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(54) **Mobile device for a swimmer**

(57) Various technologies and techniques are suggested that allow monitoring in real time persons in a water area. The persons in water include swimmers and other water sportsmen such as surfers or windsurfers. Each person is equipped with a small device combining some sensor devices and a wireless signal transmitter. The area under surveillance is equipped with a base sys-

tem composed of two or more radio antennas and a computer system maintaining a map of the persons in the water area and handling the alert signals received. The lifeguards are equipped with waterproof mobile devices communicating with the base station.

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Description

Field of the invention

[0001] The present invention is related to a mobile device for a swimmer and other water sportsmen such as surfers or windsurfers, to a portable surveillance device and to a surveillance system to prevent drowning.

Background of the invention

[0002] Drowning followed or not by death, constitutes an important public health problem since drowning is responsible for numerous deaths every year and sometimes of heavy sequels. It is estimated that over 140 000 persons die through drowning each year in the world. In Europe alone, over 8000 persons die from drowning each year. A detailed survey conducted in France showed that the distribution by place of drowning was the following: 85% happened in seawater, 6% in swimming pools, 8% in rivers and lakes, and the rest in other places such as bathtubs. As one can see, by far the largest percentage of drowning happens in sea water although a large proportion of those (75%) were not followed by hospitalization or death thanks to intervention of the people insuring surveillance and help on beaches.

[0003] In public places where swimming is authorised permanent surveillance and assistance is normally ensured. However to reduce the number of deaths and of severe sequels early detection of water sportsmen facing difficulties is essential.

[0004] In FR 2 847 370 and FR 2 847 371 a method and a device for preventing the drowning of swimmers is described. The device is divided in two different chambers and the penetration of water into one of the two chambers beyond a predetermined threshold triggers an alarm signal or a swimming aid is activated. The device is purely mechanical and does not utilise any kind of electronic equipment.

[0005] FR 2 802 653 discloses a drowning prevention system which is based on camera surveillance of a swimming pool to detect an unconscious person drifting in the water or on the ground of the pool.

[0006] Finally, in US 6,111,510 a method of drowning detection is suggested. The known method suggests detecting inherent sound waves of a beating heart in the water. If at the same time the absence of sound waves of a breathing respiratory system is detected then this is an indication that a person is drowning in the water.

[0007] Even today, there remains a desire to improve existing drowning prevention systems and to provide pieces of equipment required for such a system.

Summary of the intervention

[0008] According to a first aspect the present invention a mobile device for a person in water comprising a watertight housing, which accommodates a wireless trans-

mitter, an antenna, a data processing unit, and a power supply is suggested. The wireless transmitter transmits a radio signal identifying the mobile device to allow for localization of the mobile device. The person in water may be a swimmer or another kind of water sportsman.

[0009] In an embodiment of the invention, a movement sensor is incorporated in the mobile device for generating information on motion. The data-processing unit may be connected with the movement sensor for analyzing data produced by the movement sensor to selectively determine an alert signal included in the radio signal, which is transmitted by the wireless transmitter.

[0010] In an advantageous implementation of the invention the data processing unit generates a plurality of different kinds of alert signals having different warning levels. Preferably the radio signal also comprises an error correction code to enable correction of the radio signal in case it has been corrupted during transmission.

[0011] In an advantageous embodiment of the invention the mobile device is provided with a receiver for radio signals and the received radio signals are processed in the data processing unit. In this case it is preferred to provide a user feedback device, which is connected with the data processing unit for signaling information to the swimmer that has been: received by the receiver. The user feedback device may comprise a liquid crystal display, light emitting diodes, and/or a vibration generator.

[0012] In yet another embodiment of the invention an external drowning sensor is operatively connected with the mobile device to generate the alert signal.

[0013] According to a second aspect of the invention a portable surveillance device is suggested. The portable surveillance device comprises a radio communication unit for receiving first radio signals from a base station containing information about the localization of a person in water and for transmitting second radio signals to the base station including information about the current position of the portable surveillance device.

[0014] A preferred embodiment of the portable surveillance device according to the intervention comprises a display for indicating the direction and/or distance of the swimmer in a potentially dangerous situation with regard to the current position of the surveillance device.

[0015] Advantageously, the portable surveillance device comprises a compass to enable the display to indicate the North direction.

[0016] In a useful implementation of the invention the portable surveillance device is provided with an interface for user inputs.

[0017] According to a third aspect of the invention a surveillance system is suggested. The surveillance system comprises a mobile device, a plurality of fixed antennas connected to a base station and a portable surveillance device. The mobile device transmits a radio signal, which incorporates a data portion indicating a warning level and which is received by the fixed antennas. The fixed antennas are connected to the base station comprising data-processing means. The data-process-

ing means determine the position of the mobile device to transmit an alert signal for a reception by the portable surveillance device if the warning level exceeds a pre-determined threshold.

[0018] Advantageously, the portable surveillance device visualizes the position of the mobile device.

[0019] In an embodiment of the surveillance system according to the invention the base station transmits an alert signal to the mobile device if the position of the mobile device is determined to be outside an allowed area.

[0020] The system described herein is an assistance system providing early alerts to lifeguards. It is specially suited for open environments such as sea, lakes, and rivers, but it is also applicable to public or private swimming pools. When a potential incident is detected, lifeguards are alerted via waterproof mobile devices and pointed to the location of the person suspected of being in danger.

