(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 384 495 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
06.03.2013 Bulletin 2013/10

(21) Application number: **09785902.9**

(22) Date of filing: **12.05.2009**

(51) Int Cl.:
G07C 1/30 *(2006.01)*

(86) International application number:
PCT/IB2009/005565

(87) International publication number:
WO 2010/131059 (18.11.2010 Gazette 2010/46)

(54) AUTOMATIC PARKING DISC

AUTOMATISCHE PARKSCHEIBE

DISQUE DE STATIONNEMENT AUTOMATIQUE

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR

(43) Date of publication of application:
09.11.2011 Bulletin 2011/45

(73) Proprietor: **Needit ApS**
1165 Copenhagen K (DK)

(72) Inventor: **LARSEN, Klaus**
DK-2970 Hoersholm (DK)

(74) Representative: **Roerboel, Leif et al**
Budde Schou A/S
Vester Søgade 10
1601 Copenhagen V (DK)

(56) References cited:
EP-A- 0 952 557
EP-A- 1 221 676
EP-A- 1 231 572
WO-A-2004/114225

EP 2 384 495 B1

Printed by Jouve, 75001 PARIS (FR)

Description

Field of the invention

[0001] The present invention generally relates to a method for accurately determining the state of a vehicle, and in particular to an automatic parking disc. More specifically, the present invention relates to an autonomous parking disc without any direct couplings to the electronics of the vehicle it is placed in.

Related art

[0002] In disc parking the parking disc shows the arrival time, which is set to the next full hour, half hour, or quarter hour mark on a clock face. For example, if a parking sign indicates a one hour maximum parking time, then the effective maximum parking time is at least 61 to 75 minutes, because of the setting of the clock forward in time.

[0003] Parking discs are commonly placed inside a vehicle so that the arrival time can be read from the outside of the vehicle through the windshield or through one of the side-windows at the front. Typically, a parking disc has a traditional clock face with time marks positioned in a circle. A mechanical time indicator or arrow is rotationally connected to the centre of the circle and can be set manually relative to the clock face to indicate the arrival time. The manually operable parking discs are commonly sheet-like objects that can easily be stowed away when not in use. However, there are also parking discs that are bulky, or parking discs that are releasably or permanently attached to the windscreen.

[0004] There are also parking discs that automatically indicate the arrival time. In EP1221676A2 and EP1231572 acceleration sensors are suggested as sensors for determining whether a vehicle is in a driving state or a parked state. These kinds of parking discs are associated with the problem that they are not reliable in determining the state of the vehicle, or in determining the transition between states.

[0005] Another kind of parking discs is revealed in DE4305266A1, in which it is physically coupled to the electrical system, or more specifically to the ignition, of a vehicle. These parking discs are generally reliable in determining the state of a vehicle. However, they are associated with costly installment procedures and are also susceptible to manipulation via the physical coupling to the electrical system.

[0006] WO 2004/114225 discloses an automatic parking disc, wherein a state transition from parked to driving is based on whether an estimate of the acceleration along a single uniform direction exceeds a minimum value.

Object of the invention

[0007] It is an object of the present invention to provide a reliable determination of changes between states of a vehicle, i.e. whether the state is changed from parked to driving or from driving to parked, by an automatic parking disc. A particular feature of the present invention is that the parking disc is autonomous with respect to the vehicle, for example it is not coupled to the electrical system the vehicle for power or for receiving information about the state of the vehicle. An advantage with the present invention is an automatic and accurate parking disc that can be easily be transferred between and used in different vehicles.

General description

[0008] The object of the present invention is defined according to the subject-matter of the independent claim 1.

[0009] The accelerometer typically measures its acceleration or change in velocity relative to the surroundings. It is a multi-axis model, i.e. the accelerometer may measure velocity changes in several directions simultaneously. The chronometer may comprise any type of electronic or electro-mechanical oscillator, e.g. a quartz oscillator having a base resonance frequency of 32768 Hz. Naturally, the chronometer may have to be calibrated in order to provide an appropriate reference time. The autonomous power source may be an electrical battery, or it may be a solar or photovoltaic cell storing some of its power in an electrical battery or capacitor. Autonomous should here be understood as not depending on external power from the vehicle.

