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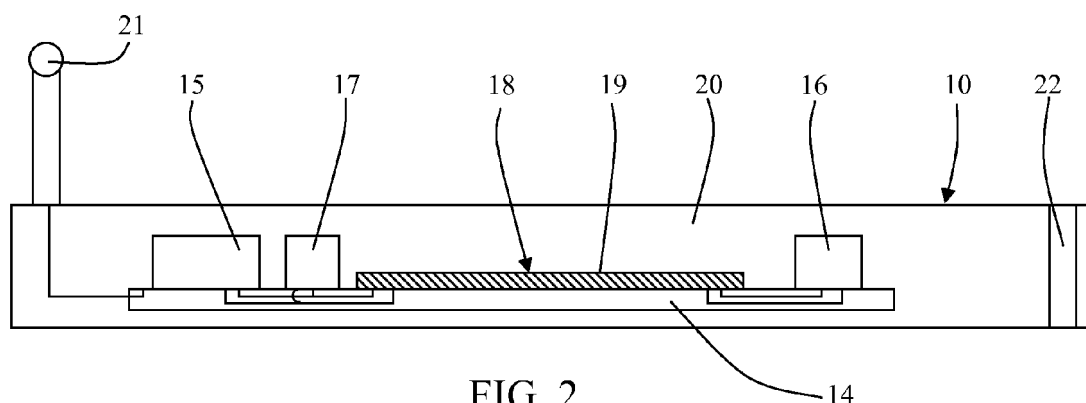
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(54) **Localization system comprising at least one localization device and one display device**

(57) The present invention concerns a localization system comprising at least one localization device (10) and one display device (11). Said localization device (10) comprises at least a localization module (15), a trans-

mission module (16) and a power supply (18). The localization system is characterized in that the localization module (15), the transmission module (16) and the power supply (18) are mounted on a flexible circuit (14) and are interconnected by this flexible circuit (14).



Description

TECHNICAL FIELD

[0001] The present invention concerns a localization system formed of a plurality of elements, at least one of these elements, called localization device, being carried by a person, an animal or an object which location is to be monitored and at least one other element, called display device, being used to inform a user about the location of the localization device.

BACKGROUND ART

[0002] Several localization systems exist today. These systems are well adapted to different bearer of these systems, these bearers being objects, animals or human beings.

[0003] In these systems, the specific design is generally adapted to one kind of bearer and can generally not be adapted to another kind. Therefore, a specific embodiment is necessary. Thus, it is not possible to use a localization device in several different applications.

[0004] The object of the present invention is to provide a device that can be used in several applications, This means that the device can be adapted to several supports for example. This also means that the device has modular functions which can be used or not, depending on the specific requirements of the application.

[0005] Such a system is described for example in the patent application N° WO 2003/058273. In this system, a first device is implemented in the body of an animal. This first device comprises an identification code that enables the individual identification of the animal. The animal must further bear a localization device, a communication device and a reading device. The localization device must determine its position. The reading device reads the identification code and transmits it to the communication device. The identification code is then transmitted to a management center that can identify and localize the animal.

[0006] This device is useful in a very specific application. However, it is not modular and several problems such as power alimentation for example should be solved if applied elsewhere.

DISCLOSURE OF INVENTION

[0007] The object of the present invention is a localization system comprising at least one localization device and one display device, said localization device comprising at least a localization module, a transmission module and a power supply, characterized in that the localization module, the transmission module and the power supply are mounted on a flexible circuit and are interconnected by this flexible circuit.

[0008] According to the invention, the system is formed of at least two elements, one of them, called localization

device, being attached to a person, an animal or an object which position is to be monitored and herein called the bearer. The other object is called display device and is used to read and display the position monitored. Depending on the application, a management center can be used, in particular when confidentiality issues are important. The management center can for example use cryptographic means to ensure that the location of the bearer is transmitted only to the authorized user. The management center can also manage authorizations as well as other specifications of the system. For example, the location of the bearer or of the localization device can be sent to the user at regular time intervals such as every 10 minutes. The position can be sent when the bearer has moved more than a predetermined distance from the last positions sent to the user.

[0009] The position can also be sent only if the bearer goes out of a predetermined area.

