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(54) Title: DEVICE FOR INDICATING DIRECTION TO PREDETERMINED LOCATION

(57) Abstract: A non-navigation device for assisting the orientation of a user towards a predetermined location, comprising, operatively connected together; a GPS receiver; a compass; a memory device; and a first indicator for informing the user of the orientation of the non- navigation device, wherein the GPS receiver provides current location data concerning the location of the non-navigation device when located in a first location so as to receive GPS signals, and the memory device stores the current location data, such that on movement of the non-navigation device to a second location shielded from GPS signals, orientation data concerning the orientation of the non-navigation device in the second location is determined by the compass in conjunction with the current location data stored in the memory device, while the non-navigation device is shielded from GPS signals.



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DEVICE FOR INDICATING DIRECTION TO PREDETERMINED LOCATION

The invention relates to a non-navigation device, in particular, to a non-navigation
5 device for assisting the orientation of a user towards a predetermined location.

It is often desirable for an individual to know how to accurately orientate himself
so that he is facing towards a particular location.

10 An example of such a situation is where a worshipper needs to orientate himself in
a predetermined direction for worship. For instance, religions such as Judaism and
Islam require their followers to pray, facing a predetermined direction a number of
times during the day. Muslims are required to pray five times a day facing towards
Mecca, and Jews are required to pray at least three times a day facing towards
15 Jerusalem.

In order to meet their religious obligations, followers use indicators or ornaments
to assist their alignment towards the required direction. For example, Jews hang a
decoration called a Mizarach on a wall in their home or synagogue to indicate the
20 preferred direction or orientation for prayer.

If the worshipper has to pray away from his home or a place of worship, he has to
orientate himself towards the required direction for prayer without the guidance he
is accustomed to. This can be very difficult as the required orientation in one
25 location is likely to be different from the required orientation in another location.

In the western hemisphere, Mecca is situated towards the east and it is generally
assumed that if a Muslim is facing east, then he is facing Mecca.

30 However, the precise direction of Mecca will depend on the location of an
individual. For example, the precise direction of Mecca from New York is not the
same as the precise direction of Mecca from Los Angeles, even though both cities
are in the same country. As such, the assumption that a Muslim situated anywhere

in the western hemisphere who faces east while praying, is facing Mecca, is inaccurate.

Therefore there is a need for a non-navigation device that is simple to use and
5 which assists the user in facing towards a predetermined location irrespective of where he is located.

According to a first aspect of the invention, there is provided a non-navigation device for assisting the orientation of a user towards a predetermined location,
10 comprising, operatively connected together;

a GPS receiver;

a compass;

a memory device; and

a first indicator for informing the user of the orientation of the non-
15 navigation device,

wherein the GPS receiver provides current location data concerning the location of the non-navigation device when located in a first location so as to receive GPS signals, and the memory device stores the current location data, such that on movement of the non-navigation device to a second location shielded from GPS
20 signals, orientation data concerning the orientation of the non-navigation device in the second location is determined by the compass in conjunction with the current location data stored in the memory device, while the non-navigation device is shielded from GPS signals.

25 The device according to the first aspect of the present invention is a non-navigation device, and as a result, it is of a much simpler construction than a navigation device.

A navigation device is a device that plots a route and directs a user along a
30 determined course to a desired location. The device calculates the user's heading, or direction of travel, by determining the movement of the user over time. Data is provided in order to orient a displayed map relative to the orientation of the navigation device in order to assist the user along a calculated path.

Navigation devices in general include extensive mapping information as well as provisions for uploading additional map information as desired.

5 While navigation devices are useful in situations when a user requires help getting from a first location to a second location, for example, from London to Manchester, they are not practical for situations where the user requires, or is interested in, a single directional heading only.

10 By means of the invention therefore, an individual desiring to know accurately the orientation he must assume in order to face a predetermined location can easily do so.

15 Preferably data concerning the predetermined location is pre-loaded into the memory device. Therefore, a user is not required to input any data into the non-navigation device in order to orientate himself towards the predetermined location, further simplifying the process of orientation.

20 Advantageously data concerning more than one predetermined location is pre-loaded into the memory device.

Preferably the non-navigation device comprises an input port for loading data concerning more than one predetermined location into the memory device.