[0021] Described herein are various technologies and techniques that, allow monitoring in real time persons in a water area. Each person, such as a swimmer, surfer, windsurfer or persons using small floating devices such as inflatable mattress or small boats, is equipped with a small device combining some sensor devices and a wireless signal transmitter. The area under surveillance is equipped with a base system composed of two or more radio antennas and a computer system or base station maintaining a map of the swimmers in the water area and handling the alert signals received. The lifeguards are equipped with waterproof mobile devices communicating with the base station.

[0022] The combination of electronic systems according to the present invention enables:

- to maintain a map of the various people present in the area regardless whether they are swimming, surfing or practicing any other water sports,
- to receive alert signals under various circumstances:
 - the person himself starts the alert,
 - the person is detected as being outside the safe area (for instance he is too far away or approaching known restricted areas or strong current zones),
 - the person has not been moving for a given period of time,
 - the person is detected as moving and not making progress for period of time (for instance because being swimming against currents or tide)
 - other alert channels could be added as needed if additional sensors and detection systems are added.

[0023] When the alert signal for a possible drowning or dangerous situation is received, a warning is immediately transmitted to the mobile devices of lifeguards and they are provided with the location of the incident detected. The location information includes the direction and

the distance to the detected incident. They then handle the alarm through their normal practices such as a visual check, signalling the need to swim back in safe area, starting an intervention, etc.

[0024] This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

Brief description of the drawings

[0025] The invention will be better understood and other particular features and advantages will become apparent on reading the following description appended with drawings. In the drawings similar or identical elements are labelled with the same reference signs. It shows:

FIGURE 1 a diagrammatic view of the classical surveillance situation;
 FIGURE 2 a diagrammatic view of possible implementation of the mobile device for a user;
 FIGURE 3 a schematic block diagram of an electronic system in the mobile device;
 FIGURE 4 a schematic structure of the messages sent by a mobile device;
 FIGURE 5 a diagrammatic view of the onshore base station set up;
 FIGURE 6 a schematic flow diagram of a the main processing algorithm handled by the base station when receiving signal from mobile devices for swimmers;
 FIGURE 7 a schematic diagram of electronic components in a portable surveillance device;
 FIGURE 8 an exemplary user interface for the portable surveillance device.

Detailed description

[0026] For the purpose of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope is thereby intended. Any alterations and further modifications in the described embodiments, and any further applications of the principles as described herein are contemplated as would normally occur to one skilled in the art.

[0027] Now reference is made to the drawings, in which like numerals represent like elements, various embodiments will be described.

[0028] The system may be described in the general context as a wireless monitoring system to ensure supervision of a water area, emission of warnings regarding

potential dangerous situations and early drowning detection.

[0029] Figure 1 shows the traditional set up of a supervised water area. Lifeguards 1 situated on the beach or on the swimming pool side on an elevated seat 2, continuously watch the area. For the sake of simplicity in Figure 1 only one lifeguard 1 is shown. They either intervene in case they detect an incident or signal through sound or other means risky behaviours. In the situation depicted in Figure 1 there are several swimmers 3 and a windsurfer 3' who behave normally while one swimmer 4 requires help. The traditional set up relies on the attention of the lifeguard to notice one specific swimmer 4 needing help among many other swimmers 3 even if the supervised swimming area is very crowded. Though it sounds simple this is a very difficult task because the situation changes permanently and many times the lifeguard has to observe a large number of subjects.

[0030] The system described in this invention assists the lifeguards in the surveillance task of the area and in the detection of potential drowning accidents.

[0031] According to the invention each person wanting to swim -or practice other water sport such as surf, windsurf, kitesurf, etc- in the guarded area like a guarded beach, a swimming pool or something similar is provided with a simple lightweight wearable mobile device 200 as shown in Figure 2. This wearable device 200 can be easily integrated into a bracelet -such as those used in many swimming pools to keep locker's key- or in a watch type device as represented in Figure 2. Other implementations could use necklaces. The wearable device 200 comprises a watertight housing in which a mobile device 300 for a user is accommodated.

[0032] Figure 3 exhibits a schematic block diagram of the user device 300. The device 300 comprises a wireless processor 302 and an associated antenna 303, a simple sensor component such as a 3D accelerometer 304, a power supply 305 and a simple processor 306 with an associated memory. In the implementation shown in Figure 3, the device 300 also has a user feedback device 307 to signal dangerous situations to the user. The feedback device 307 illuminates, for instance, a red LED light when the person is in dangerous or unauthorized areas. In other embodiments of the invention the feedback device 307 is equipped with a vibration generator to provide the user with different kinds of tactile feedback for signalling different alerts. In yet another embodiment an acoustic device is provided to produce acoustic signals to inform the user of the device 300 especially about dangerous situations. However, in a less sophisticated embodiment of the invention the device 300 is provided without the feedback device 307.

[0033] Other sensors could be added to the wearable device 200 to detect other dangerous or life threatening situations. Those include, for instance but not limited to, devices described in FR2847371, FR2847370, US6111510. The additional sensors would not change the overall invention and they could be treated as addi-

tional alert channels. E.g. if the device described in FR 2 647 370 a potential drowning situation it communicates this event to the mobile device 300 which broadcasts an alert signal.

[0034] The device 300 broadcasts, at constant or variable intervals, a unique identifier of the device using the wireless transmitter 302 and the associated antenna 303. The unique identifier is for instance a 64 bit code identifying the device 300. The signal carrying the unique identifier is broadcasted using one out of a plurality of different known wireless communication standards such as Wifi 802.3, WiMAX, GSM or more specific technologies such as Wavelet Packet Modulation. In the one embodiment of the invention, the interval between two signal broadcasts is 1 second. With such an implementation, the device 300 utilises less than 100bits/sec. With such a data rate, it can be easily understood by people skilled in the domain that a surveillance system utilizing a 1MHz bandwidth could easily monitor well above 5000 simultaneous persons in the supervised water area which would cover most common utilisations knowing that extended systems could be built if the crowd in water is expected to exceed 5000 people. Using an interval of the order of 1 second between each broadcast also has the advantage of enabling the building of robust detection system, as even if a few messages are missed from time to time the alert could start after only a few seconds. However, in other embodiments the interval can be chosen as a parameter of the system and the required data rates as well as the necessary bandwidth would change accordingly.