BRIEF DESCRIPTION OF DRAWINGS

[0010] The present invention and its advantages will be better understood with reference to the enclosed drawings and to a detailed description of different embodiments of the invention, wherein :

- Figure 1 shows the system of the invention as well as the interaction between the elements of this system;
- Figure 2 is a cross section view of the localization device of the present invention;
- Figure 3 shows a detail of the localization device of Fig. 1;
- Figure 4 illustrates an embodiment of the display device.

BEST MODE FOR CARRYING OUT THE INVENTION

[0011] With reference to Fig. 1, the system of the present invention comprises at least two elements, one of these elements called herein localization device 10 being carried by a bearer that can be a person, an animal or an object. The other element is called herein a display device 11 and can have various forms and is used to display at least the location of the localization device 10.

[0012] The system of the invention can cooperate with a management center 12 that acts as a relay between the localization device 10 and the display device 11.

[0013] The system of the invention can further cooperate with satellites 13 for example to determine the location of the localization device 10.

[0014] With reference to Fig. 2, the localization device 10 according to the present invention has the form of a collar and essentially comprises a flexible circuit 14 supporting a localization module 15, a transmission module

16, a microcontroller 17 and a power supply 18.

[0015] The localization module 15 can be a conventional GPS module capable of receiving data from satellites and for transforming said data into coordinates. According to a particular embodiment of the invention, instead of a conventional GPS module, other similar modules could be used. For example, the localization module could receive data from satellites, without having the ability to transform this data into coordinates. Said data could be transmitted to the management center 12 which transform the data into coordinates.

[0016] According to another embodiment, the localization module 15 can also receive other signals enabling localization such as signals used in mobile telephony. The location can be determined by triangulation if the location of at least three antennas is known and if the intensity of the signal received from these antennas can be measured. Another localization module can also use proprietary signals. This can be the case where a specific area is controlled for example.

[0017] The transmission module 16 is used to transmit localization data to a remote location. Said localization data can be sent to the management center 12, to the display device 11, to a survey center or to any other location entitled to receive said data.

[0018] This transmission module 16 can be a conventional GSM module or any other module capable of transmitting data to a remote location, at the distance required. Depending on the specific implementation, one could use a radio module for example.

[0019] The power supply 18 used in the present invention has to fulfill several constraints. A first one is that it must be as small as possible or at least as unobtrusive as possible. According to a preferred embodiment, the power supply is a battery 19 of flexible type. Thus, it can easily be adapted to various kinds or dimensions of supports.

[0020] According to particular embodiment, the battery 19 can be charged for example by placing the localization device on a support. This support can be contactless and charges the battery by induction. The localization device could also contain contacts which are connected to an energy source when the localization device is placed on the support. Other solutions such as for example flexible solar cells could also be used depending in particular on the electrical consumption of the device. If the device is a low consuming device, non rechargeable batteries, with a long lifetime could be used. On the contrary, if the device uses more energy, rechargeable batteries are more adapted. Similarly, if the localization device 10 can be easily removed and placed again, a rechargeable battery is adapted. This is usually the case when the collar is used for a human being, a domestic animal or an object. If the bearer is for example a wild animal, a rechargeable battery is not optimal, unless it has a long lifetime.

[0021] In the embodiment illustrated by Fig. 2, the flexible circuit 14 as well as the power supply 18 and the electronic compounds are coated by a resin 20 which

keeps the localization device 10 flexible. According to this embodiment, the elements of the localization device are protected from the environment while enabling a great range of use. The localization device thus forms a collar that can be easily attached to a bearer.

[0022] In case the battery must be removable, a casing can be made within the resin coating to remove and replace the battery.

[0023] The localization device 10 according to the present invention comprises a mechanical closing. One possibility is represented on Fig. 2 and 3. One side of the collar comprises a knob 21, fixed on the collar. The other extremity of the collar comprises a hole 22 with a diameter slightly smaller than the dimension of the knob 21, but enabling it to pass through the hole.

[0024] According to a particular embodiment illustrated in particular on Fig. 3, the collar comprises two parts of a switch, realized for example under the form of a conductive wire 23 inserted in the collar. The knob 21 or a part of it can be made of a conductive material. In this case, when the collar is closed, i.e. the knob 21 is inserted into the hole 22, the switch is closed. When the collar is open, the switch is open. This can be used to send an alarm to an alarm center or to the display device 11 of the owner of the localization device. This feature enables a user to be immediately informed when the localization device is lost or voluntarily removed for example.

[0025] Such an alarm can also be sent for example when the charge of the battery sinks under a threshold. Thus, the owner is informed that the battery should be replaced or recharged.