25 Preferably the non-navigation device comprises a processor having a Great Circle and a Rhumb line algorithm for calculating a directional heading.

30 The Great Circle algorithm will calculate the directional heading according to a Great Circle method, which will indicate the direction of the shortest route to the predetermined location. The Rhumb line algorithm will calculate the directional heading according to a Rhumb line method, which will indicate the direction of the predetermined location along a constant compass heading.

A user is able to select the algorithm, and hence a pre-set method, by which the orientation data concerning the orientation of the non-navigation device in the second location is determined.

- 5 Advantageously, the non-navigation device further comprises a second indicator, to indicate to a user the pre-set method used.

Advantageously the non-navigation device is designed to be compact and portable. For example, the non-navigation device may be handheld, or may be in
10 the form of a necklace, thereby allowing an individual to easily carry the device from one location to another.

Preferably the non-navigation device further includes an integrated power source so that the non-navigation device can be used both outdoors and indoors without
15 the need to connect the non-navigation device to a separate external power source such as an electrical mains outlet.

Conveniently the non-navigation device is powered through the integrated power source, which may be operated by means of a battery. Alternatively, the power
20 source may be operated by means of solar panels or a combination of solar and battery power.

Preferably the battery is a rechargeable battery, and the non-navigation device further comprises a charging jack to allow a user to recharge the rechargeable
25 battery.

Preferably, the first indicator comprises a direction display, which may be in the form of, for example a light, an arrow or a multi-segment LCD display, for
30 indicating to a user which direction he needs to turn to correctly align himself towards a predetermined location. Other types of indicator may be used. For example, the first indicator may be audible.

Conveniently the first indicator comprises an alert device that indicates when the user is correctly aligned in the required direction.

Advantageously the first indicator comprises an optical pointer to assist alignment of a user towards a predetermined location. The optical pointer may be powered by any light source, such as a laser or an LED.

5

The alert device may also be activated to indicate when the location data is successfully stored in the memory device.

The alert device may further include other discernable alerts such as a vibrating alert.

10

The alert device may include an audible alert and/or a visual alert. An audible or vibrating alert will enable blind or visually impaired users to use the non-navigation device without assistance.

15

Preferably the audible alert is in the form of a beep and the visual alert is in the form of a light source that illuminates on activation of the visual alert.

Advantageously the non-navigation device comprises a plurality of first indicators.

20

Advantageously the non-navigation device is configured so as to power down after a predetermined period of activity in order to conserve battery life.

According to a second aspect of the invention, there is provided a method for assisting the orientation of a user towards a predetermined location, comprising, the steps of:

25

a) positioning a GPS receiver in a first location so as to receive GPS signals;

b) obtaining current location data concerning the location of the user in the first location from the GPS receiver;

30

c) storing the current location data in a memory device;

d) calculating the direction of the predetermined location in a second location shielded from GPS signals using the compass and the current location

data stored in the memory device, to obtain orientation data concerning the orientation of the user; and

e) indicating the orientation data to the user in the second location via a first indicator.

5

Hence, the orientation of the user in the second location towards a predetermined location can be carried out indoors or outdoors, as the compass will use the most recent GPS position in the memory device to calculate the required orientation of the user when it is not possible to obtain location data directly from GPS satellites.

10

Preferably the step of calculating the direction of the predetermined location in a second location uses a pre-set method to obtain orientation data concerning the orientation of the user in the second location.

15 Preferably the pre-set method is either a Great Circle method or a Rhumb line method.

Preferably, the method comprises prior to the step of calculating the direction of the predetermined location in the second location, the further steps of:

20 f) determining orientation data concerning the orientation of the user in the first location, using the current location data and directional data from the compass in the first location;

g) indicating the orientation data to the user in the first location via the first indicator.

25

The invention will now be described by way of non-limiting example with reference being made to the accompanying drawings in which:

Figure 1 is a schematic view of the components of a non-navigation device according to the invention;

30

Figure 2 is a perspective view of a non-navigation device according to a first embodiment of the invention;

Figure 3 is a perspective view of a non-navigation device according to a second embodiment of the invention; and

Figure 4 is a perspective view of a third embodiment of the invention.

5

Referring to Figures 1 and 2, a non-navigation device 10 according to a first aspect of the invention comprises a GPS receiver 12, an electronic compass 14, a memory device 16, and a plurality of first indicators 18 operatively connected together.