[0035] In one embodiment of the system, it uses a UHF radio frequency of 430MHz (Ultra High Frequency, ranging normally from 430MHz to 470MHz). In this embodiment of the system, the mobile device 300 requires well below 1 μ W and is able to operate for several hundreds of hours with a simple battery.

[0036] The signal emitted by the devices 300 is used both to transmit information, like device number and alert signal, and to locate the devices 300 on a map. A possible structure of the messages 400 sent as radio signals by the devices 300 is presented in FIGURE 4. The message 400 is composed of three portions. The first portion 401 of the message 400 contains a warning level. The warning level distinguishes at least two different situations: a) the person behaves normally and b) the person is at risk of drowning. The latter warning level indicates an alert. In other embodiments of the invention also intermediate levels can be provided between normal swimming and drowning. The second portion 402, of the message 400 represents the unique identifier of the device 300. The unique identifier is utilised to identify a specific device 300 potentially among a large plurality of such devices as it has already been explained above. Finally, the third portion 403 contains an error correction code to correct a message 400 that has been corrupted during transmission.

[0037] The device 300 will emit an alert signal in at least two cases; In the first case, the user decides to

activate the alert. This decision could be executed by the user pushing a "panic" button or by the user opening the bracelet while at sea or by breaking the necklace in case of a necklace. In the second case the alert will be automatically generated when the device 300 detects through sensors 304 that the user has not moved for a given period of time.

[0038] The period of time from the moment when the person has stopped moving until an alert signal is emitted is an adjustable parameter of the device. In some implementations different levels of alert are provided, wherein the levels of alert are automatically increased according to the length of the inactivity period. This set up enables the lifeguards to receive early warnings but also to concentrate on the more serious cases and reduce the number of false alerts.

[0039] As mentioned above, additional detection systems can be added to the wearable device 200 as required without changing the invention described here.

[0040] Figure 5 represents the onshore system 500. The onshore system 500 is made of at least two but more probably three or more antennas 501 connected to a computing device 502. In Figure 5 three antennas 501 are shown. The antennas 501 have to be positioned in locations appropriate to cover the area being supervised. Ideally, they would form a wide triangle. The onshore system 500 makes use of well-known radio-localisation algorithms to evaluate the position of the various devices 300 present in the supervised area. The position of the mobile device 300 is transmitted from the base station 502 via the antennas 501 to a portable device 503 for a life guard. The portable device 503 is equipped with an antenna 504.

[0041] Even though Figure 5 only shows one device 300, it is noted that in reality hundreds, even thousands of devices 300 may be present at the same time in the supervised area. Currently, radio localisation is achieved in several different ways including measurements of radio signal strength (SS), signal time-of-arrival (TOA), received signal direction of arrival (DOA). For the purpose of radio localisation each antenna 501 is connected with a base station 502. Depending on the implementation, any of those or a combination of those methods could be used. If new radio localisation mechanisms are designed, they could also be used by the system.

[0042] Figure 6 shows a schematic flow diagram of a main surveillance algorithm executed in the base station 502. In the flow diagram of Figure 6 the reference X represents one specific device 300, which is identified by means of its unique identifier. In step 601 of the algorithm a signal is received from the user device x by the base station 502. In step 602 the algorithm computes the position of the device X in the supervised area. In step 603 it is determined whether the message 400 from the device X contains a warning level that indicates an alert. If the warning level of the message does not indicate an alert it is verified in step 605 if the device X has entered into a forbidden or dangerous zone if this is the case, again,

an alert and the position of the device x is transmitted to the portable device 503 of the lifeguards in step 606. The base station 502 maintains a map of all user devices 300 in the supervised area.

[0043] In an alternative embodiment of the algorithm, the alert is also transmitted to the user device 300 for outputting a warning signal to the user by the feedback device 307 (step 607). The alternative embodiment is depicted in Figure 6 in dashed lines.

[0044] Finally, it is verified (step 608) if the user makes progress against the stream or not. If the user does not make progress for a given period of time in the supervised swimming area an alert and the position of the mobile device X is transmitted to the portable device 503 of the lifeguard in step 609. However, if the swimmer makes progress the algorithm ends at step 610 to restart upon the reception of the next message 400 of a device 300.

[0045] The transmission of an alert and the position of the device 300 can also be initiated directly by the user himself by pushing the above mentioned "panic" button or by taking any other appropriate action.

[0046] Conclusively, alerts and positions of potential incidents are transmitted to the lifeguard devices 503 in four main cases:

- (1) an alert has been emitted by the user of the device X,
- (2) the user of device X is located in an unauthorised area,
- (3) the device X is detected as not making significant progress on a map for a period of time; and (4) a device X which was emitting in the supervised area has not been emitting signal for a defined period of time.

[0047] In an embodiment of the present invention the base station 502, not only tracks the position of the devices 300 as described above but also the position of the portable surveillance devices 503. This allows for transmitting an alert and the position of the device 300 to the portable device 503 and hence the lifeguard which is closest to the suspected drowning incident or potentially dangerous situation.