[0026] The switch between the two extremities of the collar can be used to switch on the functions of the localization device as soon as it is closed. Thus, no particular manipulation is required when the collar is placed on a bearer.

[0027] The localization device 10 can further comprise a memory (not shown) which stores for example the result of the location of the holder at different moments. The use of the memory is explained with greater details below.

[0028] The functioning of the system of the present invention is explained in further details below according to different possible embodiments.

Embodiment 1

[0029] According to a first embodiment of the invention, the localization device 10 is placed on an object or an animal whose location must be regularly known. An example could be the survey of a wild animal. In this case, the localization device has the form of a collar and is placed on the animal, for example around his neck. Thank to the mechanical configuration of the collar and in particular to its flexibility, it can easily be adapted to the animal and is very unobtrusive. Settings can be introduced into the microcontroller 17 at the production of the collar or at the moment it is placed on the animal or object. These settings define a time period used to send

the location of the localization collar. They may also define other parameters, in particular memorization parameters, as will be defined more specifically below.

[0030] In a particular example, the location is sent every 10 minutes. In order to manage this regular sending, the controller comprises a clock and a memory. When the controller determines, thank to the clock, that a new location must be sent, the localization module 15 is activated. The coordinates retrieved by the localization module are transmitted to the controller 17. The coordinates are introduced in a message that has a format compatible with the sending by the transmission module 16. The message may further comprises at least an identification code of the collar. It may also comprise the time. The message can be transmitted to the transmission module 16 in clear or can be encrypted by a key known to the microcontroller 17. This key can be unique and individual to each localization device 10 or on the contrary, it can be common to a group of localization devices managed by a same management center. If the key is individual, the identification code is usually not encrypted. If the key is common to a group of devices, the identification code may be encrypted or not.

[0031] The message is transmitted to the transmission module 16 which transmits it to the management center 12 and/or to the display device 11.

[0032] In case the message is directly transmitted to the display device 11, this device can extract the coordinates and display the location of the collar, either under the form of coordinates or on a map, or both. An example of the display device 11 is shown in details on Fig. 4. In this example, the display device comprises a screen on which the coordinates and/or the map are displayed. Depending on the application, other useful data can also be displayed.

[0033] According to a particular embodiment, the display device comprises a localization module such as a GPS module, a map or a set of maps and software. The GPS module determines the location of the display device. The location of the localization device is known to the display device as it was sent in a message. The screen of the display device displays a map with the location (A) of the display device and the location (B) of the localization device as well as the best way or one possible way for going from the display device 11 to the localization device 10. The scale of the map as well as the calculation of the best way can be managed by the software. Of course, different options can be proposed to the user. For example the displacement means for going to the localization device could be chosen among "by vehicle" or "by foot". The time to go to the localization device can be displayed as well as the distance. Zooming functions can also be proposed to the user.

[0034] If the message sent from the localization device 10 to the display device 11 is encrypted prior to being sent, the display device must have the key to decrypt said message. This key can be permanently stored in the device. It can also be sent once by the management

center 12. It can also be sent from the management center to the display device upon request. Depending on the embodiment, sending the key could be subjected to the payment of a given amount.

[0035] The location and time can also be stored in the memory of the microcontroller 17 for further use.

[0036] The same application could be used for example in a vehicle used for professional purposes. In this case, the localization device is placed in the vehicle, for example in a place where it can difficultly be removed.

Embodiment 2

[0037] According to a second embodiment of the invention, the localization device 10 does not send automatically its location. On the contrary, the localization device remains passive until it receives a specific request.

[0038] In this embodiment, the user sends a request to the management center 12 or directly to the localization device with the display device 11. This request is received by the transmission module 16. The request can be a simple order to send the location back or can also contain one or several addresses to which the location must be sent. The request may also contain the identification number of the localization device of interest. Alternatively, the request can be sent specifically to the localization device, without an identification number.

[0039] As in the previous embodiment, the location is determined by the localization module 15 and transmitted to the transmission module 16, possibly after encryption or otherwise processing the data.

[0040] The reply message is then resent to the correct receiver, i.e. to the management center 12 and/or to one or several display devices 11.

[0041] Sending a request could be associated to the payment of a given amount. Of course, subscription systems could also be used.

[0042] According to a variant of this embodiment, the localization device 10 can have an activation button that can be activated by the bearer of the device for example. This activation button forces the sending of a location message to the display device 11 and/or a management or alarm center. This feature is of particular interest when the bearer is a child for example.