10

Data concerning the predetermined location is pre-loaded into the memory device 16. The user is not required to input any data into the non-navigation device 10 in order to orientate himself towards the predetermined location.

15

The non-navigation device 10 is powered through an integrated power source 20, which is operated by means of a battery.

The first indicators 18 comprise a direction display 22. The direction display 22 includes an arrow 24.

20

In the preferred embodiment shown in Figure 2, the direction display 22 includes a pair of illuminating arrows 24 to help orientate a user. The first arrow is illuminated to indicate to the user to turn left, the second arrow is illuminated to indicate to the user to turn right.

25

The first indicators 18 further comprise an optical pointer 28 and an alert device 30. The optical pointer may be powered by any light source, such as a laser or an LED. The alert device may comprise an audible alert, a visual alert and/or a sensory/vibrating alert.

30

In the preferred embodiment, the audible alert is in the form of a beep and the visual alert is in the form of a light source that illuminates on activation of the alert device.

The optical pointer 28, audible alert and/or vibrating alert may be deactivated if required.

5 The non-navigation device 10 further comprises a plurality of LEDs 38 in order to indicate to a user whether the optical pointer, audible alert and/or vibrating alert have been deactivated.

10 Preferably, an LED is associated with a specific first indicator such that when an LED is illuminated, it indicates to the user that the corresponding first indicator is activated. For example, a first LED when illuminated indicating that the optical pointer is activated, and a second LED when illuminated indicating that the vibration alert is activated.

15 In the preferred embodiment, three LEDs in a row are used to indicate to the user which first indicators are activated.

20 The orientation of a user towards a predetermined location, is obtained by initially positioning the non-navigation device 10 in a first location so as to receive GPS signals. A power button 36 located on the non-navigation device is pressed for at least 2 seconds to start a GPS engine within the GPS receiver 12.

25 When the GPS engine has located a sufficient number of satellites, the latitude and longitude coordinates of the non-navigation device 10 are calculated to provide current location data concerning the location of the non-navigation device 10. This current location data is stored in the memory device 16.

Once the current location data is stored, the alert device 30 is activated to inform the user that the GPS position has been recorded.

30 The non-navigation device 10 is configured so as to power down after a predetermined period of activity. As such, the non-navigation device 10 will switch itself off after a few seconds, in order to conserve battery life.

The user can now go to a second location, which may be shielded from GPS signals. At the second location, the user turns on the non-navigation device 10 by pressing the power button 36 briefly. Orientation data concerning the orientation of the non-navigation device 10 in the second location is determined by using the electronic compass 14 and the current location data stored in the memory device to calculate the direction of the predetermined location.

In other words, the stored location data, in conjunction with directional data determined from the electronic compass 14, is used to determine orientation data of the non-navigation device 10 at the second location.

The non-navigation device 10 may further comprise a processor having a Great Circle and a Rhumb line algorithm for calculating a directional heading. The method for determining the orientation data concerning the orientation of the non-navigation device in the second location towards the predetermined location may thus be selected by a user from either a Great Circle method or a Rhumb line method.

That is to say, the processor takes the current location data and the predetermined location data from the memory device and uses the Great Circle or Rhumb line algorithm, depending on the method selected, to calculate a heading. The calculated heading is then used in conjunction with directional data determined from the electronic compass 14 to determine the orientation data at the second location.

The arrows 24 on the direction display 22 will indicate to the user, the direction in which the user should turn in order to correctly align himself with the predetermined location. When the non-navigation device 10 and the user are pointing towards the predetermined location, the alert device 30 is activated to indicate that the user is appropriately orientated.

Referring to Figure 3, a second embodiment of the non-navigation device 40 according to the present invention is shown. The second embodiment differs from

the first embodiment in that the non-navigation device 40 further comprises an input port 44 for loading data concerning more than one predetermined location.

5 In addition, the non-navigation device 40 further comprises a screen 42 to indicate to the user the selected predetermined location.

Referring to Figure 4, a third preferred embodiment of a non-navigation device 50 according to the present invention is shown. Parts of the device 50 corresponding to devices 10, 40 have been given corresponding reference numerals for ease of
10 reference.