[0010] The automatic parking disc may further comprise a first indicator on the front face to display the arrival time. This has the advantage that, if the parking disc is attached to the windscreen, or for that matter on any window of a vehicle, the arrival time can be seen from the outside of the vehicle. The first indicator may comprise a clock face on the front face having twelve hour differentiating marks in a closed loop, a thirty-minutes differentiating mark between each pair of neighboring hour differentiating marks, and a fifteen-minutes differentiating mark between each neighboring thirty-minutes and hour differentiating marks. The automatic parking disc may further comprise a liquid-crystal-display to display the arrival time by a pointer to any of the hour, thirty-minutes, and fifteen-minutes differentiating marks. All these technical features have the advantage of improving the displaying of the arrival time.

[0011] The chronometer may further provide a reference date, and the automatic parking disc may further comprise a second indicator on the back face to display the reference time and the reference date. Naturally, the chronometer may have to be calibrated in order to provide an appropriate reference time and reference date. Hence, the automatic parking disc may further comprise a first manual input to manually set the reference time and/or the reference date. This has the advantage that the reference time can be adjusted to any Coordinated Universal Time or UTC, i.e. the parking disc can easily be used in two different time-zones by a simple recali-

bration of the chronometer.

[0012] The automatic parking disc may further comprise a second manual input to manually set the arrival time. This has the advantage that if the time-limited parking starts at a particular time that is later than the present time, the arrival time can be set to the later particular time. This way, it is not necessary to go back to a parked vehicle to set the arrival time when the time-limited parking starts.

[0013] The automatic parking disc may further comprise a support to releasably attach the automatic parking disc to a windshield with the front face facing the windshield. This has the advantage that the arrival time can be seen from the outside when the land vehicle is in a parked state.

Brief description of the figures

[0014] Additional objects and features according to the present invention will be more readily apparent from the following detailed description of a preferred embodiment presented in conjunction with the figures:

Figure 1 is a schematic block diagram illustrating the method for determining a change of state of a land vehicle.

Figure 2 is a graph illustrating in the frequency domain a low-pass filtering of the sampled signal.

Figure 3 is a graph illustrating in the frequency domain another low-pass filtering of the sampled signal, where the cut-off frequency is lower than In Figure 2.

Figure 4 is a graph illustrating in the frequency domain the subtraction of the signal after passing the low-pass filtering of Figure 3 from the signal after passing the low-pass filtering of Figure 2, thus effectively representing a band-pass filtering.

Figure 5 is a phase diagram illustrating the hysteresis of the method for determining a change of state of a land vehicle.

Figure 6 is a block diagram illustrating the principal electronic components of an automatic parking disc.

Figure 7 is a front view of an automatic parking disc.

Figure 8 is a side view of an automatic parking disc.

Figure 9 is a back view of an automatic parking disc.

Detailed description

[0015] Figure 1 is a schematic block diagram 10 illustrating a preferred embodiment of the method for determining a change of state of a land vehicle. Two thresholds *p2d* and *d2p* are defined 30, where the former is higher than the latter. The signal s is sampled 32 at a sampling frequency of 16 Hz and subjected to a low-pass filter 36 having a cut-off frequency at approximately 0.5 Hz, giving a first filtered signal. The sampled signal s is also subjected to another low-pass filter 34 having a cut-off frequency at approximately 0.03 Hz, giving a second filtered signal. The second filtered signal is subtracted 38 from the first filtered signal filtered signal to. The signal is then integrated 40 over a time window of 16 s, thereby giving the signal parameter S.

[0016] The thresholds p2d and d2p are set by calibration with respect to the properties of the signal parameter S in the state of parked and in the state of driving for a car on a road surface.

[0017] The signal parameter *S* is compared 44 with the thresholds *p2d* and *d2p* and the present state, either parked *P* or driving *D*, is recalled 42. If the present state is driving *D* and the signal parameter *S* is smaller than *d2p* 46, then the present state is changed 48 to parked *P*, which is stored to be recalled later 42. Next, an arrival time *t* is determined 50 from a reference time and rounded to the closest future quarter of an hour. The rounded arrival time is then displayed 54. Subsequently, the sampling 32 of a new signal s is performed iteratively 56. If the present state is parked P and the signal parameter *S* is larger than *p2d* 58, then the present state is changed 60 to driving *D*, which is stored to be recalled later 42. Next, the displaying of the arrival time *t* is discontinued 62. Subsequently, the sampling 32 of a new signal s is performed iteratively 64.