Embodiment 3

[0043] In a third embodiment, a given geographic area is stored in the memory of the localization device 10. This area can be defined by a set of coordinates, by one coordinate and a distance or by different possible ways. The area is associated to a rule or a set of rules. Usually, one possible rule can be either the localization device must stay in the area or the localization device must remain out of this area. Of course, other more complex rules can be used. For example, the collar must not be out of the area more than a given duration or at a given

time of the day.

[0044] In this embodiment, the localization module 15 determines the location of the collar and compares this location to the given area. The rule is also used to determine if this rule is respected or not. If this rule is respected, no message is sent. The time of the last location measured can be stored in the memory.

[0045] If the rule is not respected, a message can be sent to a management center or to one or several display devices 11. This message can contain only the information that the rule is not respected. It usually also comprises the location of the device. According to a variant, one message can be sent to a user's device indicating only that the rule is not respected and another message can be sent to the management center indicating the location.

[0046] As previously, the messages can be in clear or encrypted.

[0047] The message can also contain more than the last or present location. It can for example contain a given number of previous locations, as stored in the memory of the microcontroller.

[0048] According to a variant of this embodiment, the data concerning the area as well as the rules are stored in the management center 12. A message is regularly sent from the localization device 10 to the management center who checks if the rules are respected or not. This management center 12 forwards a message to the display device 11 only when the rules are not respected.

Further embodiments

[0049] All the previous embodiments can have additional features. One of these features is illustrated by Fig. 3. As can be seen from this figure, a contact is established between the two extremities of the collar. This contact is closed by the knob 21 on one part of the collar. Usually, on use, the contact is closed. When the collar is open, either voluntarily removed or open by accident, the contact is open. This open contact activates an alarm. This alarm is a message sent to the management center or to one or several display devices, comprising the location of the localization device.

[0050] According to specific embodiments, the collar contains different kinds of detectors. These detectors can measure physical or chemical parameters such as temperature, speed, quantity of light, presence of a given gas, pH,...

[0051] In a first application, the temperature can be measured. The values measured can be sent together with a message according to any of the embodiments described above. The temperature can also be associated to a rule, similar to the rule of embodiment 3. In that case, the temperature is sent when the rule is not respected, i.e. when the temperature goes beyond a given threshold for example.

[0052] According to another embodiment, a gas detector can be used. A message can be sent as soon as the detector detects the presence of a given gas or when

the gas concentration rises over a given threshold. Of course, a wide variety of detectors can be used within the scope of the invention.

[0053] In the embodiments illustrated, the device has the form of a collar. However, depending on the specific application, it can further have the form of a "box" such as a mobile phone or a PDA. It could also have the form of a key or any other suitable form.

Claims

1. Localization system comprising at least one localization device and one display device, said localization device (10) comprising at least a localization module (15), a transmission module (16) and a power supply (18), **characterized in that** the localization module (15), the transmission module (16) and the power supply (18) are mounted on a flexible circuit (14) and are interconnected by this flexible circuit (14).
2. Localization system according to claim 1, **characterized in that** the power supply (18) is a battery (19) of flexible type.
3. Localization system according to claim 1 or 2, **characterized in that** the localization module (15), the transmission module (16), the power supply (18) and the flexible circuit (14) are coated by a resin (20).
4. Localization system according to claim 3, **characterized in that** the resin (20) is flexible.
5. Localization system according to claim 1, **characterized in that** the localization device (10) further comprises a microcontroller (17) arranged to process signals received from said localization module (15).
6. Localization system according to claim 1, **characterized in that** the localization device (10) comprises a switch that is closed when the localization device is closed and that is open when the localization device is open.
7. Localization system according to claim 1, **characterized in that** the localization module (15) is a GPS module.
8. Localization system according to claim 1, **characterized in that** the transmission module (16) is a GSM module.
9. Localization system according to claim 1, **characterized in that** the display device (11) comprises means for displaying at least the location of the localization device (10).