In this embodiment, data concerning one predetermined location only may be stored in the memory device 16 of the non-navigation device 50 at any time. Each time a user wishes to be able to orientate towards a different predetermined
15 location to that currently stored in the non-navigation device 50, data concerning the new predetermined location may be loaded onto the non-navigation device 50.

Data concerning the new predetermined location may be loaded onto the non-navigation device 50 via the input port 44. Data concerning the current
20 predetermined location stored in the memory device 16 will thus be overwritten by the new data. Once the new data has been uploaded, the non-navigation device 50 will assist the orientation of the user towards the new predetermined location.

In this embodiment, the direction display 22 is in the form of a multi-segment
25 LCD orientation ring 52 displayed on an LCD panel 54.

In this embodiment, the direction in which a user has to turn will be indicated by an illuminated segment of the orientation ring 52.

30 The non-navigation device 50 is powered by means of a rechargeable battery and comprises a charging jack 62 for recharging the rechargeable battery. In the embodiment shown in Figure 4, the charging jack is integrated with the input port 44.

The non-navigation device 50 further comprises a plurality of display icons 58 in order to indicate to a user whether the optical pointer, audible alert and/or vibrating alert have been deactivated.

- 5 The display icons 58 may further include an icon to indicate to a user the status of the rechargeable battery.

The display icons 58 may also include an icon to indicate to a user the strength of the GPS signal being received by the GPS receiver.

10

The non-navigation device 50 may further include a second indicator 60 to indicate to a user which method of orientation is being used, i.e. whether the method of orientation is a Great Circle or a Rhumb line method or some other method. In the embodiment shown in Figure 4, the second indicator is in the form of a display icon.

15

Let us consider the situation where the predetermined location/point of interest is Mecca, and the non-navigation device 50 according to the invention is to be used by a worshipper who wants to orientate himself towards Mecca.

20

The worshipper would first position the non-navigation device 50 in a location with a clear view of the sky (and/or satellites) and activate the non-navigation device 50. The alert device 30 will inform the worshipper that the GPS position has been recorded once the location data is stored in the memory device 16.

25

The worshipper can now go to a place of prayer, which can be inside or outside. When the worshipper is in the position where the worshipper would like to pray, the non-navigation device 50 is held flat and turned on.

- 30 The worshipper will then choose which method he would like the non-navigation device 50 to use to calculate the direction of Mecca i.e. the Great Circle or Rhumb line method.

The precise direction of Mecca will now be calculated, using the stored location data in conjunction with the compass 14 and the processor. The worshipper will then turn in the direction shown by a flashing or illuminated segment of the LCD orientation ring 52 of the direction display unit 22, holding the non-navigation device 10 flat in his hands.

As the worshipper turns in the direction towards Mecca, a respective segment of the LCD orientation ring 52 will flash or be illuminated to guide the worshipper in the right direction.

10

The alert device 30 will be activated when the non-navigation device 10 is pointing precisely towards Mecca, and the optical pointer 28 will be energised to further assist alignment. The worshipper now aligns his prayer mat in the direction indicated by the optical beam 56 emitted by the optical pointer 28, in the knowledge that he is pointing precisely towards Mecca.

15

If the audible alert of the alert device 30 is activated, the alert device 30 will emit a pulsing beep once the user is within $\pm 10^\circ$ of the direction of Mecca. The frequency of the beep will increase as the user turns the device towards Mecca, and will decrease as the user turns the device away from Mecca. When the device is directly facing Mecca the pulsing beep will become a continuous tone. The continuous tone will sound for a brief period of time before being switched off. Once the continuous tone has been achieved the audible alert of the alert device 30 will not sound again unless the user moves further than $\pm 10^\circ$ from the direction of Mecca.

20

25

The optical pointer 28 will be activated only when the non-navigation device 10 is pointing precisely towards Mecca, the optical pointer 28 will turn off if the worshipper turns beyond the direction of Mecca.

30

Although the use of the non-navigation device according to the invention has been described with particular reference to a Muslim requiring to orientate himself towards Mecca, it is to be understood that the invention is not limited to such use

but can be used in circumstances where a user wishes to orientate himself towards a predetermined location, which may be for religious or non-religious reasons.

5 For instance, a broadcasting company could give a device according to the invention pre-loaded with the position of a particular satellite to installation engineers or correspondents in order to assist with precise alignment of receiving equipment.

