent machine to the child machine;

Fig.8 is a flowchart for explaining operations of the child machine of Fig.3A, in which steps ST7 and ST8 are deleted from the flowchart of Fig. 4 in order to prevent speech from being raised;

Fig.9 is a flowchart for explaining operations of the parent machine of Fig.3B, in which the steps ST19 and ST20 are deleted from the flowchart of Fig.5;

Fig.10 is a flowchart for explaining operations of the child machine of Fig.2A, with a difference from Figs.4 and 6 that a robbery message is forcedly reported by a radio wave indicating a robbery warning sent from the parent machine; and

Fig.11 is a flowchart for explaining operations of the parent machine of Fig.2B, with a difference from Figs.5 and 7 that a radio wave is forcedly transmitted from the parent machine for raising robbery-warning speech from the parent machine to the child machine.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] The following will describe embodiments of the present invention with reference to the drawings.

[0034] Figs.2A, 2B, 3A and 3B show respective basic configurations of an audio reporting apparatus according to the present invention for detecting a wanderer and preventing an article from being left behind.

[0035] The present audio reporting apparatus for wanderer detection and article-leaving prevention features that child and parent machines receive and transmit a radio wave therebetween which has power corresponding to a distance set therebetween so that if they are away from each other beyond the radio-wave communicating range, they may send a warning audio message to each other.

[0036] Fig.2A is a block diagram showing a configuration of a child machine of an audio reporting apparatus according to the present invention.

[0037] First, the child machine in Fig.2A which uses a micro-wave type non-contact IC card or PHS radio card, is capable of entering therein an address, a name, an age, a telephone number, etc. In the child machine in Fig.2A, a communication means 1 comes in a transceiver IC chip etc., to which are connected an antenna for receiving and transmitting a communication radio wave and a signal processing means 3. Although as the communication radio wave for the communication means 1 is selected a micro wave with a frequency in a 2GHZ band, it may be in a mega Hz or kilo Hz band for typical cellular phones. This communication means 1 is adapted to receive and transmit a radio wave with power corresponding to a specified distance as measured from the signal processing means 3. Note here that this distance is preferably about 30 meters for a wanderer and about 5 meters for losing or leaving behind an article.

[0038] Next, a power supply means 2 in Fig.2A comes in a small-sized battery etc., for feeding power to each function in the child machine. Note here that a typical non-contact IC card or a PHS radio card itself is not provided with a power supply such as a battery, so that the IC card receives an electromagnetic wave from an IC reader/writer to obtain DC power while the PHS radio card is obtain power from a personal computer or a portable terminal, whereas according to the present

invention, a battery, in particular, is provided because prolonged communication or speech output requires additional power.

[0039] The communication means 3 in the child machine in Fig.3A comes in a microprocessor etc., for extracting and processing accident warning speech, a communication code number, a communication distance, etc. stored in a memory means 4. This communication code number corresponds to a conventional cellular phone number, for recognizing a parent machine, while the communication distance comes in a distance with respect to the parent machine in communication. This signal processing means 3 also performs processing of such a signal with a communication code number added thereto received and transmitted at the above-mentioned communication means that has a radio wave having power corresponding to the communication distance. Moreover, it permits a speech outputting means 5 to output an accident-warning speech message if the above-mentioned communication means 1 is disabled to communication with the parent machine.

[0040] Next, the communication means 4 in the child machine shown in Fig.2A comes in a memory medium such as a flash memory or an EEPROM, for storing accident-warning speech type, sound volume, communication code number for communication with the parent machine, communication distance, and other data registered beforehand by an IC reader/writer for an IC card or by a personal computer for a PHS radio card.

[0041] The speech output means 5 in the child machine shown in Fig.2A comes in a small-sized speaker etc., for outputting a message with accident-warning speech and sound volume instructed by the above-mentioned signal processing means 3. Note here that the conventional non-contact IC card or the PHS radio card is not equipped with a speaker, so that the PHS radio card has an accessory small-sized earphone/microphone for speech communication services.

[0042] Fig.2B is a block diagram showing a configuration of a child machine of an audio reporting apparatus according to the present invention.

[0043] Although the parent machine in Fig.2B, on the other hand, may, like the child machine, come in a non-contact IC card or LHS radio card, according to the present invention, such a parent machine is assumed that is build in a cellular phone because it is economical since it can share some functions with a cellular phone or a PHS terminal.

[0044] First, at the parent machine shown in Fig.2B, a communication means 11 comes in, for example, a transceiver IC chip, to which are connected an antenna for receiving and transmitting a communication radio wave and a signal processing means 13. Although as the communication radio wave for the communications means 11 is selected a micro wave in a 2GHz band, it may be in a mega Hz or kilo Hz for typical cellular phones. This communication means 11 is adapted to receive and transmit a radio wave with power corresponding to a specified distance. Note here that this distance is preferably about 30 meters for a wanderer and about 5 meters for losing or leaving behind an article.

[0045] Next, a power supply means 12 in the parent machine shown in Fig.2B comes in, for example, a small-sized battery, for feeding power to various functions in the parent machine. According to the present invention, power is required for prolonged communication and speech output, so that a battery is equipped in particular. Note here that the battery can be shared in use if it is build in the cellular phone.

[0046] Also, the signal processing means 13 in the parent machine shown In Fig.2B comes in, for example, a microprocessor, for extracting and processing accident warning speech, a communication code number, a communication distance, etc. stored in a memory means 14. The communication code number corresponds to a conventional cellular phone number, for recognizing the child machine, while the communication distance is set at a distance with respect to the child machine. This signal processing means 13 performs also processing of such a signal with a communication code number added thereto received and transmitted at the above-mentioned communication means 11 that has a radio wave corresponding to the communication distance. Moreover, it permits a speech outputting means 15 to output an accident-warning speech message if the above-mentioned communication means 11 is disabled to communicate with the child machine.

[0047] Next, the memory means 14 in the parent machine shown in Fig.2B comes in a memory medium such as a flash memory or EEPROM, for storing sound volume, a communication code number for communication with the parent machine, a communication distance, and other data registered beforehand by an IC reader or personal computer.

[0048] The speech outputting means 15 in the parent machine shown in Fig.2B comes in a small-sized speaker etc., for outputting a message with accident-warning speech and sound volume instructed from the above-mentioned signal processing means 13.

[0049] A setting means 16 in the parent machine shown in Fig. 2B, on the other hand, is capable of changing the setting of and specifying data stored in the above-mentioned memory means 14. For example, it can change a communication distance or sound volume and specify combination or deletion of stored accident warning messages. This setting means 16 has an operation display image similar to an operation display portion of a typical cellular phone. Note here that the data set at the parent machine can be transmitted also to the child machine so that the child machine can change data stored in the memory means 4.

[0050] A propagation loss in reception and transmission of a radio wave between the child and parent machines is represented by $Pr = PT \cdot Gt \cdot Gr \cdot \lambda^2/(4\pi d)^2$ in terms of reception

power.

[0051] Since that loss is expressed in decibel (dB) and power in dBm (1mW = 0dBm), if [Pr], for example, is assumed to be $10\log_{10}Pr$, the following is obtained:

$$[Pr] = [Pt] + [Gt] + 2 \cdot [\lambda/d] + 2 \cdot [1/4\ \pi] + [Gr]$$

[0052] This means that the propagation loss is proportional to a square of a distance, wherein Pr is reception power, Pt is transmission power, Gt is a transmission antenna gain, λ is a radio-wave frequency wavelength, d is a distance for reception and transmission (unit: meter), and Gr is a reception antenna gain.

[0053] That is, when a reception/transmission distance between the child and parent machines is specified, the above-mentioned signal processing means 3 and 13 can use the above-mentioned equations to calculate power of a radio wave with power corresponding to that reception/transmission distance, thus posting the radio wave power to the above-mentioned communication means 1 and 11.

[0054] Figs.3A and 3B are block diagrams showing configurations of a child machine and a parent machine of an audio reporting apparatus for prevention of losing or leaving of an article, etc., according to an embodiment of the present invention, in which the child machine differs from that in Fig.2A in that it does not have the speech outputting means 5, but the others including the parent machine are the same as those in Figs.2A and 2B, so that its description is omitted here. Although the configuration shown in Fig.3A may be the same as that shown in Fig.2A in such a manner that the child machine would warns an accident of losing an article, the parent machine can readily tell an owner of his having lost his belonging, so that the child need not in particular have the speech outputting means 5.

[0055] With this, the configurations of Figs. 3A and 3B are the same as those of Figs.2A and 2B except that the child machine in Fig.3A does not have the speech outputting means 5.

[0056] The following will describe with reference to Figs.4-11 the operations of the above-mentioned configuration for detection of a wanderer and prevention of losing an article as well as the operations of an audio reporting apparatus for robbery prevention.

[0057] First, Fig.4 is a flowchart for explaining operations of the above-mentioned child machine shown in Fig.2A, for transmitting a radio wave from the child machine to the parent machine.

[0058] In Fig.4, necessary accident-warning speech, a communication code number, a communication distance, etc. are registered beforehand in the memory means 4 in the above-mentioned child machine (ST1). Then, the above-mentioned memory means 4 stores thus registered data (ST2). Next, the above-mentioned signal processing means 3 recognizes thus registered communication code number and the communication distance (ST3).

[0059] Next, according to an instruction from the above-mentioned signal processing means, the above-mentioned communication means 1 transmits a radio wave having power corresponding to the communication code number and the communication distance to the parent machine (ST4). Then, when the parent machine has received that radio wave, a response signal returned from the parent machine is confirmed (ST5).

[0060] When the response signal is returned from the parent machine, the process goes back to the above-mentioned step ST4, to repeatedly confirm the response signal from the parent machine (ST6). If the distance between the child and parent machines is too large for a radio wave corresponding to a communication distance registered in the above-mentioned memory means 4 to reach, thus disabling confirming response from the parent machine, the above-mentioned signal processing means 3 extract accident-warning data registered in the above-mentioned memory means 4, thereby instructing the above-mentioned speech outputting means 5 to report an accident audibly (ST7).

[0061] With this, the speech outputting means 5 in the child machine raises accident-warning speech (ST8). Then, the process is finished. Note here that for example as an accident-warning message given by the child machine of an audio reporting apparatus for wanderer detection, the speaker repeatedly reports an accident warning, saying "I am lost. Any one who has found me is expected to make contact with Nakamura, with a telephone number 00-0000." This is done for requesting a general passer-by to find a wanderer for detection. Also, since his address, name, age, telephone number, etc. are entered to the child machine, the finder can judge whether he lives near or not and also temporarily have him under protection until his family member comes up to them.