[0048] The lifeguards are equipped with waterproof portable surveillance devices 503 such as standard mobile phones or PDAs. In some implementations, the devices 503 could also be purpose-designed devices as described in FIGURE 7. Such a device includes a display 701, data storage 702, a processing unit 703, a user interface 704 to receive user inputs, and a radio communication unit 705 which is connected with the antenna 504. The components 504, 701 to 705 are interconnected as it is known in the art for proper operation of the device 503. The radio communication unit 705 and the antenna 504 are similar to the one used for the user devices. These communication systems will be used both to locate the lifeguard in the area and to receive the alert and warning signal from the on shore system 500.

[0049] FIGURE 8 shows the display 701 and the user interface 704 of the portable surveillance device 503 for the lifeguard in greater detail. In this implementation, when an alert or a warning is received, the display 701 shows the relative position of the incident vis-a-vis the position of the lifeguard with an arrow 801. The distance between the position of the incident and the position of the lifeguard is displayed as well. A smaller arrow 802 and the letter "N" indicate the North direction for supporting the orientation of the lifeguard. The information about the North direction is provided by a compass integrated in the portable surveillance device.

[0050] In an embodiment of the portable device 503 the colour of the arrow 801 is a function of a warning level of the received alert. E.g. the arrow 801 turns increasingly red for increased warning levels.

[0051] Upon the reception of an alert, the lifeguard points his device towards the North direction. Then the arrow 801 will point to the potential incident and the distance from the lifeguard will be indicated.

[0052] The portable lifeguard device 503 has a limited set of push buttons 704a, 704b, 704c. Push button 704a is provided to cancel an alert if, after checking it, the lifeguard thinks it is a false alert. Push button 704b is provided to list all active alerts, and push button 704c is provided or move to the next alert.

Claims

1. Mobile device for a person in water comprising a watertight housing, which accommodates a wireless transmitter(302), an antenna (303), a data processing unit (306), and a power supply (305), wherein the wireless transmitter (302) transmits a radio signal identifying the mobile device (300) to allow for localization of the mobile device.
2. Mobile device according to claim 1, wherein a movement sensor (304) is incorporated in the mobile device for generating information on motion.
3. Mobile device according to claim 2, wherein the data-processing unit (306) is connected with the movement sensor (304) for analyzing data produced by the movement sensor to selectively determine an alert signal included in the radio signal (400), which is transmitted by the wireless transmitter (302).
4. Mobile device according to claim 3, wherein the data processing unit (306) generates a plurality of alert signals having different warning levels (401).
5. Mobile device according to claim 3, wherein the radio signals (400) also comprises an error correction code (403).
6. Mobile device according to claim 1, wherein the mobile device is provided with a receiver for radio signals and wherein the received radio signals are processed in the data processing unit (306).
7. The mobile device according to claim 1, wherein a user feedback device is connected with the data processing unit (306) for signaling to the swimmer information that has been received by the receiver.
8. The mobile device according to claim for wherein the user feedback device (307) comprises a liquid crystal display, light emitting diodes, and/or a vibration generator.
9. Mobile device according to claim 3, wherein an external drowning sensor is operatively connected with the mobile device to generate the alert signal.
10. A portable surveillance device comprising a radio communication unit to (1) first receive radio signals from a base station (502) containing information about the localization of a person in water and (2) second to transmit radio signals to the base station including information about the current position of the portable surveillance device (503).
11. Portable surveillance device according to claim 10, wherein the portable surveillance device comprises a display (701) for indicating the direction and/or distance of the person in water in a potentially dangerous situation with regard to the current position of the surveillance device (503).
12. Portable surveillance device according to claim 11, wherein the portable surveillance device comprises a compass to enable the display to indicate the North direction (802),
13. Portable surveillance device according to claim 11, wherein an interface (704a, 704b, 704c) for user inputs is provided.
14. Surveillance system comprising a mobile device (300), a plurality of fixed antennas (501) connected to a base station (502) and a portable surveillance device (503), wherein the mobile device transmits a radio signal (400), which incorporates a data portion indicating a warning level (401) and which is received by the fixed antennas, wherein the fixed antennas (501) are connected to the base station (502) comprising data-processing means, wherein the data-processing means determine the position of the mobile device (300) to transmit an alert signal for a reception by the portable surveillance device (503) if the warning level exceeds a predetermined threshold.
15. Surveillance system according to claim 14, wherein

the portable surveillance device visualizes the position (802) of the mobile device.

- 16.** Surveillance system according to claim 14, wherein the base station transmits an alert signal to the mobile device if the position of the mobile device is determined to be outside an allowed area.