10. Localization system according to claim 9, **characterized in that** the display device (11) comprises means for determining its own location and for displaying simultaneously the location of the localization device (10) and the location of the display device (11). 5
11. Localization system according to claim 10, **characterized in that** the display device (11) comprises means for displaying on a map, a way for going from the location of the display device (11) to the location of the localization device (10). 10
12. Localization system according to claim 1, **characterized in that** the display device (11) comprises cryptographic means for decrypting data received from the localization device (10). 15
13. Localization system according to claim 1, **characterized in that** the display device (11) comprises means for sending a request for asking for the location of the localization device (10). 20
14. Localization system according to claim 1, **characterized in that** the localization device (10) comprises means for sending its position to the display device further to an action on the localization device. 25
15. Localization system according to claim 1, **characterized in that** the localization device (10) comprises at least a detector for measuring a physical parameter of the environment of the localization device. 30

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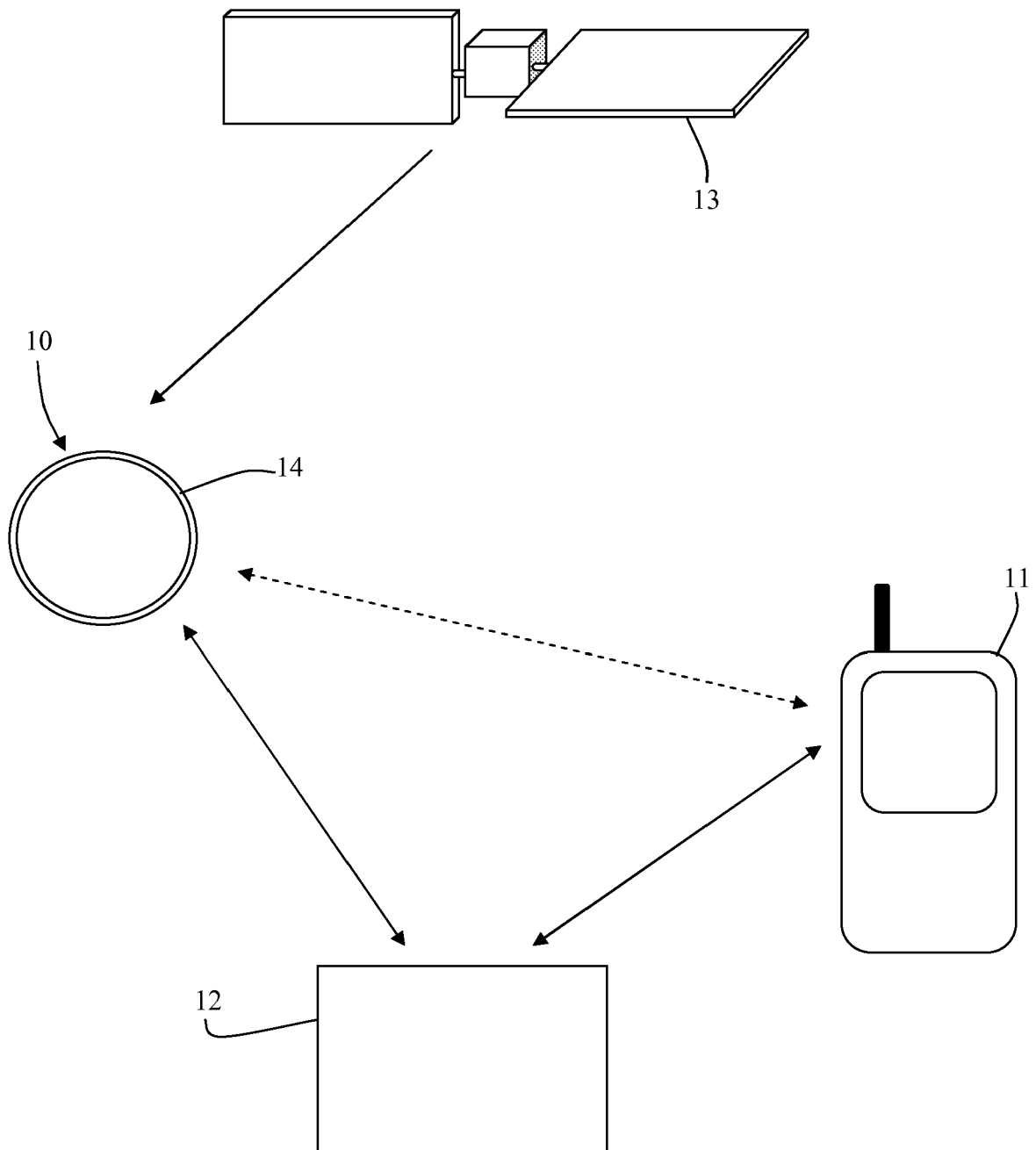