[0062] Now, Fig.5 is a flowchart for explaining the operations by the parent machine shown in Fig.2B, for receiving a radio wave sent by the child machine.

[0063] In Fig.5, necessary accident-warning speech, a communication code number, and a communication distance are registered beforehand in the memory means 14 (ST11). Then, the above-mentioned memory means 14 stored thus registered data (ST12). Next, the above-mentioned signal processing means 13 confirms thus registered communication code number and the communication distance (ST13).

[0064] Next, according to an instruction from the above-mentioned signal processing means, the above-mentioned communication means 11 receives from the child machine a radio wave having power corresponding to the communication code number and the communication distance (ST14). And whether any communication signal is given with respect to the child machine (ST15). When a communication signal is given with respect to the child machine, a response signal is

returned to the child machine (ST16). Then, the process goes back to the above-mentioned step ST14, to repeatedly confirm the communication signal sent from the child machine.

[0065] If the distance between the parent and child machines is too large for the communication signal to be communicated to the child machine, the above-mentioned signal processing means 13 extract the accident-warning speech data registered in the above-mentioned memory means 14, to instruct the above-mentioned speech outputting means 15 to report the accident speech (ST17). With this, the above-mentioned speech outputting means 15 raises that accident-warning speech (ST18).

[0066] Next, the process confirms whether the parent machine should stop the speech reporting (ST19). When it is not stopped, the reporting is continued. If it is stopped, the above-mentioned setting means 16 is operated to stop the reporting at the parent machine (ST20). Then, the process is finished.

[0067] Note here that for example as an accident-warning message raised at the parent machine of an audio reporting apparatus for wanderer detection, the speaker make an accident-warning reports, saying "Please, find missing Mr. or Ms. so-and-so." Since such a message speech can be automatically raised by the parent machine even at night if a wanderer got out of a registered communication range as far as his family has the parent machine even he is not attended by them.

[0068] Now, Fig.6 shows a flowchart for explaining the operations of Fig.2A about the child machine that receives a radio wave sent from the parent machine, in which the radio wave is received and transmitted in a direction opposite to that in Fig.4.

[0069] In Fig.6, necessary accident-warning speech, a communication code number, a communication distance, etc. are registered beforehand in the memory means 4 in the above-mentioned machine (ST21). Then, the above-mentioned memory means 4 stores thus registered data (ST22). Next, the above-mentioned signal processing means 3 confirms this registered communication code number and the communication distance (ST23).

[0070] Next, according to an instruction sent from the above-mentioned signal processing means 3, the above-mentioned communication means 1 receives a radio wave with a power corresponding to the communication code number and the communication distance sent from the parent machine (ST24). The, whether any communication signal is given with respect to the parent machine is confirmed (ST25). When a communication signal is given with respect to the parent machine, a response signal is returned to the parent machine (ST26). Then, the process goes back to the above-mentioned step ST24, to repeatedly confirm the communication signal from the parent machine.

[0071] If the distance between the parent and child machines is too large for the communication signal with respect to the parent machine to be confirmed, the above-mentioned signal processing means 3 extracts the accident-warning speech data registered in the above-mentioned memory means 4, to instruct the above-mentioned speech outputting means 5 to raise that accident-warning speech (ST27). Then, the above-mentioned speech outputting means 5 raises the accident-warning speech (ST28). Then, the process is finished.

[0072] Note here that the audio reporting apparatus according to the present invention can be used not only for detection of a wanderer but also for detection of a missing pet dog or cat. That is, the above-mentioned child machine can be attached to the neck of a dog or cat so that the speaker may repeatedly raise a message, saying "I am a missing dog Mary. Any one who has found me is expected to make contact with Nakamura, with a telephone number of 00-0000. You will be rewarded for that." With this, the people near the dog can recognize it to be missing and can expect a reward from his master, so that any one who has found it would usually have it under his protection and make contact with the master.

[0073] Now, Fig.7 shows a flowchart for explaining the operations of the above-mentioned parent machine of Fig.2B, in which a radio wave is transmitted from the parent machine to the child machine.

[0074] In Fig.7, necessary accident-warning speech, a communication code number, a communications distance, etc. are registered beforehand in the memory means 14 in the parent machine (ST31). Then, the above-mentioned memory means 14 stores this registered data (ST32). Next, the above-mentioned signal processing means 13 confirms thus registered communication code number and the communication distance (ST33).

[0075] Next, according an instruction from the above-mentioned signal processing means, the above-mentioned communication means 11 transmits to the child machine a radio wave with power corresponding to the communication code number and the communication distance (ST34). Then, when the radio wave is received by the child machine, a response signal returned from the child machine is confirmed (ST35).

[0076] When there is provided any response signal from the child machine, the process goes back to the above-mentioned step ST34, to repeatedly confirm the response signal from the child machine (ST36). If the distance between the child and parent machines is too large for the radio wave corresponding to the communication distance registered in the above-mentioned memory means 14 to reach for confirmation of response from the child machine, the above-mentioned signal processing means 13 extracts the accident-warning speech data registered in the above-mentioned memory means 14, to instruct the above-mentioned speech outputting means 15 to raise that accident-warning speech (ST37). Then, the above-mentioned

speech outputting means 15 raises that speech (ST38).

[0077] Next, whether the parent machine should stop raising the speech is confirmed (ST39). When it is not stopped, the reporting is continued. If it is stopped, the above-mentioned setting means 16 is operated to stop the reporting by the parent machine (ST40). Then, the process is finished.

[0078] Note here that the parent machine automatically reports a warning if the registered communication distance is exceeded, indicated by such an accident-warning message by the parent machine in the audio accident warning apparatus as saying "May pet dog Mary is missing, so please look for her" when some one's missing dog or cat is to be detected. With this, when her master has the parent machine, she can readily be found and protected.

[0079] Now, Fig.8 shows a flowchart for explaining the operations of the child machine of Fig.3A, in which steps ST7 and ST8 are deleted from the flowchart of Fig.4 in order to prevent speech from being raised. That is, since the communication distance registered for detection of a lost or left article is about 5 meters and the article can be readily found, the child machine need not in particular raise the speech.

[0080] In Fig.8, necessary accident-warning speech, a communication code number, a communication distance, etc. are registered beforehand in the memory means 4 in the above-mentioned child machine (ST41). Then, the above-mentioned memory means 4 stores thus registered data (ST42). Next, the above-mentioned signal processing means 3 confirms thus registered communication code number and the communication distance (ST43).

[0081] Next, according to an instruction from the above-mentioned signal processing means 3, the above-mentioned communication means 1 transmits to the parent machine a radio wave with power corresponding to the communication code number and the communication distance (ST44). With this, when that radio wave is received by the parent machine, a response signal returned from the parent machine is confirmed (ST45).

[0082] When there is provided a response signal from the parent machine, the process goes back to the above-mentioned step ST44, to repeatedly confirm the response signal sent from the parent machine (ST46). If the distance between the child and parent machines is too large for the radio wave corresponding to the communication distance registered in the above-mentioned memory means 4 to reach for confirmation of response from the parent machine, the process is finished.

[0083] Now, Fig.9 shows a flowchart for explaining the operations of the parent machine of Fig.3B, in which the steps ST19 and ST20 are deleted from the flowchart of Fig.5. That is, since the communication distance registered for detection of a lost or left article is about 5 meters and, when the parent machine raises an accident-warning speech, the owner can see it readily and comes up to the child machine to pick it up, when he comes within 5 meters from it, the parent machine resumes communication with the child machine and automatically stops audio reporting. Therefore, the functions of the steps ST19 and ST20 of Fig.5 are not in particular required here.

[0084] In Fig.9, necessary accident-warning speech, a communication code number, and a communication distance are registered beforehand in the memory means of the above-mentioned parent machine (ST51). Then, the above-mentioned memory means 14 stores thus registered data (ST52). Next, the above-mentioned signal processing means 13 confirms thus registered communication code number and the communication distance (ST53).

[0085] Next, according to an instruction from the above-mentioned signal processing means 13, the above-mentioned communication means 11 receives a radio wave with power corresponding to the communication code number and the communication distance from the child machine (ST54). And whether there is provided any communication signal with respect to the child machine is confirmed (ST55). When there is provided a communication signal with respect to the child machine, a response signal is returned to the child machine (ST56). Then, the process goes back to the above-mentioned step ST54, to repeatedly confirm the communication signal from the child machine.

[0086] If the distance between the child and parent machines is too large to confirm the communication signal with respect to the child machine, the above-mentioned signal processing means 13 extract the accident-warning speech data registered in the above-mentioned memory means 14, to instruct the above-mentioned speech outputting means 15 to raise that warning speech (ST57). Then, the above-mentioned speech outputting means 15 raises the warning speech (ST58). Then, the process is finished.

[0087] Note here that the parent machine of an audio reporting apparatus for prevention of loosing an article raises such an accident-warning message as saying "My car key is missing, please find it" using a speaker. This readily holds true also with such a case where the key fell off the pocket without being noticed by its owner.

[0088] Now, Fig.10 shows a flowchart for explaining the operations of the child machine of Fig.2A, with a difference from Figs.4 and 6 that a robbery message is forcedly reported by a radio wave indicating a robbery warning sent from the parent machine.

[0089] In Fig.10, necessary accident-warning speech, a communication code number, a communication distance, etc. are registered beforehand in the memory means 4 of the above-mentioned child machine (ST61). Then, the above-mentioned memory means 4 stores thus registered data (ST62). Next, the above-mentioned signal processing means 3 confirms thus registered communication code number and the

communication distance (ST63).

[0090] Next, whether the above-mentioned communication means 1 has received a robbery-warning radio wave from the parent machine is confirmed (ST64). If the robbery-warning radio wave is received, the above-mentioned signal processing means 3 extracts the robbery-warning speech data registered in the above-mentioned memory means 4, to instruct the above-mentioned speech outputting means 5 to raise that warning speech (ST65).

[0091] With this, the above-mentioned speech outputting means 5 in the child machine raises the robbery-warning speech (ST66). Then, whether the report stopping signal is sent from the parent machine is confirmed (ST67). When the report stopping signal is not sent from it, the robbery-warning speech continues to be raised. If the report stopping signal is sent from it, the robbery-warning report is stopped at the child machine (ST68). Then, the process is finished.

[0092] Note here that the speaker of the audio reporting apparatus for robbery protection raises such a robbery-warning message as saying "This is a robbed article, so make contact with police" to the surrounding people. In the case of a lost article, the message is reported to that effect. In the case of an oversea travel, the message is raised in English.

[0093] Now, Fig.11 is a flowchart for explaining the operations of the parent machine of Fig.2B, with a difference from Figs.5 and 7 that a radio wave is forcedly transmitted from the parent machine for raising robbery-warning speech from the parent machine to the child machine.