10 It is also possible that the army may supply its personnel with a device according to the invention pre-loaded with the precise location of a target or their base to enable them to know the direction in which they should move.

CLAIMS

1. A non-navigation device for assisting the orientation of a user towards a predetermined location, comprising, operatively connected together;
5 a GPS receiver;
a compass;
a memory device; and
a first indicator for informing the user of the orientation of the non-
navigation device,
10 wherein the GPS receiver provides current location data concerning the location of the non-navigation device when located in a first location so as to receive GPS signals, and the memory device stores the current location data, such that on movement of the non-navigation device to a second location shielded from GPS signals, orientation data concerning the orientation of the non-navigation device in
15 the second location is determined by the compass in conjunction with the current location data stored in the memory device, while the non-navigation device is shielded from GPS signals.
2. The non-navigation device of Claim 1 wherein data concerning the
20 predetermined location is pre-loaded into the memory device.
3. The non-navigation device of Claim 1 wherein data concerning more than one predetermined location is pre-loaded into the memory device.
- 25 4. The non-navigation device of any one of the preceding claims further comprising an input port for loading data concerning more than one predetermined location into the memory device.
5. The non-navigation device of any one of the preceding claims further
30 comprising a processor having a Great Circle and a Rhumb line algorithm for calculating a directional heading.
6. The non-navigation device of any one of the preceding claims further comprising a second indicator.

7. The non-navigation device of any preceding claim further including an integrated power source.

5 8. The non-navigation device of Claim 7 wherein the integrated power source is a rechargeable battery and the non-navigational device further comprises a charging jack for recharging the rechargeable battery.

9. The non-navigation device of any preceding claim wherein the first
10 indicator comprises an optical pointer.

10. The non-navigation device of any preceding claim wherein the first indicator comprises an alert device.

15 11. The non-navigation device of Claim 10 wherein the alert device comprises an audible alert.

12. The non-navigation device of Claim 10 or Claim 11 wherein the alert device comprises a visual alert.

20

13. The non-navigation device of any preceding claim including a plurality of first indicators.

14. The non-navigation device according to any preceding claim wherein the
25 first indicator comprises an LCD directional display.

15. The non-navigation device of any preceding claim wherein the non-navigation device is configured so as to power down after a predetermined period of activity.

30

16. The non-navigation device of any preceding claim wherein the predetermined location is Mecca.

17. A method for assisting the orientation of a user towards a predetermined location, comprising, the steps of:

a) positioning a GPS receiver in a first location so as to receive GPS signals;

5 b) obtaining current location data concerning the location of the user in the first location from the GPS receiver;

c) storing the current location data in a memory device;

d) calculating the direction of the predetermined location in a second location shielded from GPS signals using the compass and the current location data stored in the memory device, to obtain orientation data concerning the
10 orientation of the user; and

e) indicating the orientation data to the user in the second location via a first indicator.

15 18. The method of Claim 17 wherein the step of calculating the direction of the predetermined location in a second location uses a pre-set method to obtain orientation data concerning the orientation of the user in the second location.

19. The method of Claim 18 wherein the pre-set method is either a Great
20 Circle method or a Rhumb line method.

20. The method of any of Claims 17 to 19 including, prior to the step of calculating the direction of the predetermined location in the second location, the further steps of

25 f) determining orientation data concerning the orientation of the user in the first location, using the current location data and directional data from the compass in the first location;

g) indicating the orientation data to the user in the first location via the first indicator.

30

21. The method of any of Claims 17 to 20 wherein data concerning the predetermined location is pre-loaded into the memory device.

22. The method of any of Claims 17 to 21 further including the step of activating the first indicator when the location data has been stored in the memory.

23. The method of any of Claims 17 to 22 further including the step of
5 activating the first indicator when the user is orientated with the predetermined location.

24. The method of Claim 22 or 23 wherein the first indicator comprises an optical pointer and the step of activating the first indicator comprises the
10 activation of the optical pointer.

25. The method of any of Claims 22 to 24 wherein the first indicator comprises an alert device and the step of activating the first indicator comprises the activation of the alert device.
15

26. The method of Claims 25 wherein the alert device comprises an audible alert.

27. The method of Claim 25 or Claim 26 wherein the alert device comprises a
20 visual alert.

28. The method of any of Claims 23 to 27 wherein the predetermined location is Mecca.

25 29. A non-navigation device substantially as hereinbefore described with reference to the accompanying drawings.