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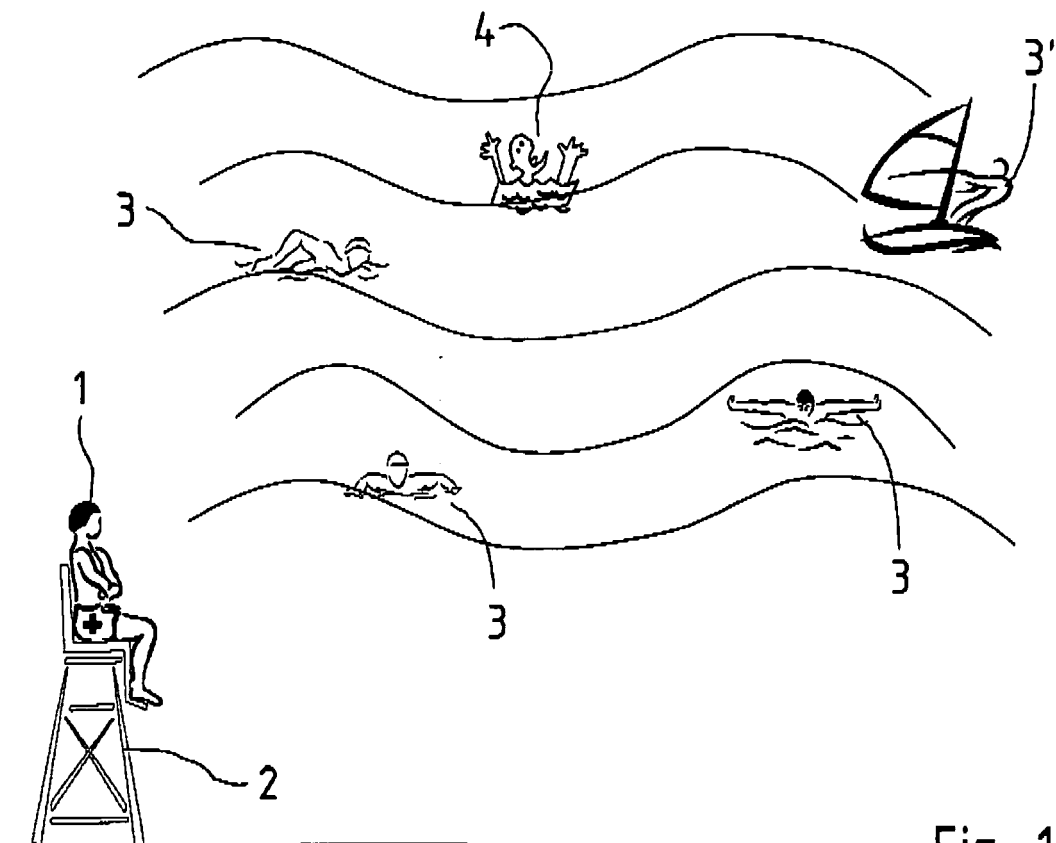