[0094] In Fig.11, necessary accident-warning speech, a communication code number, a communication distance, etc. are registered beforehand in the memory means 14 in the above-mentioned parent machine (ST71). Then, the above-mentioned memory means 14 stores thus registered data (ST72). Next, the above-mentioned signal processing means 13 confirms thus registered communication code number and the communication distance (ST73).

[0095] Next, whether a lost baggage is a robbed one is confirmed (ST74). If it has been robbed, the above-mentioned setting means 16 is used to indicates a robbery warning to the child machine (ST75). Then, the above-mentioned communication means 11 transmits to the child machine the communication code number and the robbery-warning radio wave (ST76).

[0096] When the robbed article is found, the above-mentioned setting means 16 is operated so as to stop the raising of the robbery warning by the child machine (ST77). With this, the parent machine permits the above-mentioned communication means 11 to transmit a signal for stopping the robbery-warning report (ST78). Then, the process is finished.

[0097] Note here that although the above-mentioned audio reporting apparatus for robbery prevention has been described in a case of the communication distance set at 200-300 meters, the functions of the above-mentioned audio reporting apparatus for wanderer detection and the robbery prevention may be combined to make two settings of the communication distance so that if the distance between the parent and child machines becomes 5 meters or more, when a baggage beside someone is robbed, first the parent machine may raises a losing-warning speech and be operated to permit the child machine to raise a robbery-warning message.

[0098] Thus, the above-mentioned configuration of the present embodiment permits the parent and child machines to raise their respective warning messages if the distance therebetween exceeds a registered value to disable communication therebetween. This feature can be effected in an audio reporting apparatus for wanderer detection in such a manner that family members can readily know that their member has been lost and take necessary actions even if they do not monitor him always. If the actions are delayed, a general passer-by may make contact with them, to readily locate him.

[0099] Conventionally, no one can tell whether a pedestrian may be a wanderer or a walking dog or cat may be lost, whereas according to the present invention, the child itself makes announcement, so that a general passer-by can decide it, thereby accelerating the detection. Thus, the one who has found a wandered or a lost dog or cat can have it under his protection and then make contact with the family or master, resulting in more accurate detection.

[0100] Also, an audio reporting apparatus for prevention of losing or leaving behind an article will make a report only if the distance between the parent and child machines exceeds 5 meters approximately, the person concerned can readily notice his article being lost or left behind.

[0101] Moreover, an audio reporting apparatus for robbery prevention will announce a robbed article to the surrounding people, the robber cannot escape carrying the robbed article. When used in a foreign country, it makes robbery announcement not only in English but also on the country concerned, thus improving the robbery preventing effects.

[0102] Although the present invention has been described with reference to the embodiments of an audio reporting apparatus for the detection of a lost dog or cat and the prevention of losing or leaving behind an article and robbery, it may be applied to other fields.

[0103] Although the audio reporting apparatus according to the present invention comprises a communication means, a power supply means, a signal processing means, a memory means, a speech outputting means, and a setting means, the components are not limited to them.

[0104] Various modifications may be possible without departing from the gist of the present invention.

Claims

1. An audio reporting apparatus comprising:

a child machine (6) carried by a potential-wanderer, the child machine including:

communication means (1) for transmitting a radio wave for communication with a parent machine (8);
power supply means (2) for feeding power;
signal processing means (3) for processing a communication signal, stored data and a speech output signal; and
memory means (4) for storing accident-warning speech, a communication code, a communication distance and other data; and

the parent machine (8) held by the wanderer's family, the parent machine including:

communication means (11) for receiving a radio wave from the child machine (6) to return a response signal to the child machine;
power supply means (12) for feeding power;
signal processing means (13) for processing a communication signal, stored data, and a speech output signal;
memory means (14) for storing accident-warning speech, a communication code number, a communication distance and other data;
speech outputting means (15) for outputting speech according to an instruction from the signal processing means (3) if there is provided no communication signal from the child machine to the communication means (11); and
setting means (16) for changing and specifying setting of data stored in the memory means (14).

2. An audio reporting apparatus according to claim 1, wherein the child machine (6) further comprises speech outputting means (5) for outputting speech in response to an instruction from the signal processing means (3) of the child machine if no response signal is returned from the parent machine (8) to the communication means (11) of the child machine (6).

3. An audio reporting apparatus according to claim 2, wherein the speech outputting means (5) comprises a speaker and a battery power supply.

4. An audio reporting apparatus according to claim 1, wherein the child machine (6) is a non-contact type IC card.

5. An audio reporting apparatus according to claim 1, wherein the parent machine (8) is housed in a cellular phone and shares all or a part of the communication means (11), the power supply means (12), the signal processing means (13), the memory means (14), the speech outputting means (15), and the setting means (16) with the cellular phone.

6. An audio reporting apparatus comprising:

a child machine (6) carried by a potential wanderer, the child machine including:

communication means (1) for receiving a radio wave from a parent machine (8) to return a response signal to the parent machine;
power supply means (2) for feeding power;
signal processing means (3) for a communication signal, stored data and a speech output signal; and
memory means (4) for storing accident-warning speech, a communication code number, a communication distance and other data; and

the parent machine (8) held by the wanderer's family, the parent machine including:

communication means (11) for transmitting a radio wave to communicate with the child machine (6);
power supply means (12) for feeding power;
signal processing means (13) for processing a communication signal, stored data and a speech output signal;
memory means (14) for storing accident-warning speech, a communication code number, a communication distance and other data;
speech outputting means (15) for outputting speech according to an instruction from the signal processing means (13) if no response signal is returned to the communication means (11) from the child machine (6); and
setting means (16) for changing and specifying setting of data stored in the memory means (14).

7. An audio reporting apparatus according to claim 6, wherein the child machine (6) further comprises speech outputting means (5) for outputting speech

according to an instruction from the signal processing means (3) of the child machine if there is provided no communication signal from the parent machine (8) to the communication means (1) of the child machine.

8. An audio reporting apparatus according to claim 7, wherein the speech outputting means (5) comprises a speaker and a battery power supply.

9. An audio reporting apparatus according to claim 6, wherein the child machine (6) is a non-contact type IC card.

10. An audio reporting apparatus according to claim 6, wherein the parent machine (8) is housed in a cellular phone and shares all or a part of the communication means (11), the power supply means (12), the signal processing means (13), the memory means (14), the speech outputting means (15), and the setting means (16) with the cellular phone.

11. An audio reporting apparatus comprising:

a child machine (6) attached to each of belongings of a person, the child machine including:

communication means (1) for receiving a robbery-warning radio wave from a parent machine (8);
power supply means (2) for feeding power;
signal processing means (3) for a communication signal, stored data and a speech output signal;
memory means (4) for storing robbery-warning speech, a communication code number, a communication distance and other data; and
speech outputting means (5) for outputting the robbery-warning speech according to an instruction from the signal processing means (3) if the communication means (1) receives the robbery-warning radio wave from the parent machine (8); and

the parent machine (8) held by the person, the parent machine including:

communication means (11) for transmitting the robbery-warning wave to the child machine (6) if each of the belongings is robbed;
power supply means (12) for feeding power;
signal processing means (13) for processing a communication signal, stored data and a speech output signal;
memory means (14) for storing a communication code number, a communication distance and other data; and
setting means (16) for changing and specifying setting of data stored in the memory means (14).

12. An audio reporting apparatus according to claim 11, wherein the speech outputting means (5) comprises a speaker and a battery power supply.

13. An audio reporting apparatus according to claim 11, wherein the child machine (6) is a non-contact type IC card.

14. An audio reporting apparatus according to claim 11, wherein the parent machine (8) is housed in a cellular phone and shares all or a part of the communication means (11), the power supply means (12), the signal processing means (13), the memory means (14), and the setting means (16) with the cellular phone.

15. Apparatus comprising first and second devices adapted to be in radio communication with each other over a predetermined communication range, the first device being fittable to an article or being and the second device comprising a warning generating means activatable to provide a warning when the distance between said devices is greater than said predetermined communication range.