30. A method substantially as hereinbefore described with reference to the accompanying drawings.
30

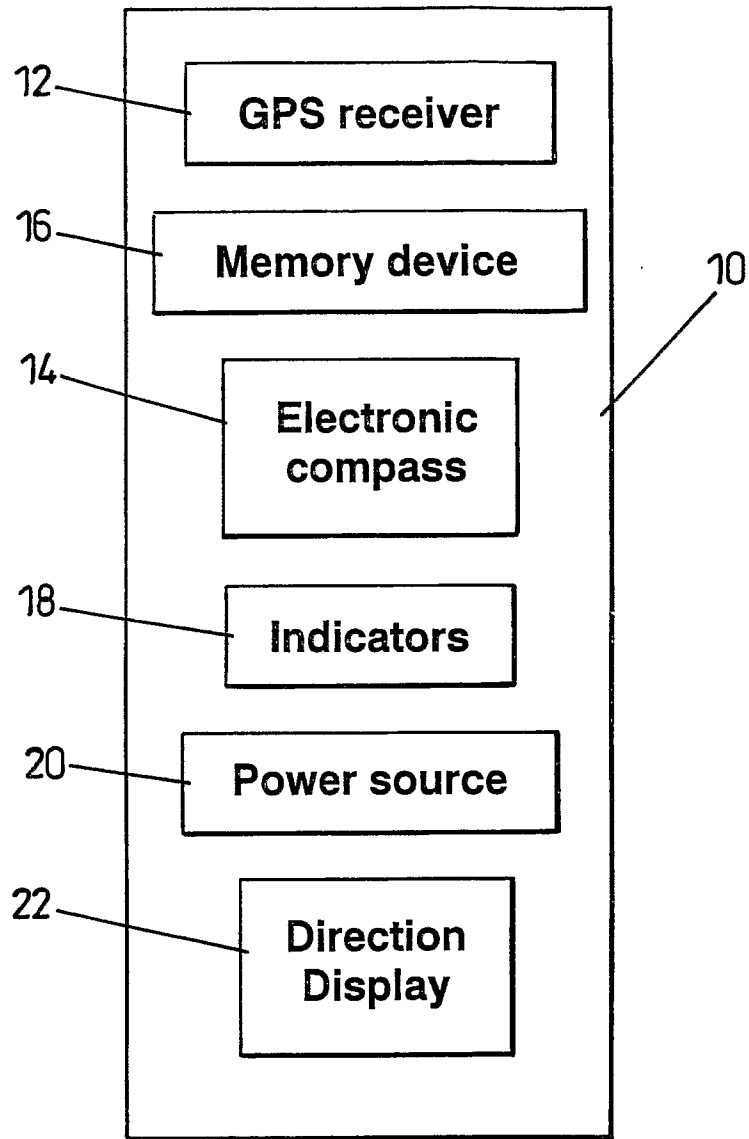


Fig. 1

2/3

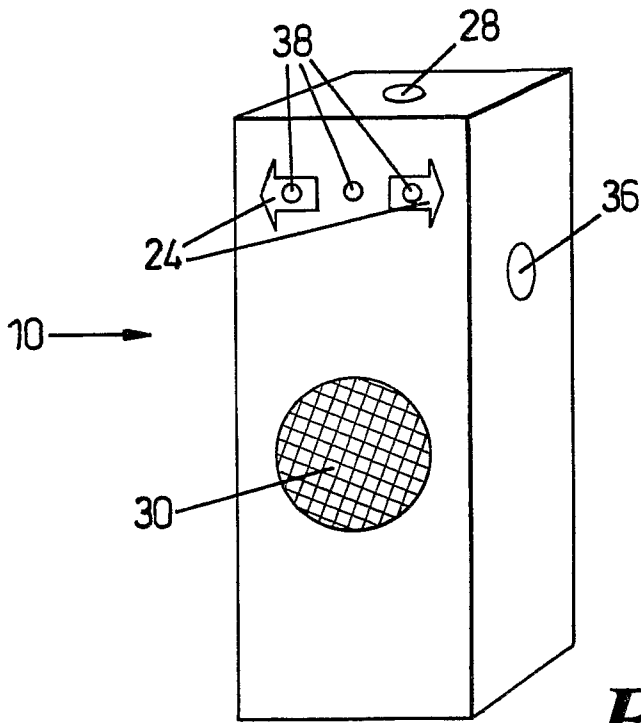


Fig. 2

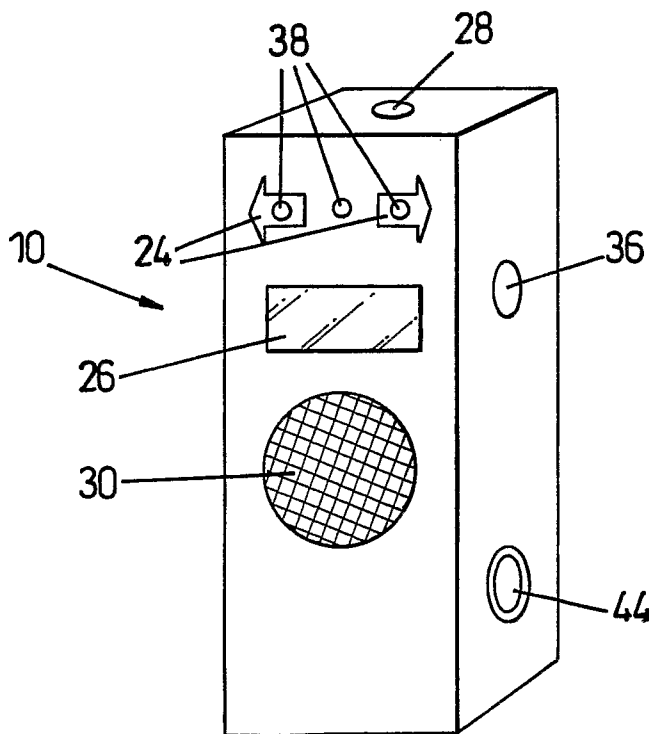


Fig. 3

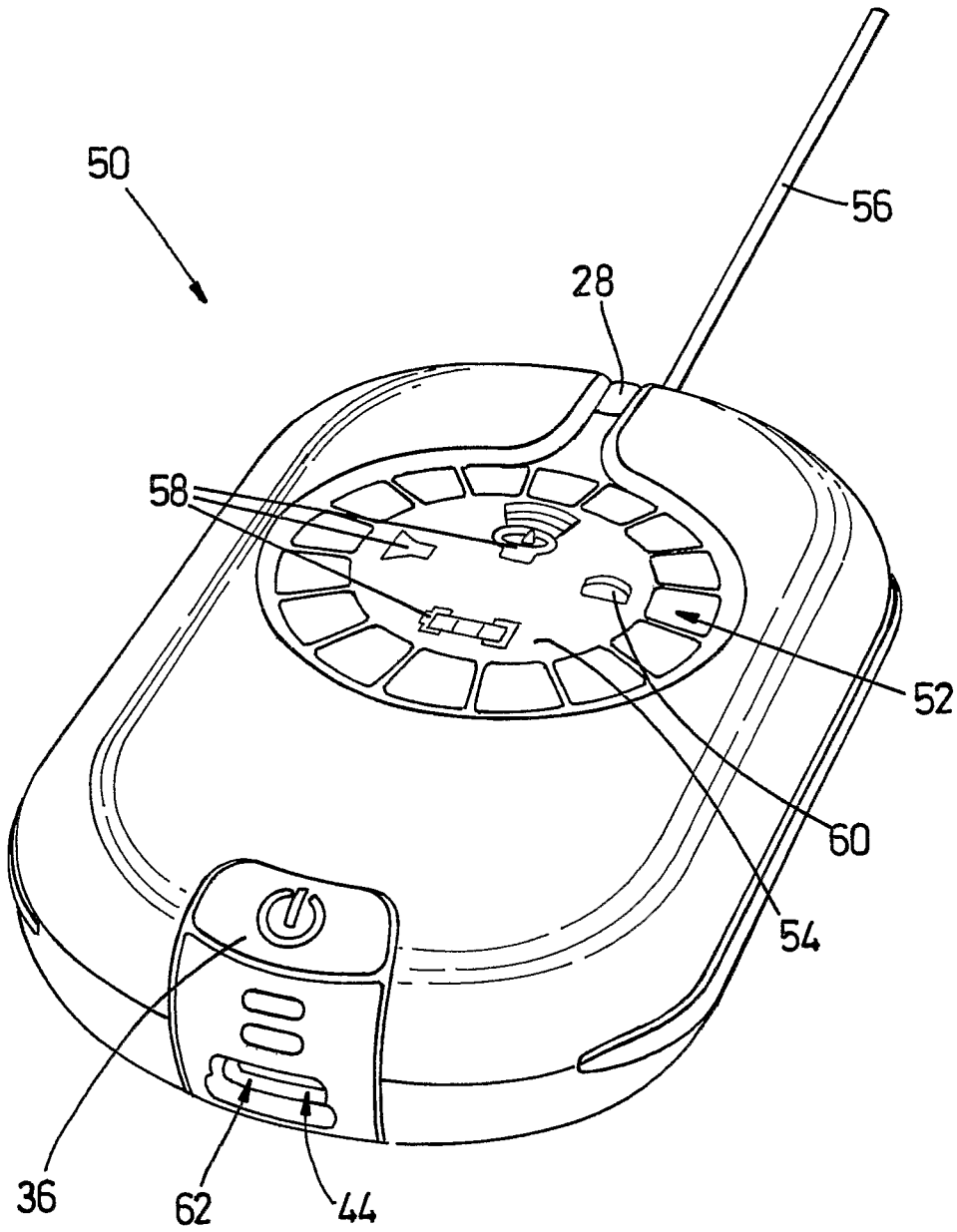


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2006/003452

A. CLASSIFICATION OF SUBJECT MATTER
INV. G01C17/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G01C G01S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97/48025 A (ASULAB SA [CH]) 18 December 1997 (1997-12-18) page 1, paragraph 3 - page 2, paragraph 1 page 2, paragraph 4 - page 3, paragraph 1 page 3, paragraph 4 - page 5, paragraph 2 page 8, paragraph 4 - page 9, paragraph 1 figure 1	1-30