Fig. 1

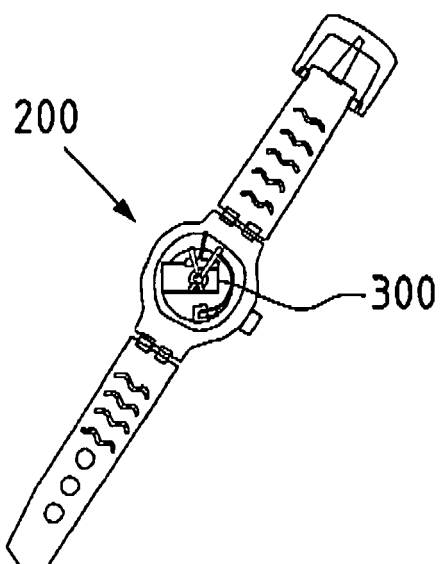


Fig. 2

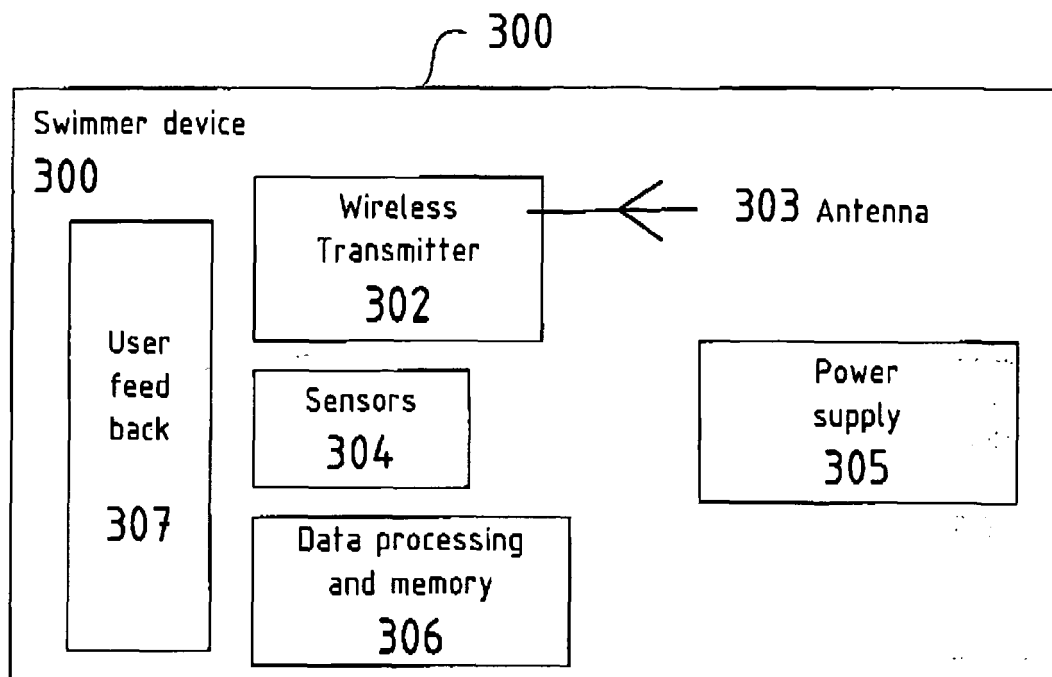


Fig. 3

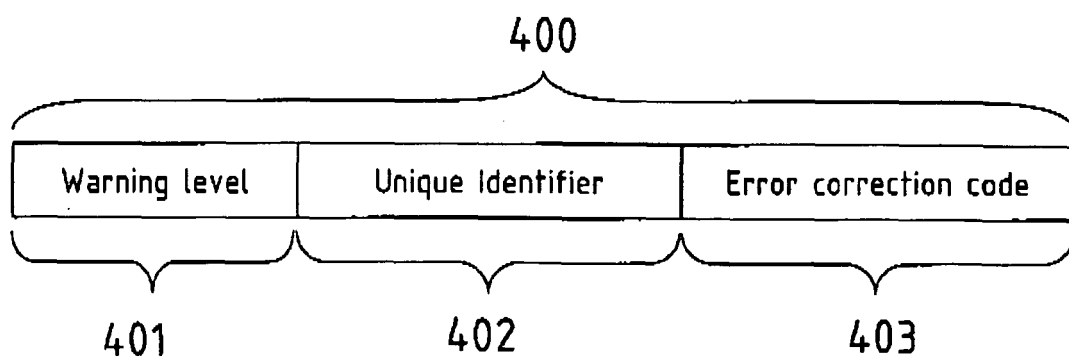


Fig. 4

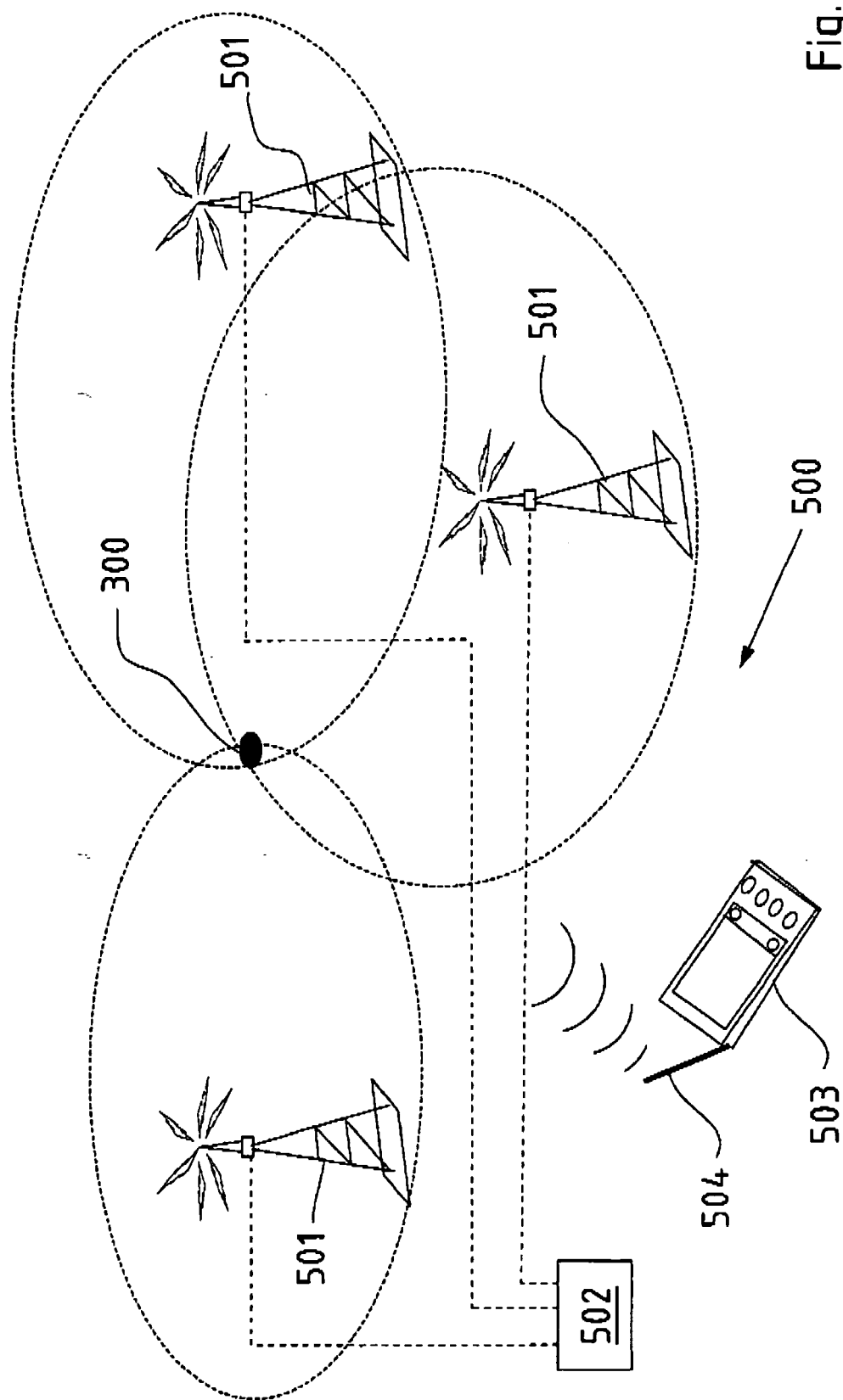


Fig. 5

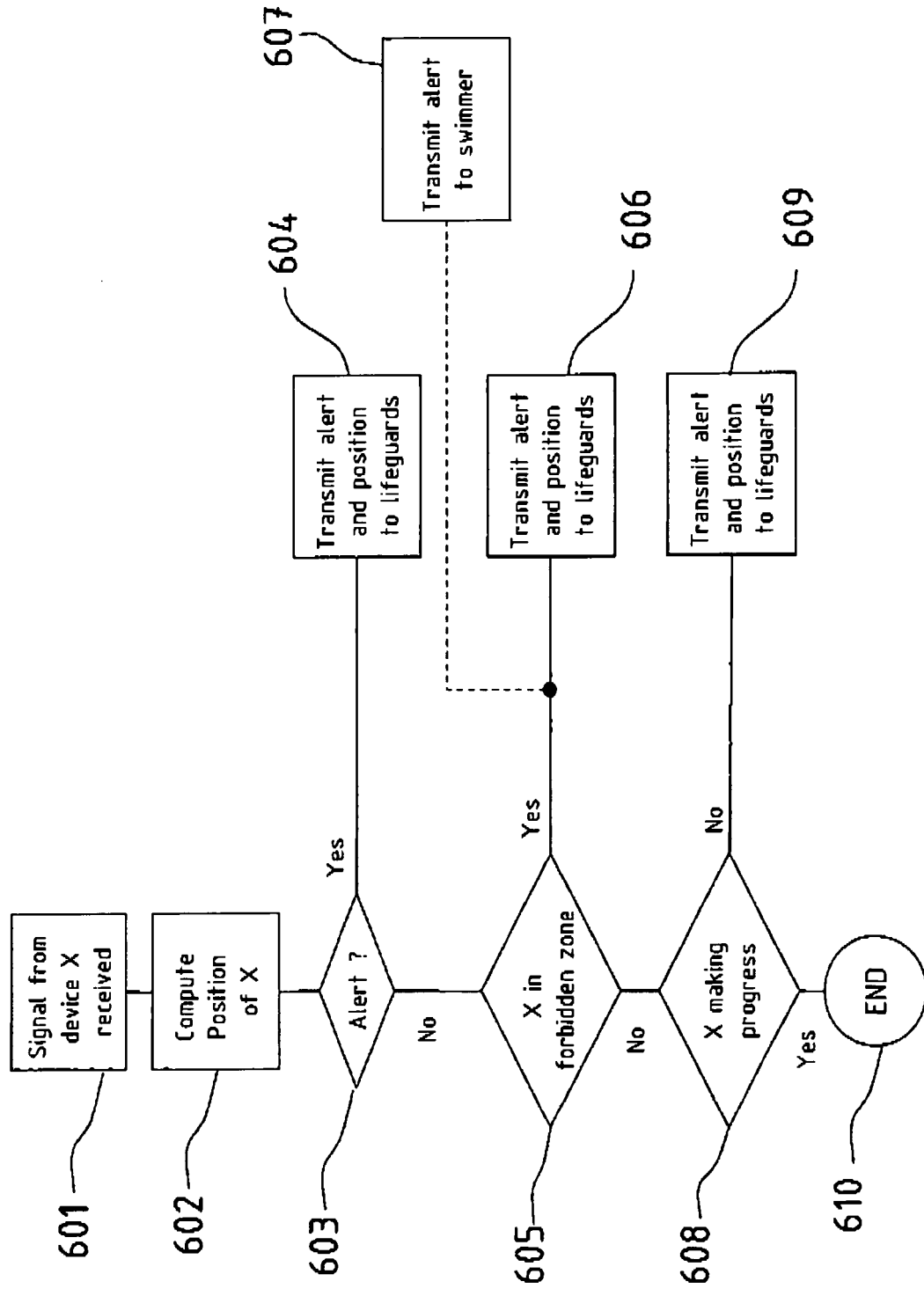


Fig. 6

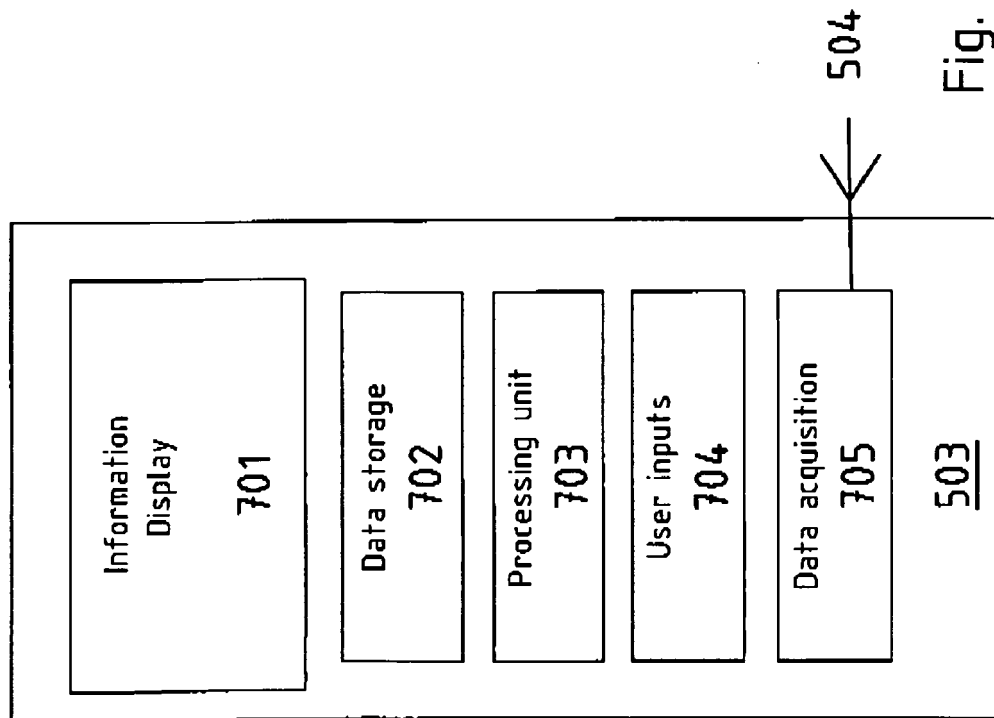


Fig. 7

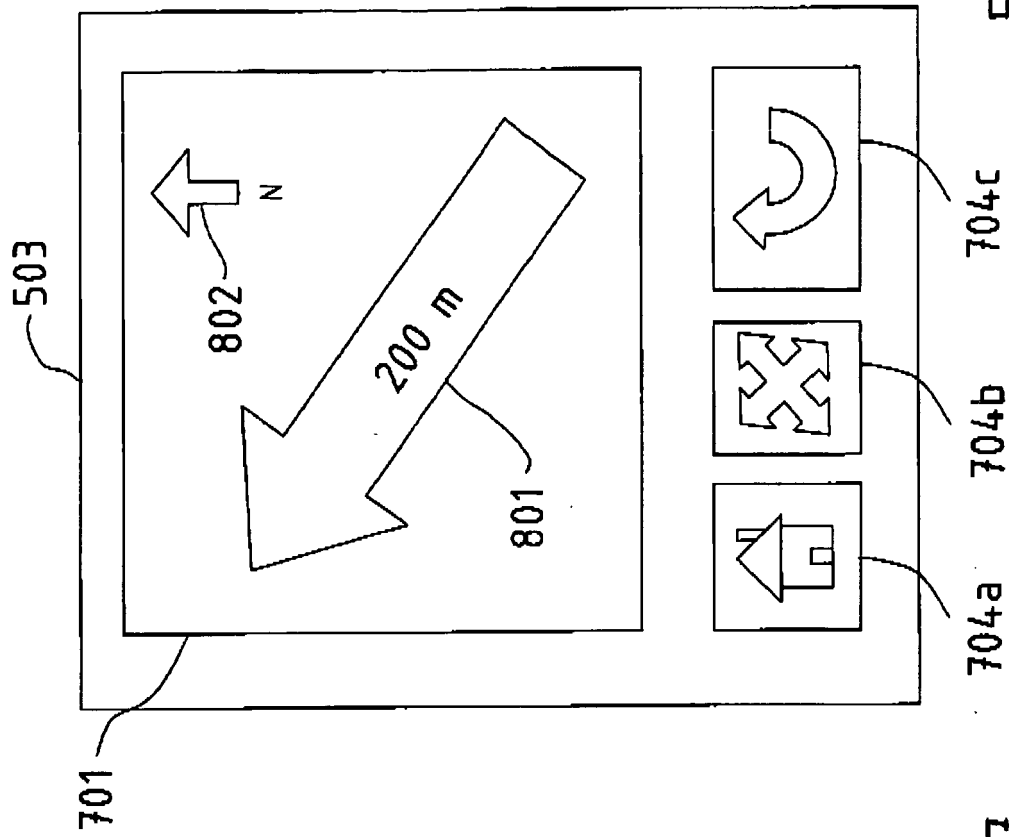


Fig. 8



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 02 4893

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 02/077943 A (CM HAMMAR UTVECKLING AB [SE]; GORDON PETER [GB]; BUTTON MARK [GB]) 3 October 2002 (2002-10-03)	1-4,6-9	INV. G08B21/08
Y	* page 14, lines 12-15,21-26,29,30 * * page 15, lines 1-9 * * page 15, line 27 - page 16, line 13 * * page 17, lines 2-10,26-32 * * page 19, line 31 - page 20, line 1 * * page 21, lines 11-16,28-31 * * page 22, lines 1-5,23-25 * * figures 1,2 *	5	
Y	----- WO 98/36390 A (TELELARM CARE AB [SE]; AASTROEM PER OLOF [SE]) 20 August 1998 (1998-08-20) * page 1, lines 2-16 * * page 2, lines 8-11 * * page 3, lines 8-24 * * page 4, line 33 - page 5, line 3 * * page 15, lines 1-7 *	5	