FIG. 1
PRIOR ART

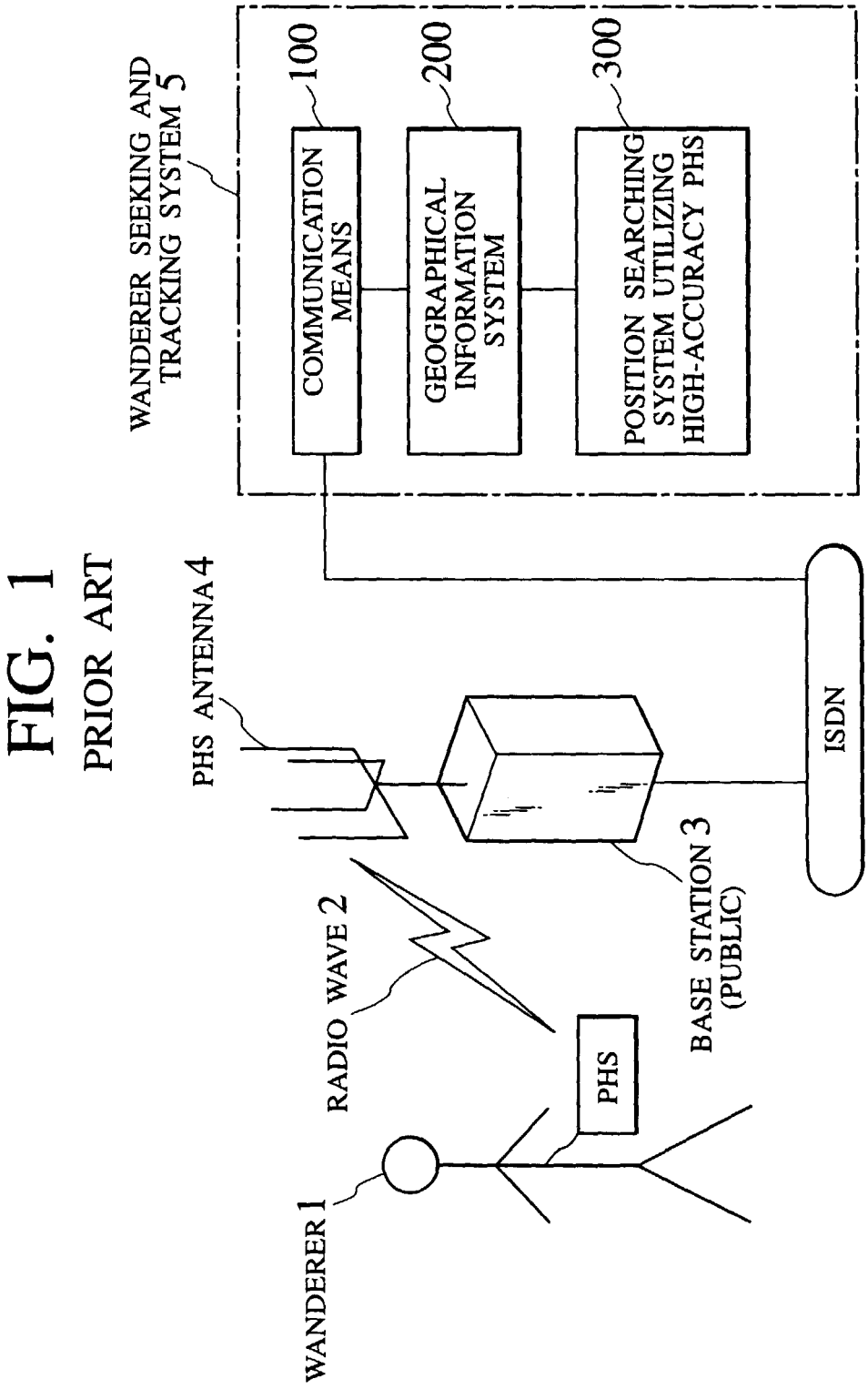


FIG. 2A

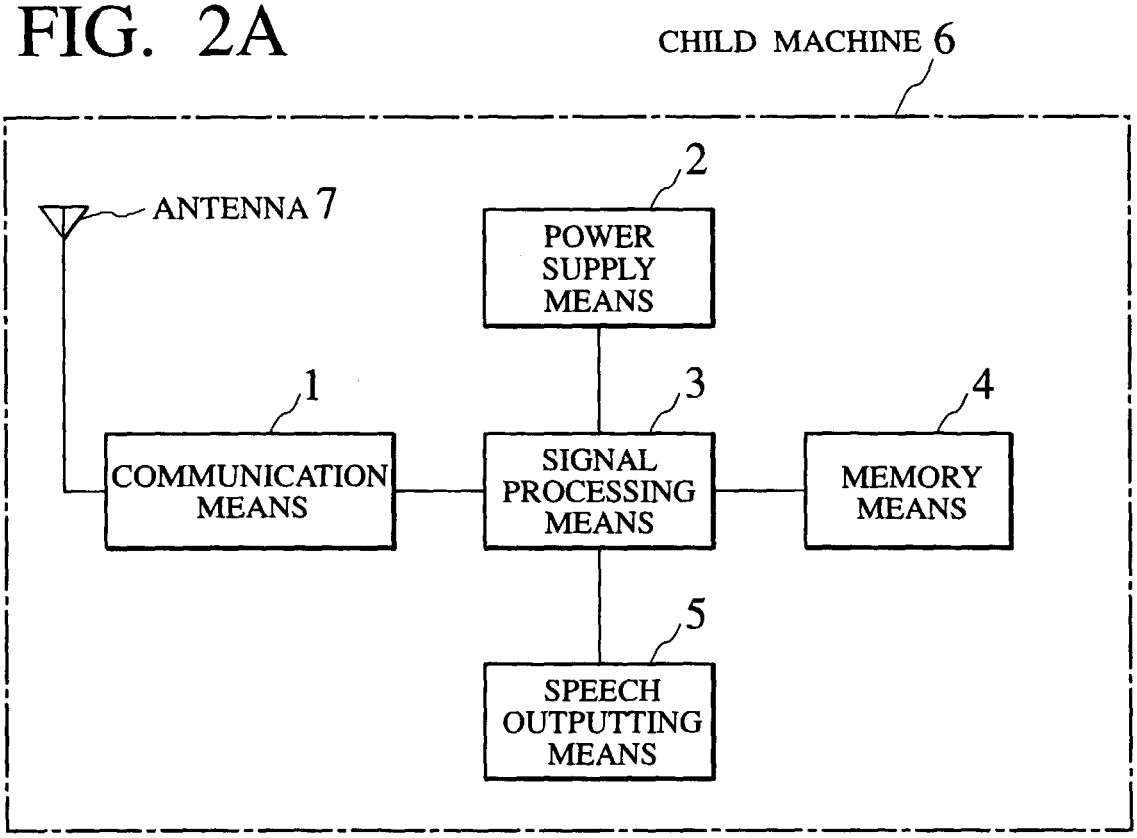

CHILD MACHINE 6
ANTENNA 7
2
POWER SUPPLY MEANS
1
COMMUNICATION MEANS
3
SIGNAL PROCESSING MEANS
4
MEMORY MEANS
5
SPEECH OUTPUTTING MEANS

FIG. 2B

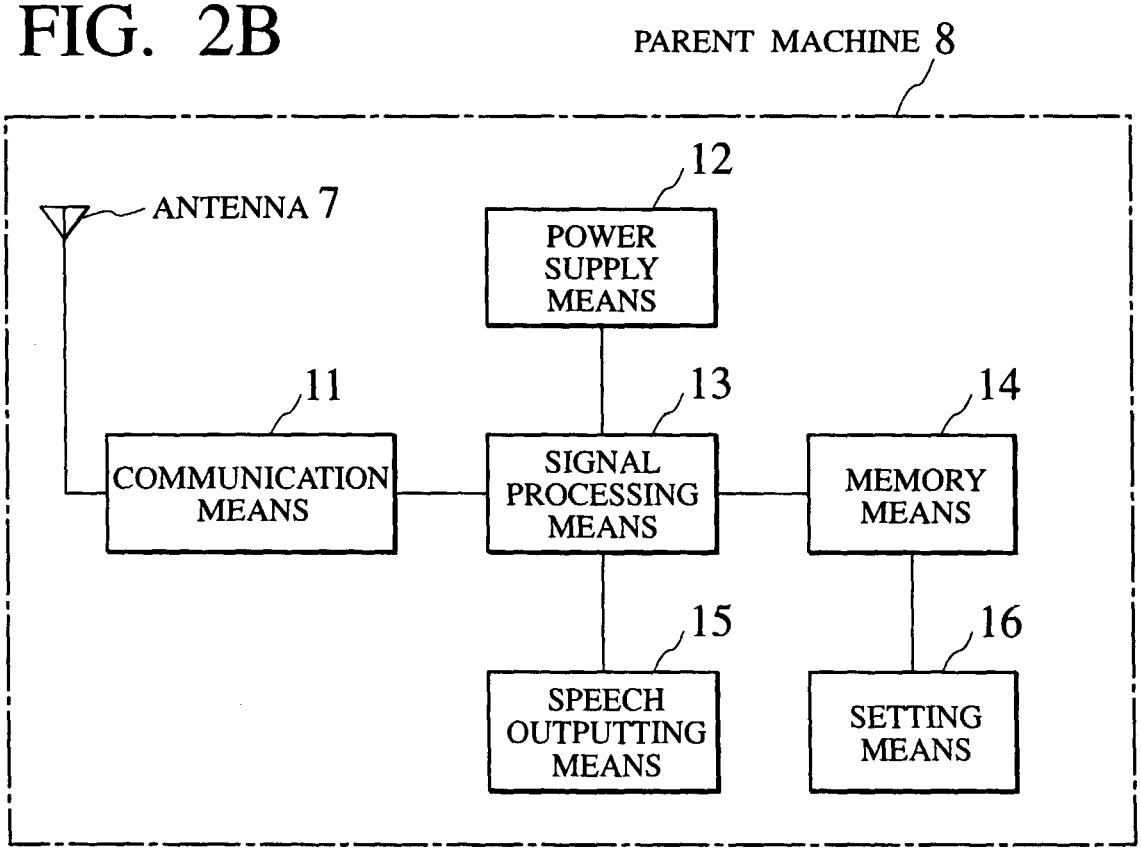

PARENT MACHINE 8
ANTENNA 7
12
POWER SUPPLY MEANS
11
COMMUNICATION MEANS
13
SIGNAL PROCESSING MEANS
14
MEMORY MEANS
15
SPEECH OUTPUTTING MEANS
16
SETTING MEANS