[0018] Figure 2 is a graph 12 illustrating in the frequency domain a low-pass filtering of the sampled signal 84. The ordinate 80 shows the changes in velocities a being normalized to a single gravity *g*, i.e. having the unit of meters per seconds squared, while the abscissa 82 shows the frequency *f* in the unit of Hertz. An example of a signal is represented by a dashed line 84. A low pass filter, having the cut-off frequency *f1* that is less than half of the sampling frequency $f_{sam\text{-}ple}$ is shown as a solid line 86. Figure 3 is a graph 14 illustrating in the frequency domain a low-pass filtering of the same sampled signal 84 as in Figure 2. Here, the ordinate 92 also shows the changes in velocities a being normalized to a single gravity *g*, while the abscissa 94 shows the frequency *f* in the unit of Hertz. A low pass filter, having the cut-off frequency *f2* that is less than the cut-off frequency *f1* of Figure 2 is shown as a solid line 98.

[0019] Figure 4 is a graph 16 illustrating in the frequency domain the subtraction of the signal after passing the low-pass filter of Figure 3 from the signal after passing the low-pass filter of Figure 2. Thus, the filtered and subtracted signal 106 is effectively within the upper cut-off frequency *f1* and the lower cut-off frequency f_2. As in the previous Figures 2 and 3, the ordinate 102 shows the changes in velocities a being normalized to a single gravity *g*, while the abscissa 104 shows the frequency *f* in the

unit of Hertz. The same scales on the corresponding coordinate axis of Figures 2 to 4 have been used.

[0020] Figure 5 is a phase or state diagram 18 illustrating the hysteresis of the method for determining a change of state of a land vehicle. The ordinate 100 shows the values of the signal parameter *S*, while the abscissa 112 shows to the state of the land vehicle. The hysteresis curve 114 is shown as a solid line, where the dashed arrows 124 indicate the direction of changes between states. The transition from parked *P* 120 to driving *D* 122 requires the signal parameter *S* to be larger than the threshold *p2d* 116, while the transition from driving *D* 120 to parked *P* 120 requires the signal parameter *S* to be smaller than the threshold *d2p* 118, where the threshold p2d 116 is higher than the threshold *d2p* 118.

[0021] Figure 6 is a block diagram 20 illustrating the principal electronic components of a preferred embodiment of the automatic parking disc. An Accelerometer 130 samples an analog signal at least partly representing the driving motions of a vehicle. The Accelerometer 130 is set to primarily measure driving motion along in a vertical direction and in the driving direction of the vehicle. Naturally, this may require that the Accelerometer 130 is placed in the appropriate orientation for this to be achieved. The analog signal is sent to an Analog-to-Digital converter 132 converting it to a digital signal. The digital signal is sent via a Control/Data bus 134 to a Processor 136 in connection with a quartz Oscillator 138 having a base resonance frequency of 32766 Hz. The Processor 136 and the quartz oscillator 138 together define a chronometer for providing a reference time and a reference date. A Temperature sensor 140 also sends an analog temperature signal to the Analog-to-Digital converter 132 to give a digital temperature signal, which is sent via the Control/Data bus 134 to the Processor 136. The digital temperature signal is employed for correcting or partly compensating for temperature induced shifts in the resonance frequency of the quartz oscillator 138.

[0022] The Processor performs the method described in conjunction with Figures 1 to 5. Naturally, the Processor 136 comprises a memory unit for storing the correspounding algorithms and the present state of the vehicle.

[0023] if the change of state from driving to parked is determined, the Processor 136 sends a signal to the Display controller 144 via the Control/Data bus 134, which in turn sends a display signal via the Display bus 146 to the Front face indicator 148 to display the arrival time. If the change of state from parked to driving is determined, the Processor 136 sends a signal to the display controller 144 via the Control/Data bus 134 to stop display the arrival time on the Front face indicator 148. The processor 136 also sends a signal to the display controller 144 via the Control/Data bus 134 to continuously display the reference time and reference date on the Back face indicator 150.