A	----- WO 03/015045 A (LUCAS ROBERT [GB]; COOLEGE JOHN [GB]) 20 February 2003 (2003-02-20) * page 1, lines 3,4 * * page 5, line 20 - page 6, line 10 * * page 7, lines 22-28 * -----	2,3	TECHNICAL FIELDS SEARCHED (IPC) G08B B63C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 May 2007	Examiner Meister, Mark
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

2
EPO FORM 1503 03/02 (P04C01)



European Patent
Office

Application Number
EP 06 02 4893

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-9



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-9

A mobile device for a person in water comprising a watertight housing, which accommodates a wireless transmitter, an antenna, a data processing unit, and a power supply, wherein the wireless transmitter transmits a radio signal identifying the mobile device to allow for localization of the mobile device, and wherein the radio signals also comprise an error correction code.

2. claims: 10-13

A portable surveillance device comprising a radio communication unit to first receive radio signals from a base station containing information about the localization of a person in water and second to transmit radio signals to the base station including information about the current position of the portable surveillance device.

3. claims: 14-16

A surveillance system comprising a mobile device, a plurality of fixed antennas connected to a base station and a portable surveillance device, wherein the mobile device transmits a radio signal, which incorporates a data portion indicating a warning level and which is received by the fixed antennas, wherein the fixed antennas are connected to the base station comprising data-processing means, wherein the data-processing means determine the position of the mobile device to transmit an alert signal for a reception by the portable surveillance device if the warning level exceeds a predetermined threshold.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 02 4893

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

21-05-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 02077943 A	03-10-2002	NONE	
WO 9836390 A	20-08-1998	AU 6234398 A SE 9700471 A	08-09-1998 13-08-1998
WO 03015045 A	20-02-2003	GB 2380040 A	26-03-2003

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- FR 2847370 [0004] [0033]
- FR 2847371 A [0004]
- FR 2802653 [0005]
- US 6111510 A [0006] [0033]
- FR 2847371 [0033]
- FR 2647370 A [0033]