FIG. 3A

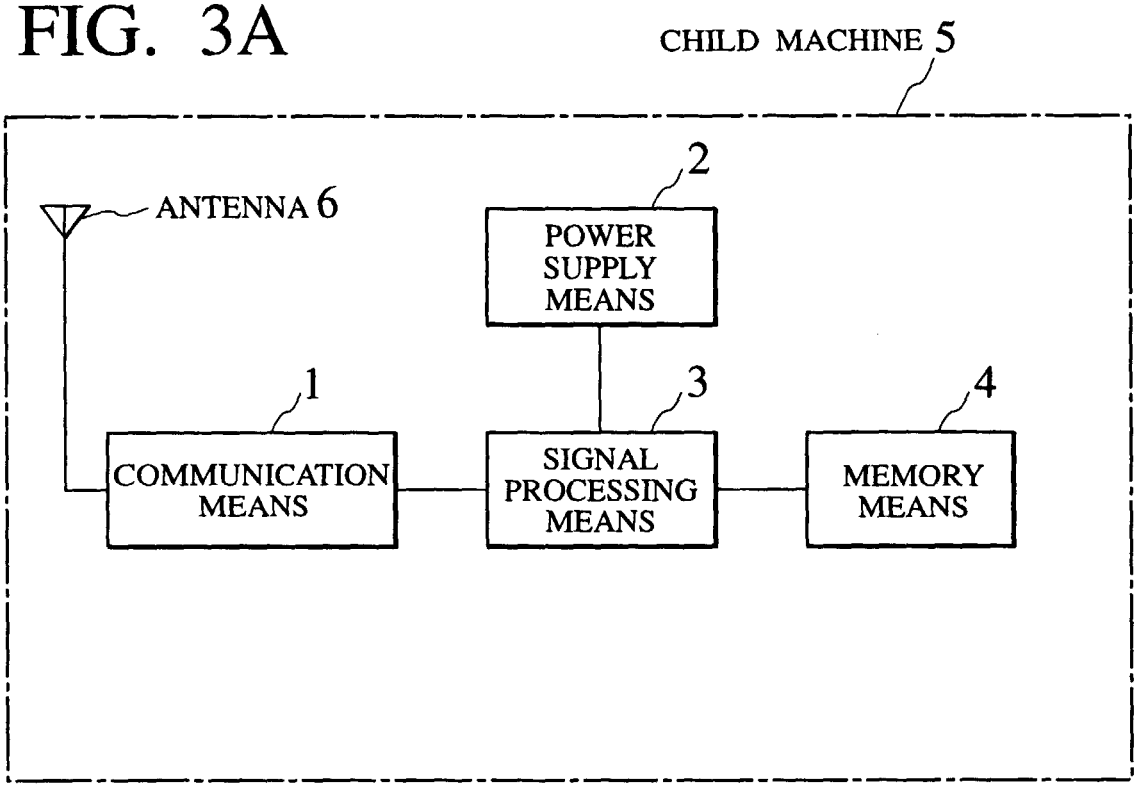

CHILD MACHINE 5
ANTENNA 6
2
POWER SUPPLY MEANS
1
3
4
COMMUNICATION MEANS
SIGNAL PROCESSING MEANS
MEMORY MEANS

FIG. 3B

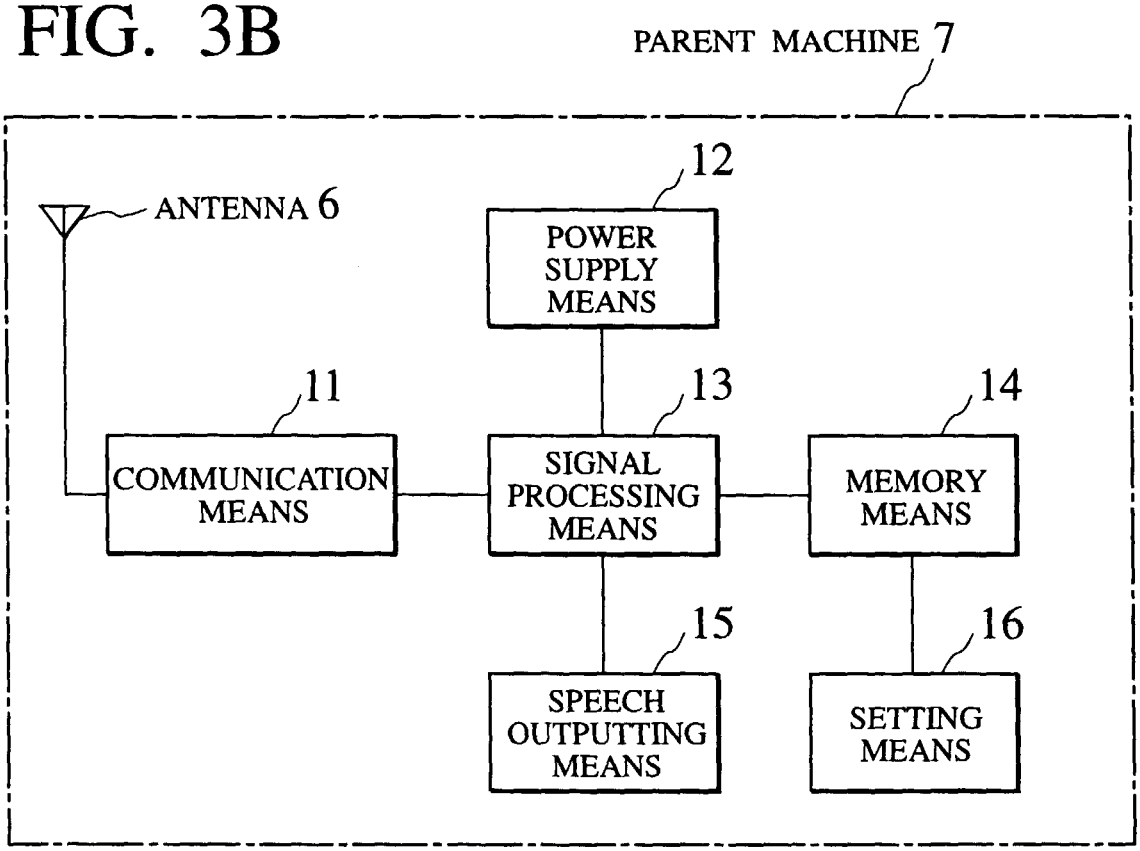

PARENT MACHINE 7
ANTENNA 6
12
POWER SUPPLY MEANS
11
13
14
COMMUNICATION MEANS
SIGNAL PROCESSING MEANS
MEMORY MEANS
15
16
SPEECH OUTPUTTING MEANS
SETTING MEANS

FIG. 4

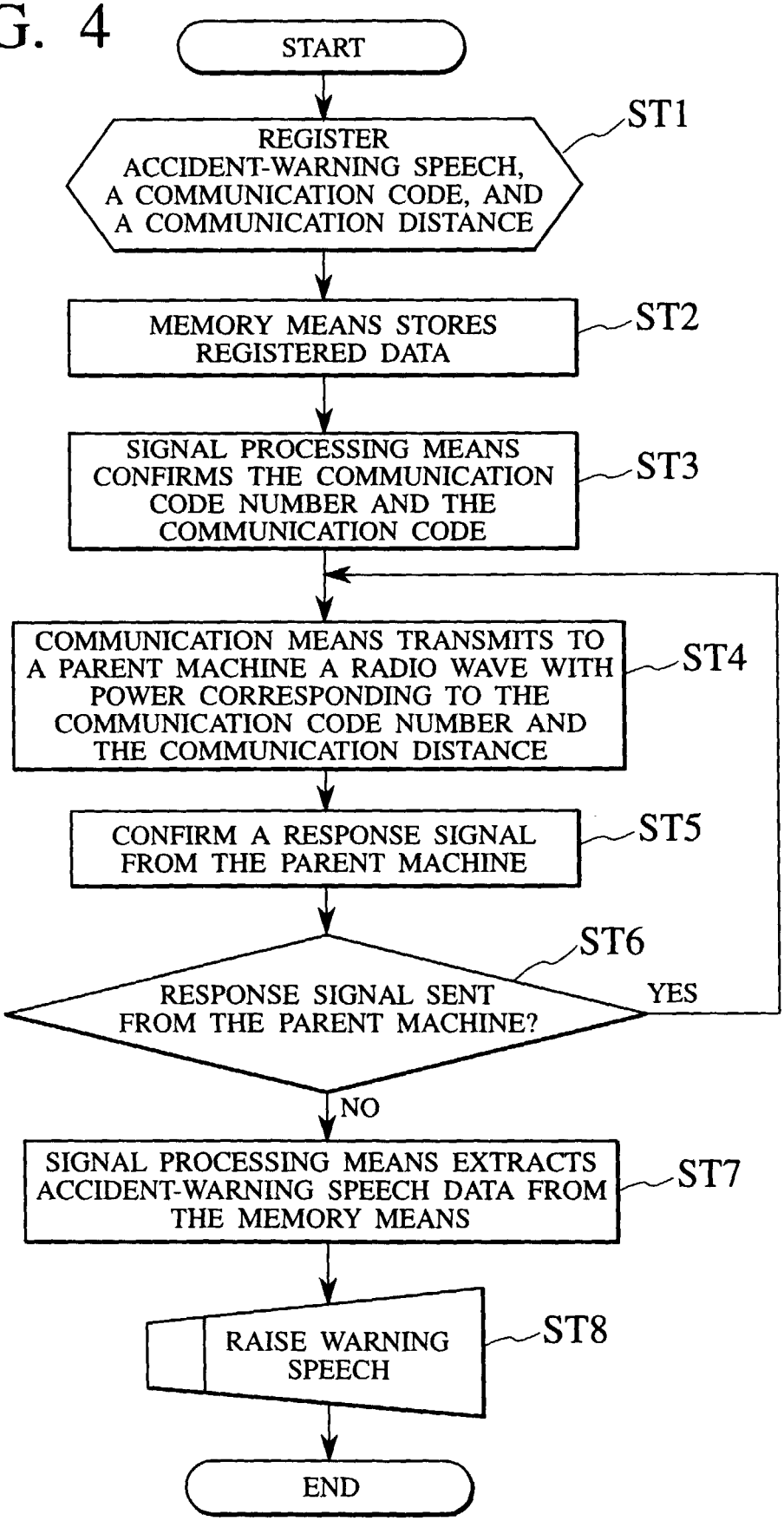

START
REGISTER ACCIDENT-WARNING SPEECH, A COMMUNICATION CODE, AND A COMMUNICATION DISTANCE
ST1
MEMORY MEANS STORES REGISTERED DATA
ST2
SIGNAL PROCESSING MEANS CONFIRMS THE COMMUNICATION CODE NUMBER AND THE COMMUNICATION CODE
ST3
COMMUNICATION MEANS TRANSMITS TO A PARENT MACHINE A RADIO WAVE WITH POWER CORRESPONDING TO THE COMMUNICATION CODE NUMBER AND THE COMMUNICATION DISTANCE
ST4
CONFIRM A RESPONSE SIGNAL FROM THE PARENT MACHINE
ST5
ST6
RESPONSE SIGNAL SENT FROM THE PARENT MACHINE?
YES
NO
SIGNAL PROCESSING MEANS EXTRACTS ACCIDENT-WARNING SPEECH DATA FROM THE MEMORY MEANS
ST7
RAISE WARNING SPEECH
ST8
END