[0024] A key input 152 enables a time recalibration signal to be sent to the Processor 136 via a Digital In-/Output and the Control/Data bus 134 to manually set the reference time. Another key input 154 enables a date recalibration signal to be sent to the Processor 136 via a Digital In-/Output and the Control/Data bus 134 to manually set the reference date. Similarly, a key input 156 enables an arrival-time recalibration signal to be sent to the Processor 136 via a Digital In-/Output and the Control/Data bus 134 to manually set the arrival time.

[0025] The electronic components of the parking disc are provided with power via an eleotrical battery 142. The output power of the battery is monitored by the Processor 136 via the Analog-to-Digital converter 132 and the Control/Data bus 134.

[0026] Figure 7 is a front view of a preferred embodiment of the automatic parking disc 22. The cylindrical automatic parking disc 22 has a front face 184 with a clock face 170. The clock face 170 is provided with twelve hour differentiating marks 178 in a closed loop and a thirty-minute differentiating mark 180 between each pair of neighboring hour differentiating marks 178. Further, the clock face 170 is also provided with a fifteen-minutes differentiating mark 182 between each neighboring thirty-minutes 180 and hour 178 differentiating mark. On the inside of the clock face 170 is a liquid-crystal-display 174 showing an arrow 176 indicating the arrival time when the state is changed from driving to parked. The arrow 176 points either at an hour differentiating mark, a thirty-minutes differentiating mark, or a fifteen-minutes differentiating mark.

[0027] Figure 8 is a side view of a preferred embodiment of the automatic parking disc 22. The depth of the side 186 of the cylindrical parking disc 22 is significantly smaller than the diameter of its front 184 or back 172 faces, thereby giving it a flat profile. The front face is provided with a transparent suction ring 186 on the clock face 170 to enable a releasable attachment of the parking disc onto the inside of a windshield with the front face 184 facing outwards from the vehicle. The transparent cover 202 of a battery indicator lamp, which is turned on at low battery energy levels, protrudes from the back face 172.

[0028] Figure 9 is a back view of a preferred embodiment of the automatic parking disc 22. The cylindrical automatic parking disc 22 has a back face 172 provided with a liquid-crystal-display 192 for indicating the reference time and reference date. The parking disc 22 is also provided with an autonomous power source in the form of a battery housed behind a battery lid 200. The back face 172 is also provided with a manual key input 196 for setting the reference time, a manual key input 198 for setting the reference date, and manual key input 194 for setting the arriving time.

Claims

1. An automatic parking disc (22) having a front face (184) for being viewed from the outside of a land

vehicle and a back face (172) for being viewed from the inside of said land vehicle, said automatic parking disc (22) comprising:

a processor (136),
an accelerometer (130) coupled to said processor (136) to provide a signal,
a chronometer (138) to provide a reference time to said processor (136), and
an autonomous power source (142) to provide said automatic parking disc with electrical power,
the processor being configured for determining changes between states of a land vehicle from parked to driving and from driving to parked, sampling the signal provided by the accelerometer (130), said signal having a signal parameter representing the driving motions of said land vehicle, the accelerometer being a multi-axis accelerometer measuring velocity changes In several directions simultaneously, **characterized in that** the processor is configured for:

filtering (34, 36) said sampled signal to suppress said signal outside a frequency window,
integrating the filtered signal over a time interval In order to provide an integrated signal parameter, and
determining a change from parked to driving (44, 58, 60) if the present state is parked and if said integrated signal parameter is greater than an upper threshold, or alternatively
determining a change from driving to parked (44, 46, 48) if the present state is driving and if said integrated signal parameter is smaller than a lower threshold.

2. The automatic parking disc (22) according to claim 1, wherein the processor is further configured for determining an arrival time (50) from the reference time if said change from driving to parked is determined (44, 46, 48), and displaying said arrival time (54) in a first indicator (148, 174) on said front face (184) of the automatic parking disc (22).

3. The automatic parking disc (22) according to claim 2, wherein the processor is further configured for rounding said arrival time to the next full quarter of an hour.

4. The automatic parking disc (22) according to claim 2 or 3, wherein the processor is further configured for discontinuing the displaying of said arrival time (62) if said change from parked to driving is determined (44, 58, 60).

5. The automatic parking disc (22) according to claim 1, wherein the frequency window has its lower cut-off frequency (34) and its upper cut-off frequency (36) within approximately 0.01 Hz and approximately 1Hz.