X	WO 97/19321 A (BALLAD INVESTMENT N V [NL]; LAMEER JOEP [NL]) 29 May 1997 (1997-05-29) figure 1 claims 1,2 page 5, line 8 - line 24 page 6, line 15 - page 7, line 14	1-30

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search

4 January 2007

Date of mailing of the international search report

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Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2006/003452

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003/103002 A1 (HASEBE KIYOSHI [JP] ET AL) 5 June 2003 (2003-06-05) figure 1 paragraphs [0030], [0031] paragraphs [0047], [0083] -----	1-30
A	NL 1 004 528 C2 (ERIK THEO AGTERBERG [NL]; SANNE KERKHOF [NL]) 18 May 1998 (1998-05-18) page 1, line 32 - page 2, line 18 figure 1 page 6, line 1 - line 11 -----	1-30
A	NL 1 015 962 C1 (HELIX ASPERSA B V [NL]) 19 February 2002 (2002-02-19) the whole document -----	1-30
A	DE 199 46 169 A1 (HEYNER KLAUS [DE]) 5 April 2001 (2001-04-05) column 1, line 38 - line 65 column 2, line 26 - line 44 -----	1-30
A	WO 00/62131 A (ROBBA ROBERTO [IT]) 19 October 2000 (2000-10-19) page 1, line 5 - line 15 page 2, line 14 - page 3, line 17 -----	1-30

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2006/003452

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9748025	A	US 5790477 A	04-08-1998
WO 9719321	A	AU 7626396 A	11-06-1997
		DE 69607979 D1	31-05-2000
		DE 69607979 T2	16-11-2000
		EP 0861416 A1	02-09-1998
		JP 2000516335 T	05-12-2000
		NL 1001683 C2	21-05-1997
		TW 399823 Y	21-07-2000
		US 6202035 B1	13-03-2001
US 2003103002	A1	CN 1418036 A	14-05-2003
		JP 2003209598 A	25-07-2003
		KR 20030038494 A	16-05-2003
		TW 233037 B	21-05-2005
NL 1004528	C2	NONE	
NL 1015962	C1	NONE	
DE 19946169	A1	NONE	
WO 0062131	A	AU 5192399 A	14-11-2000
		IT PI990022 A1	13-10-2000