FIG. 5

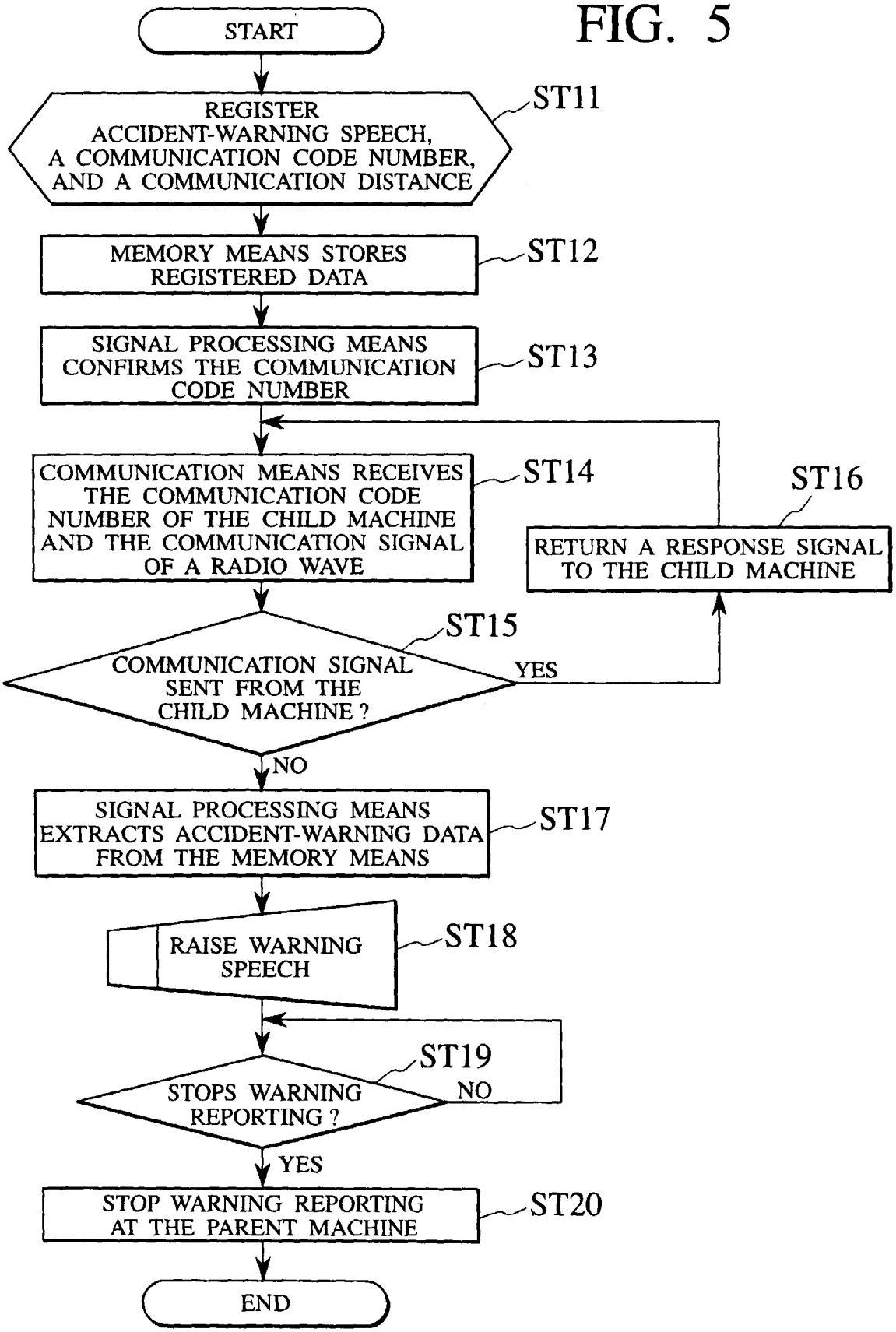

START
REGISTER ACCIDENT-WARNING SPEECH, A COMMUNICATION CODE NUMBER, AND A COMMUNICATION DISTANCE
ST11
MEMORY MEANS STORES REGISTERED DATA
ST12
SIGNAL PROCESSING MEANS CONFIRMS THE COMMUNICATION CODE NUMBER
ST13
COMMUNICATION MEANS RECEIVES THE COMMUNICATION CODE NUMBER OF THE CHILD MACHINE AND THE COMMUNICATION SIGNAL OF A RADIO WAVE
ST14
ST16
RETURN A RESPONSE SIGNAL TO THE CHILD MACHINE
ST15
COMMUNICATION SIGNAL SENT FROM THE CHILD MACHINE ?
YES
NO
SIGNAL PROCESSING MEANS EXTRACTS ACCIDENT-WARNING DATA FROM THE MEMORY MEANS
ST17
RAISE WARNING SPEECH
ST18
ST19
STOPS WARNING REPORTING ?
NO
YES
STOP WARNING REPORTING AT THE PARENT MACHINE
ST20
END

FIG. 6

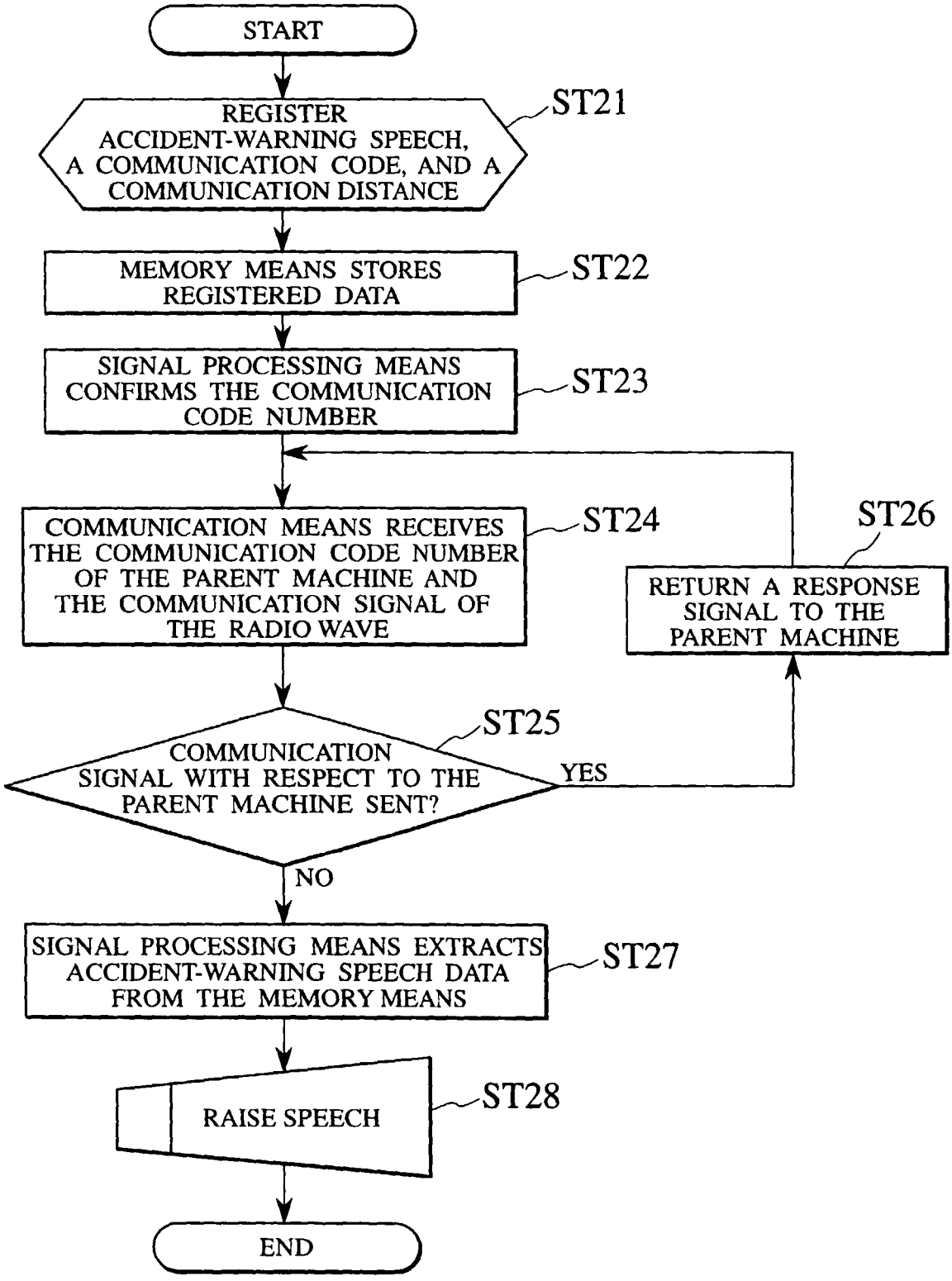

START
REGISTER ACCIDENT-WARNING SPEECH, A COMMUNICATION CODE, AND A COMMUNICATION DISTANCE
ST21
MEMORY MEANS STORES REGISTERED DATA
ST22
SIGNAL PROCESSING MEANS CONFIRMS THE COMMUNICATION CODE NUMBER
ST23
COMMUNICATION MEANS RECEIVES THE COMMUNICATION CODE NUMBER OF THE PARENT MACHINE AND THE COMMUNICATION SIGNAL OF THE RADIO WAVE
ST24
ST26
RETURN A RESPONSE SIGNAL TO THE PARENT MACHINE
ST25
COMMUNICATION SIGNAL WITH RESPECT TO THE PARENT MACHINE SENT?
YES
NO
SIGNAL PROCESSING MEANS EXTRACTS ACCIDENT-WARNING SPEECH DATA FROM THE MEMORY MEANS
ST27
RAISE SPEECH
ST28
END