6. The automatic parking disc (22) according to claim 1, wherein the frequency window has its lower cut-off frequency (34) at approximately 0.03Hz and its upper cut-off frequencies (38) at approximately 0.5 Hz.

7. The automatic parking disc (22) according to any of the claims 1 - 6, wherein the length of said time interval is in the range of approximately 10 seconds to approximately 100 seconds.

8. The automatic parking disc (22) according to any of the claims 1 - 7, wherein said first indicator (148, 174) comprises a clock face (170) on said front face (184) having:

twelve hour differentiating marks (178) in a closed loop,
a thirty-minutes differentiating mark (180) between each pair of neighboring hour differentiating marks (178), and
a fifteen-minutes differentiating mark (182) between each neighboring thirty-minutes (180) and hour (178) differentiating marks.

9. The automatic parking disc (22) according to any of the claims 1 to 8, wherein said first indicator (148, 174) further comprises: a liquid-crystal-display (174) to display said arrival time by a pointer (176) to any of said hour (178), thirty-minutes (180), and fifteen-minutes (182) differentiating marks.

10. The automatic parking disc (22) according to any of the claims 1 to 9, wherein said chronometer (138) further provides a reference date, and said automatic parking disc (22) further comprising: a second indicator (150, 192) on said back face (172) to display said reference time and said reference date.

11. The automatic parking disc (22) according to any of the claims 1 to 10 further comprising: a first manual input (194) to manually set said reference time and/or said reference date.

12. The automatic parking disc (22) according to any of the claims 1 to 11 further comprising: a second manual input (196, 198) to manually set said arrival time.

13. The automatic parking disc (22) according to any of the claims 1 to 12 further comprising: a support (186) to releasably attach said automatic parking disc (22) to a windshield with said front face (184) facing said

windshield.

Patentansprüche

1. Automatische Parkscheibe (22), die eine Vorderseite (184) aufweist, um von außerhalb eines Landfahrzeugs ersichtlich zu sein, und eine Rückseite (172), um von innerhalb des Landfahrzeugs ersichtlich zu sein, wobei die automatische Parkscheibe (22) umfasst:

einen Prozessor (136),
einen mit dem Prozessor (136) gekoppelten Beschleunigungsmesser (130) zum Bereitstellen eines Signals,
ein Chronometer (138) zum Bereitstellen einer Referenzzeit für den Prozessor (136),
eine autarke Stromquelle (142) zum Speisen der automatischen Parkscheibe (22) mit elektrischem Strom,
wobei der Prozessor für Festlegen von Wechseln zwischen geparkten zu fahrenden Zuständen und fahrenden zu geparkten Zuständen eines Landfahrzeugs konfiguriert ist, Prüfen des durch den Beschleunigungsmesser (130) bereitgestellten Signals, wobei das Signal einen Signalparameter aufweist, der die Fahrbewegungen des Landfahrzeugs repräsentiert, wobei der Beschleunigungsmesser ein Mehrachsbeschleunigungsmesser ist, der gleichzeitig Geschwindigkeitsveränderungen in mehrere Richtungen misst, **dadurch gekennzeichnet, dass** der Prozessor konfiguriert ist für:

Filtern (34, 36) des geprüften Signals zum Unterdrücken des Signals außerhalb eines Frequenzfensters,
Integrieren des gefilterten Signals über ein Zeitintervall, um einen integrierten Signalparameter bereitzustellen, und
Festlegen eines Wechsels vom geparkten Zustand zum fahrenden Zustand (44, 58, 60), wenn der gegenwärtige Zustand geparkt ist, und wenn der integrierte Signalparameter größer als eine obere Schwelle ist, oder alternativ
Festlegen eines Wechsels vom fahrenden Zustand zum geparkten Zustand (44, 46, 48), wenn der gegenwärtige Zustand fahrend ist, und wenn der integrierte Signalparameter kleiner als eine untere Schwelle ist.

2. Automatische Parkscheibe (22) nach Anspruch 1, wobei der Prozessor für Festlegen einer Ankunftszeit (50) von der Referenzzeit konfiguriert ist, wenn der Wechsel vom fahrenden Zustand zum geparkten Zustand festgelegt ist (44, 46, 48), und Anzeigen der Ankunftszeit (54) in einem ersten Indikator (148, 174) auf der Vorderseite (184) der automatischen Parkscheibe (22).