FIG. 1

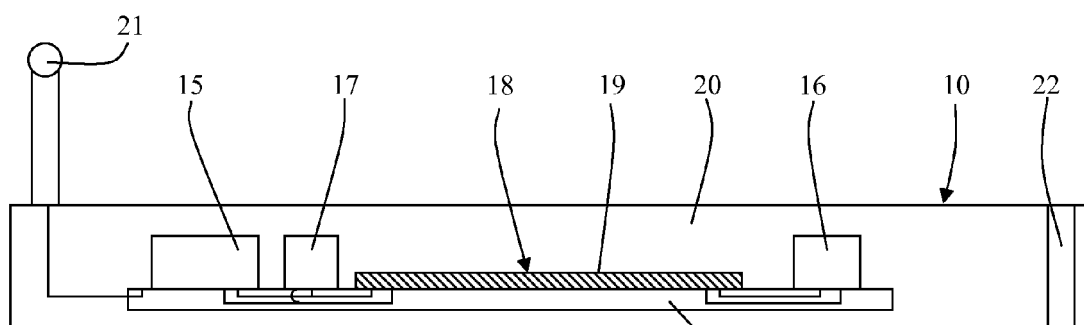


FIG. 2

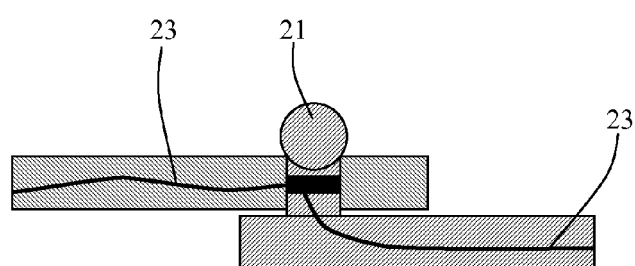


FIG. 3

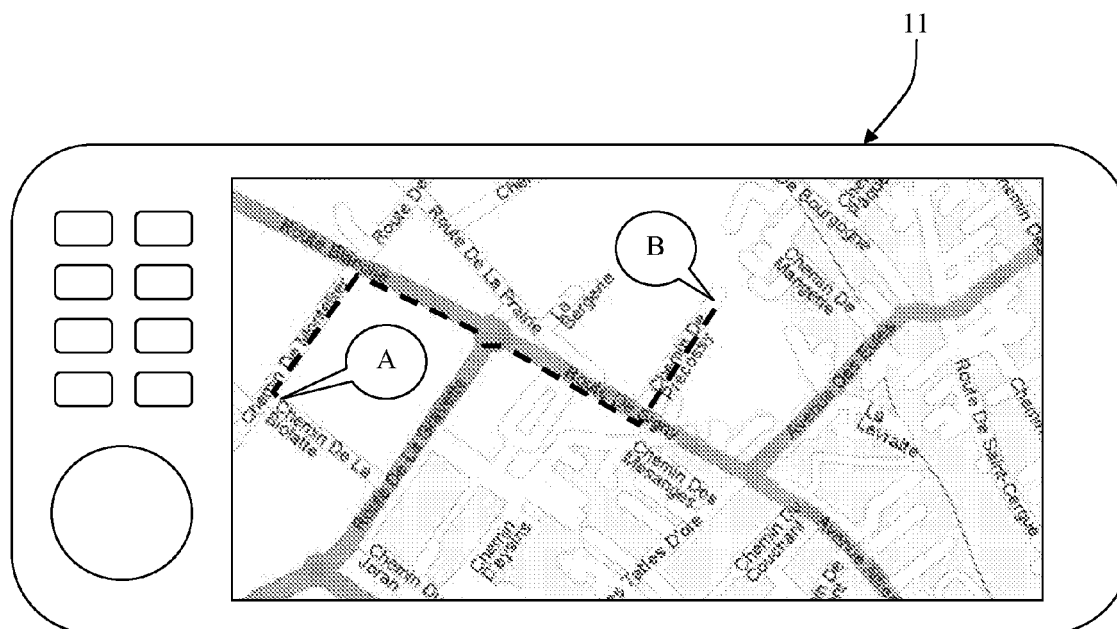


FIG. 4



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Place of search The Hague		Date of completion of the search 8 July 2010	Examiner Meister, Mark
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EUROPEAN SEARCH REPORT

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