FIG. 7

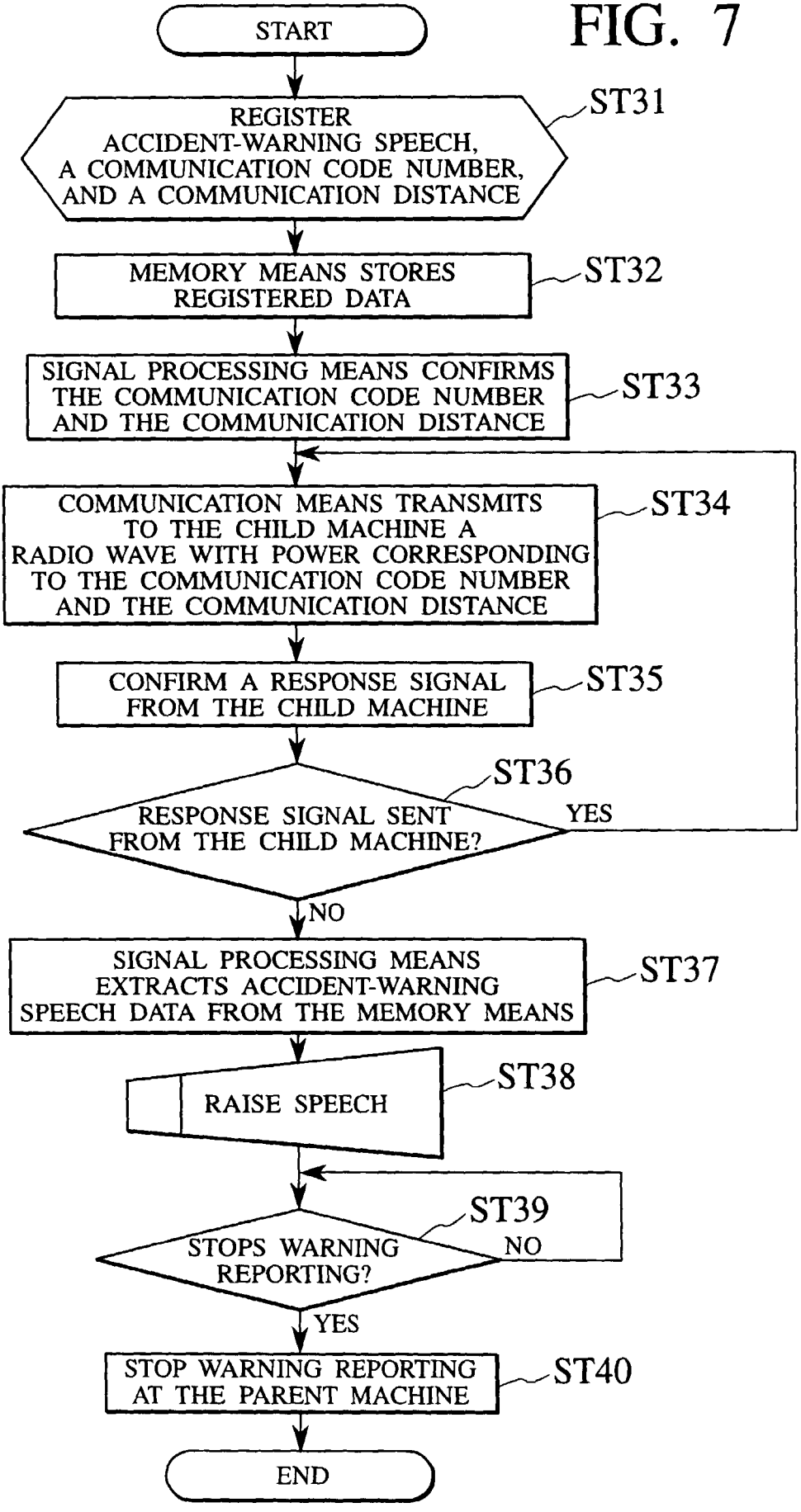

START
REGISTER ACCIDENT-WARNING SPEECH, A COMMUNICATION CODE NUMBER, AND A COMMUNICATION DISTANCE
ST31
MEMORY MEANS STORES REGISTERED DATA
ST32
SIGNAL PROCESSING MEANS CONFIRMS THE COMMUNICATION CODE NUMBER AND THE COMMUNICATION DISTANCE
ST33
COMMUNICATION MEANS TRANSMITS TO THE CHILD MACHINE A RADIO WAVE WITH POWER CORRESPONDING TO THE COMMUNICATION CODE NUMBER AND THE COMMUNICATION DISTANCE
ST34
CONFIRM A RESPONSE SIGNAL FROM THE CHILD MACHINE
ST35
RESPONSE SIGNAL SENT FROM THE CHILD MACHINE?
ST36
YES
NO
SIGNAL PROCESSING MEANS EXTRACTS ACCIDENT-WARNING SPEECH DATA FROM THE MEMORY MEANS
ST37
RAISE SPEECH
ST38
STOPS WARNING REPORTING?
ST39
NO
YES
STOP WARNING REPORTING AT THE PARENT MACHINE
ST40
END

FIG. 8

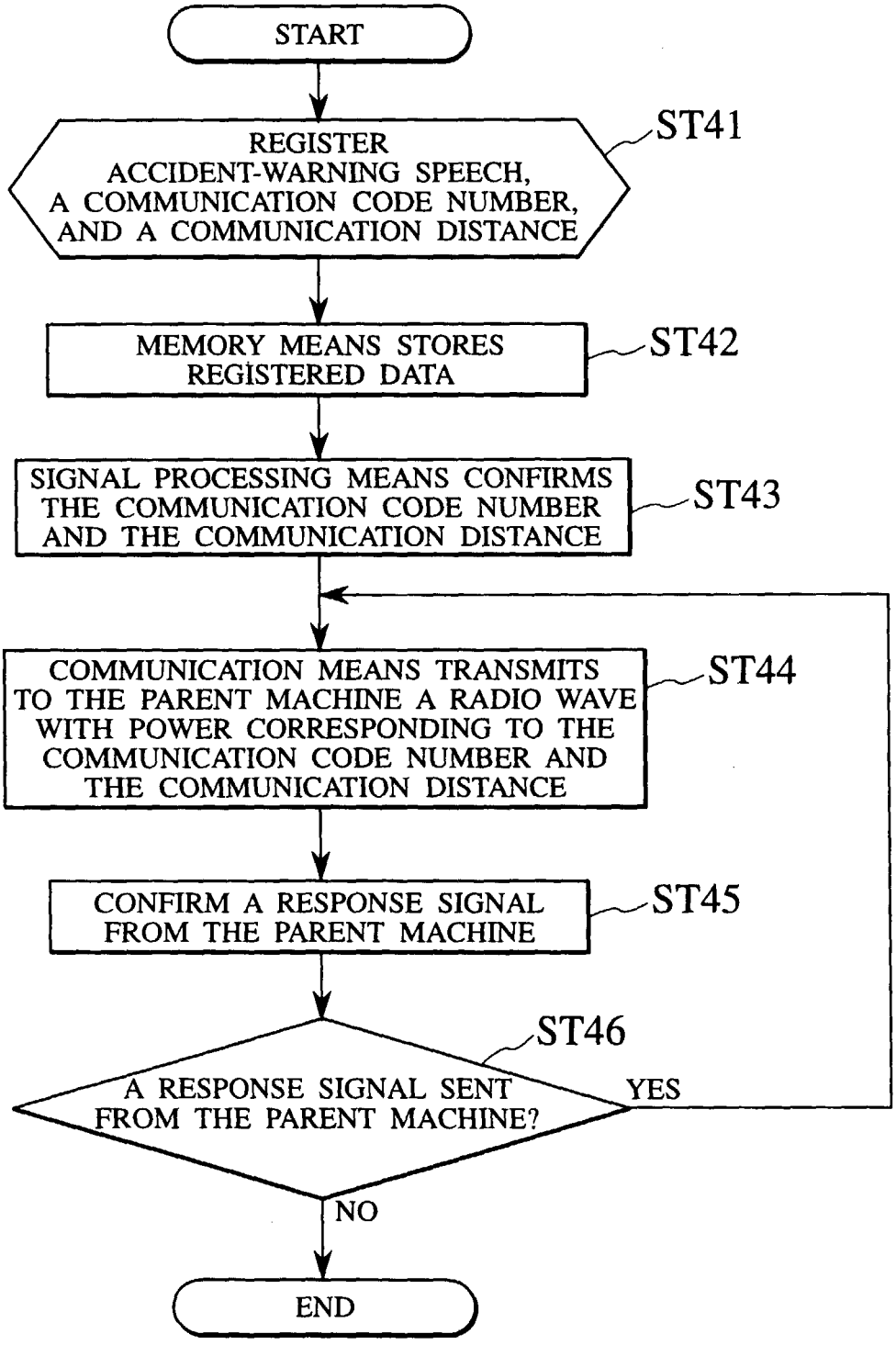

START
REGISTER ACCIDENT-WARNING SPEECH, A COMMUNICATION CODE NUMBER, AND A COMMUNICATION DISTANCE
ST41
MEMORY MEANS STORES REGISTERED DATA
ST42
SIGNAL PROCESSING MEANS CONFIRMS THE COMMUNICATION CODE NUMBER AND THE COMMUNICATION DISTANCE
ST43
COMMUNICATION MEANS TRANSMITS TO THE PARENT MACHINE A RADIO WAVE WITH POWER CORRESPONDING TO THE COMMUNICATION CODE NUMBER AND THE COMMUNICATION DISTANCE
ST44
CONFIRM A RESPONSE SIGNAL FROM THE PARENT MACHINE
ST45
ST46
A RESPONSE SIGNAL SENT FROM THE PARENT MACHINE?
YES
NO
END

FIG. 9

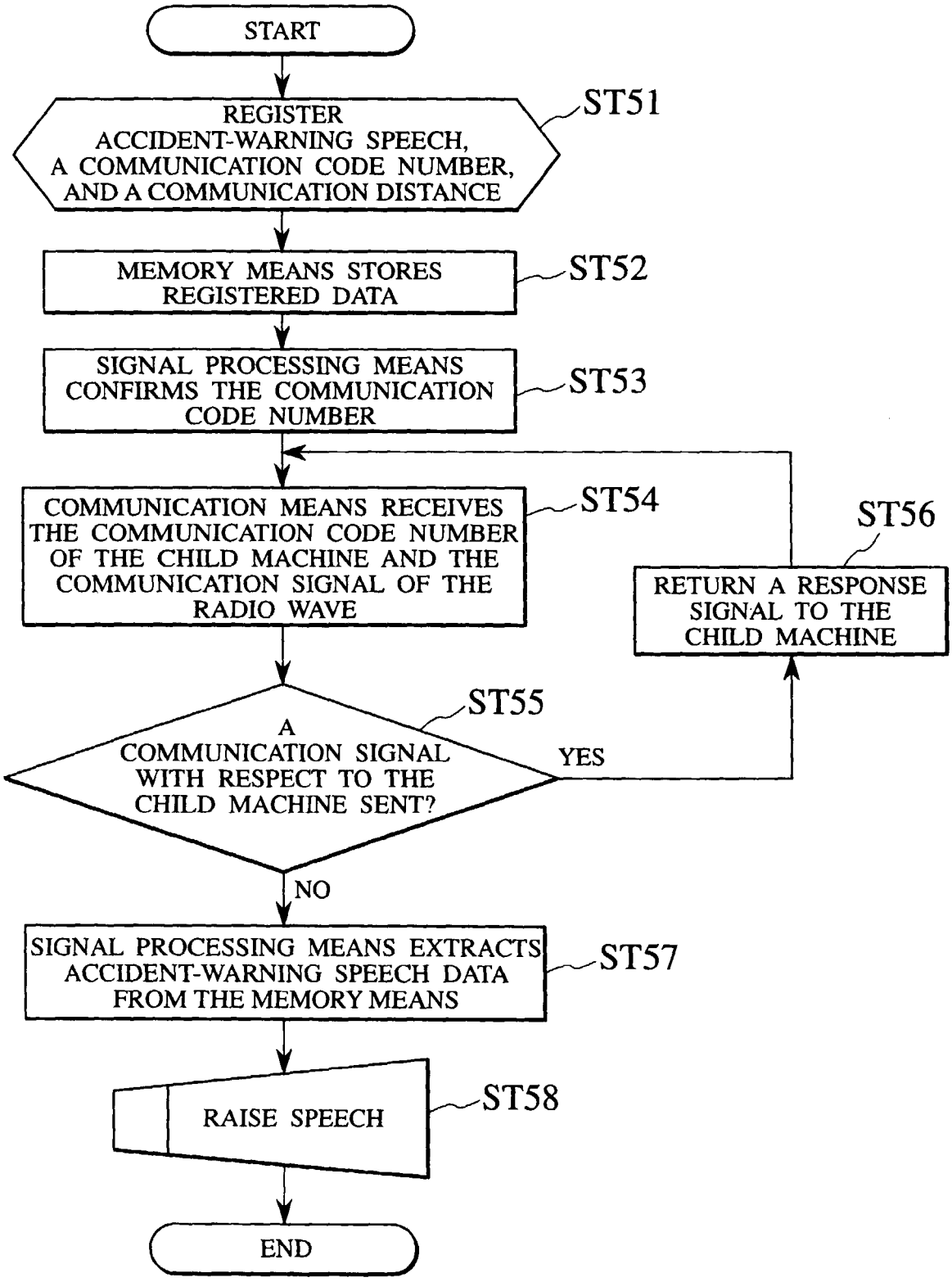

START
REGISTER ACCIDENT-WARNING SPEECH, A COMMUNICATION CODE NUMBER, AND A COMMUNICATION DISTANCE
ST51
MEMORY MEANS STORES REGISTERED DATA
ST52
SIGNAL PROCESSING MEANS CONFIRMS THE COMMUNICATION CODE NUMBER
ST53
COMMUNICATION MEANS RECEIVES THE COMMUNICATION CODE NUMBER OF THE CHILD MACHINE AND THE COMMUNICATION SIGNAL OF THE RADIO WAVE
ST54
ST56
RETURN A RESPONSE SIGNAL TO THE CHILD MACHINE
ST55
A COMMUNICATION SIGNAL WITH RESPECT TO THE CHILD MACHINE SENT?
YES
NO
SIGNAL PROCESSING MEANS EXTRACTS ACCIDENT-WARNING SPEECH DATA FROM THE MEMORY MEANS
ST57
RAISE SPEECH
ST58
END

FIG. 10

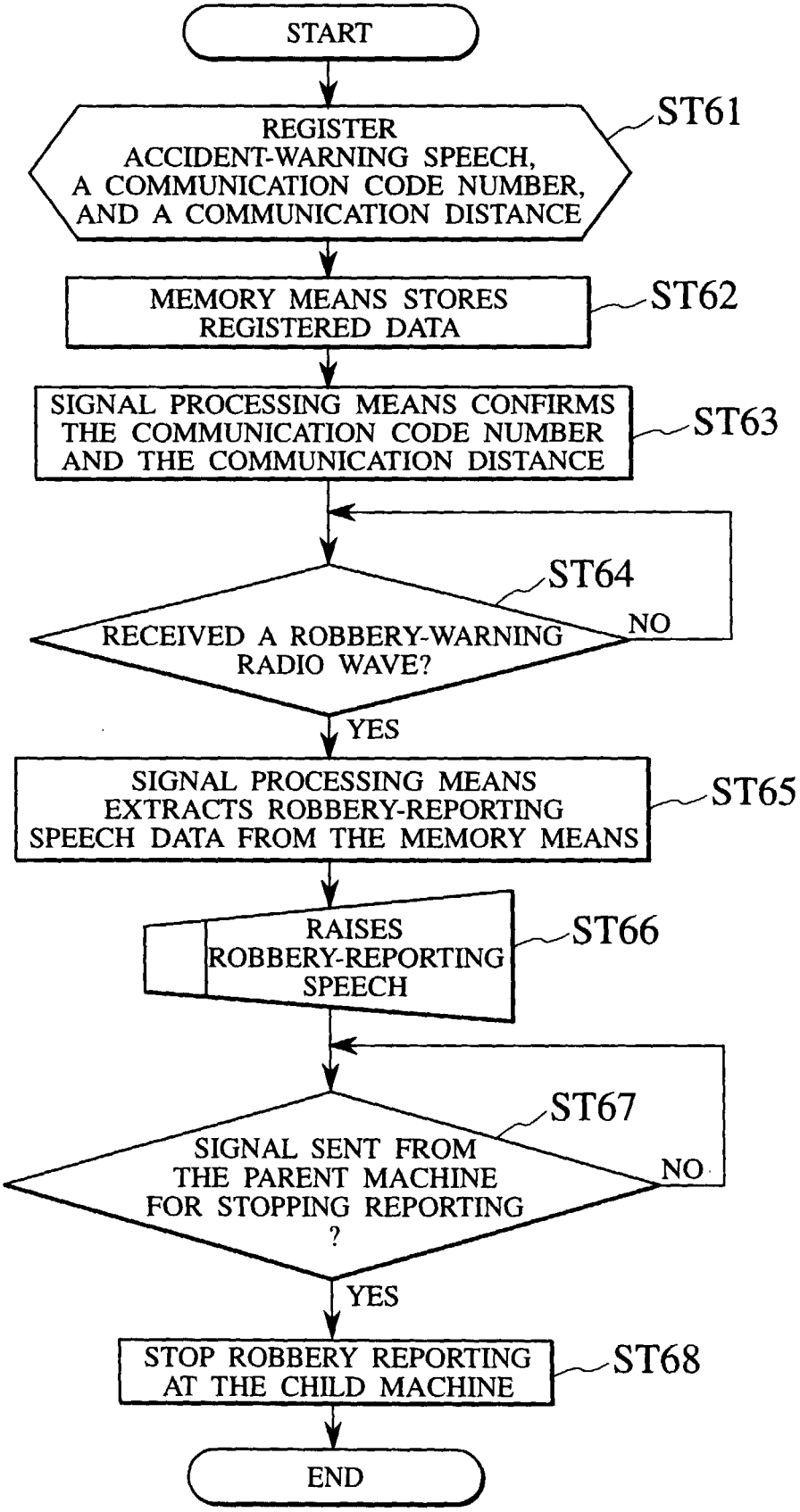
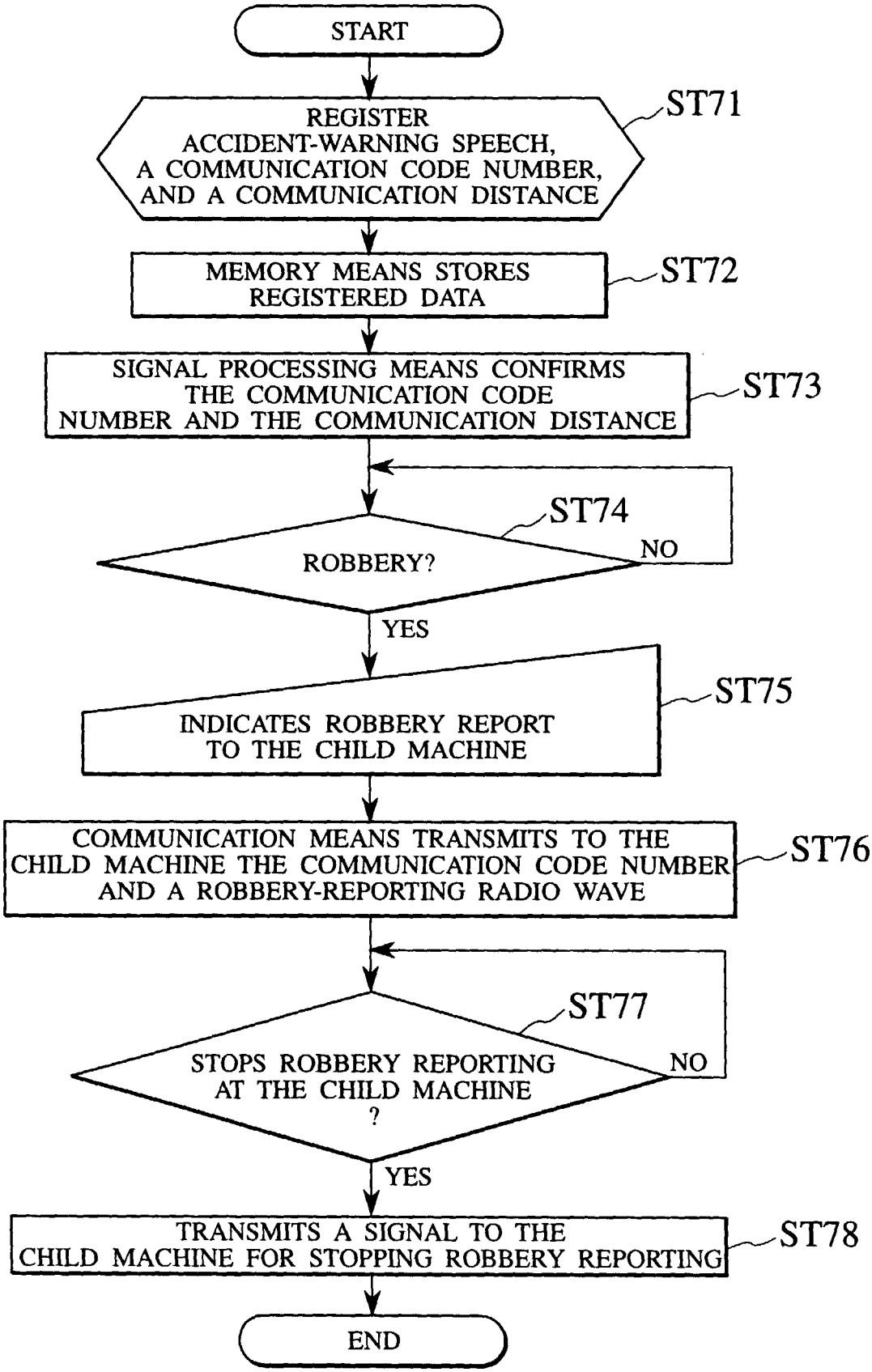

START
REGISTER ACCIDENT-WARNING SPEECH, A COMMUNICATION CODE NUMBER, AND A COMMUNICATION DISTANCE
ST61
MEMORY MEANS STORES REGISTERED DATA
ST62
SIGNAL PROCESSING MEANS CONFIRMS THE COMMUNICATION CODE NUMBER AND THE COMMUNICATION DISTANCE
ST63
ST64
RECEIVED A ROBBERY-WARNING RADIO WAVE?
NO
YES
SIGNAL PROCESSING MEANS EXTRACTS ROBBERY-REPORTING SPEECH DATA FROM THE MEMORY MEANS
ST65
RAISES ROBBERY-REPORTING SPEECH
ST66
ST67
SIGNAL SENT FROM THE PARENT MACHINE FOR STOPPING REPORTING ?
NO
YES
STOP ROBBERY REPORTING AT THE CHILD MACHINE
ST68
END

FIG. 11


START
REGISTER ACCIDENT-WARNING SPEECH, A COMMUNICATION CODE NUMBER, AND A COMMUNICATION DISTANCE
ST71
MEMORY MEANS STORES REGISTERED DATA
ST72
SIGNAL PROCESSING MEANS CONFIRMS THE COMMUNICATION CODE NUMBER AND THE COMMUNICATION DISTANCE
ST73
ST74
ROBBERY?
NO
YES
INDICATES ROBBERY REPORT TO THE CHILD MACHINE
ST75
COMMUNICATION MEANS TRANSMITS TO THE CHILD MACHINE THE COMMUNICATION CODE NUMBER AND A ROBBERY-REPORTING RADIO WAVE
ST76
ST77
STOPS ROBBERY REPORTING AT THE CHILD MACHINE ?
NO
YES
TRANSMITS A SIGNAL TO THE CHILD MACHINE FOR STOPPING ROBBERY REPORTING
ST78
END