3. Automatische Parkscheibe (22) nach Anspruch 2, wobei der Prozessor ferner für Abrunden der Ankunftszeit auf das nächste volle Viertel konfiguriert ist.

4. Automatische Parkscheibe (22) nach Anspruch 2 oder 3, wobei der Prozessor ferner für Anhalten des Anzeigens der Ankunftszeit (62) konfiguriert ist, wenn der Wechsel vom geparkten Zustand zum fahrenden Zustand festgelegt ist (44, 58, 60).

5. Automatische Parkscheibe (22) nach Anspruch 1, wobei das Frequenzfenster seine untere Grenzfrequenz (34) und seine obere Grenzfrequenz (36) innerhalb von ungefähr 0,01 Hz und ungefähr 1 Hz hat.

6. Automatische Parkscheibe (22) nach Anspruch 1, wobei das Frequenzfenster seine untere Grenzfrequenz (34) bei ungefähr 0,03Hz und seine oberen Grenzfrequenzen (36) bei ungefähr 0,5 Hz hat.

7. Automatische Parkscheibe (22) nach einem der Ansprüche 1 bis 6, wobei die Länge des Zeitintervalls im Bereich von ungefähr 10 Sekunden bis ungefähr 100 Sekunden beträgt.

8. Automatische Parkscheibe (22) nach einem der Ansprüche 1 bis 7, wobei der erste Indikator (148, 174) ein Zifferblatt (170) auf der Vorderseite (184) umfasst, aufweisend:

Zwölf-Stunden unterscheidende Markierungen (178) in einem geschlossenen Kreis,
eine dreißig-Minuten unterscheidende Markierung (180) zwischen jedem Paar benachbarten Stunden unterscheidenden Markierungen (178), und
eine fünfzehn-Minuten unterscheidende Markierung (182) zwischen jeder benachbarten dreißig-Minuten (180) und Stunden (178) unterscheidenden Markierung.

9. Automatische Parkscheibe (22) nach einem der Ansprüche 1 bis 8, wobei der erste Indikator (148, 174) ferner umfasst: ein Flüssigkeitskristalldisplay (174) zum Anzeigen der Ankunftszeit durch einen Zeiger (176) auf irgendeine der Stunden (178), dreißig-Minuten (180) und fünfzehn-Minuten (182) unterscheidenden Markierungen.

10. Automatische Parkscheibe (22) nach einem der Ansprüche 1 bis 9, wobei das Chronometer (138) ferner ein Referenzdatum bereitstellt, und die automatische Parkscheibe (22) ferner umfasst: einen zweiten

Indikator (150, 192) auf der Rückseite (172) zum Anzeigen der Referenzzeit und des Referenzdatums.

11. Automatische Parkscheibe (22) nach einem der Ansprüche 1 bis 10 ferner umfassend: eine erste manuelle Eingabe (194) zum manuellen Einstellen der Referenzzeit und/oder des Referenzdatums.

12. Automatische Parkscheibe (22) nach einem der Ansprüche 1 bis 11 ferner umfassend: eine zweite manuelle Eingabe (196, 198), zum manuellen Einstellen der Ankunftszeit.

13. Automatische Parkscheibe (22) nach einem der Ansprüche 1 bis 12 ferner umfassend: eine Abstützung (186) zum lösbaren Befestigen der automatischen Parkscheibe (22) an einer Windschutzscheibe, wobei die Vorderseite (184) der Windschutzscheibe zugewandt ist.

Revendications

1. Disque de stationnement automatique (22) ayant une face avant (184) à être vue de l'extérieur dun véhicule terrestre, et une face arrière (172) à être vue de l'intérieur dudit véhicule terrestre, ledit disque de stationnement automatique (22) comprenant:

un processeur (136),
un accéléromètre (130) accouplé audit processeur (136) pour fournir un signal,
un chronomètre (138) pour fournir un temps de référence audit processeur (136), et
une source dénergie autonome (142) pour fournir de la puissance électrique audit disque de stationnement automatique,
le processeur étant configuré pour déterminer des changements entre l'état de stationnement à l'état de conduite et vice-versa dun véhicule terrestre, essayer le signal fourni par l'accéléromètre (130), ledit signal ayant un paramètre de signal représentant les mouvements de conduite dudit véhicule terrestre, l'accéléromètre étant un accéléromètre multidirectionnel mesurant des changements de vélocité dans plusieurs directions simultanément, **caractérisé en ce que** le processeur est configuré pour:

filtrer (34, 36) ledit signal essayé pour supprimer ledit signal à l'extérieur dune fenêtre de fréquence,
intégrer le signal filtré au cours dun intervalle de temps de manière à fournir un paramètre de signal intégré, et
déterminer un changement d'un état de stationnement à un état de conduite (44, 58, 60) pourvu que l'état présent est un état de stationnement et pourvu que le paramètre de signal intégré est supérieur à un seuil supérieur, ou alternativement
déterminer un changement dun état de conduite à un état de stationnement (44, 58, 60) pourvu que l'état présent est un état de conduite et pourvu que le paramètre de signal intégré est inférieur à un seuil inférieur.

2. Disque de stationnement automatique (22) selon la revendication 1, dans lequel le processeur est ultérieurement configuré pour déterminer un temps darrivé (50) du temps de référence si ledit changement dun état de conduite à un état de stationnement est déterminé (44, 46, 48), et afficher ledit temps d'arrivé (54) dans un premier indicateur (148, 174) sur ladite face avant (184) du disque de stationnement automatique (22).

3. Disque de stationnement automatique (22) selon la revendication 2, dans lequel le processeur est ultérieurement configuré pour arrondir ledit temps darrivé au prochain quart d'heure entier.

4. Disque de stationnement automatique (22) selon la revendication 2 ou la revendication 3, dans lequel le processeur est en outre configuré pour discontinuer faffichage du temps d'arrivé (62) si ledit changement détat de stationnement à l'état de conduite est déterminé (44, 58, 60).

5. Disque de stationnement automatique (22) selon la revendication 1, dans lequel la fenêtre de fréquence a sa fréquence de coupure inférieure (34) et sa fréquence de coupure supérieure (36) entre environ 0.01 Hz et environ 1 Hz.

6. Disque de stationnement automatique (22) selon la revendication 1, dans lequel la fenêtre de fréquence a sa fréquence de coupure inférieure (34) à environ 0.03 Hz et ses fréquences de coupure supérieure (36) à environ 0.5 Hz.

7. Disque de stationnement automatique (22) selon l'une quelconque des revendications 1 à 6, dans lequel la longueur dudit intervalle de temps se situe dans une plage d'environ 10 secondes à environ 100 secondes.

8. Disque de stationnement automatique (22) selon l'une quelconque des revendications 1 à 7, dans lequel le premier indicateur (148, 174) comprend une face montre (170) sur ladite face avant (184) ayant:

douze marques de différenciation de temps (178) formant une boucle fermée,
une marque de différenciation de trente minutes (180) entre chacune des deux marques de dif-

férenciation d'heure avoisinantes (178), et une marque de différenciation de quinze minutes (182) entre chaque marque de différenciation de trente minutes (180) et d'heure (178) avoisinantes.

9. Disque de stationnement automatique (22) selon l'une quelconque des revendications 1 à 8, dans lequel ledit premier indicateur (148, 174) comprend en outre: un écran à cristaux liquides (174) pour afficher ledit temps darrivé par un pointeur (176) à n'importe lesquelles desdites marques de différenciation dheure (178), de trente minutes (180) et de quinze minutes (182).

10. Disque de stationnement automatique (22) selon l'une quelconque des revendications 1 à 9, dans lequel ledit chronomètre (138) fournit en outre une date de référence, et ledit disque de stationnement automatique (22) comprend en outre: un deuxième indicateur (150, 192) sur ladite face arrière (172) pour afficher ledit temps de référence et ladite date de référence.

11. Disque de stationnement automatique (22) selon l'une quelconque des revendications 1 à 10 comprenant en outre: une première entrée manuelle (194) pour régler ledit temps de référence et/ou ladite date de référence manuellement.

12. Disque de stationnement automatique (22) selon l'une quelconque des revendications 1 à 11 comprenant en outre: une deuxième entrée manuelle (196, 198) pour régler ledit temps d'arrivé manuellement.

13. Disque de stationnement automatique (22) selon l'une quelconque des revendications 1 à 12 comprenant en outre: un support (186) pour attacher, de manière amovible, ledit disque de stationnement automatique (22) à un pare-brise avec ladite face avant (184) faisant face audit pare-brise.

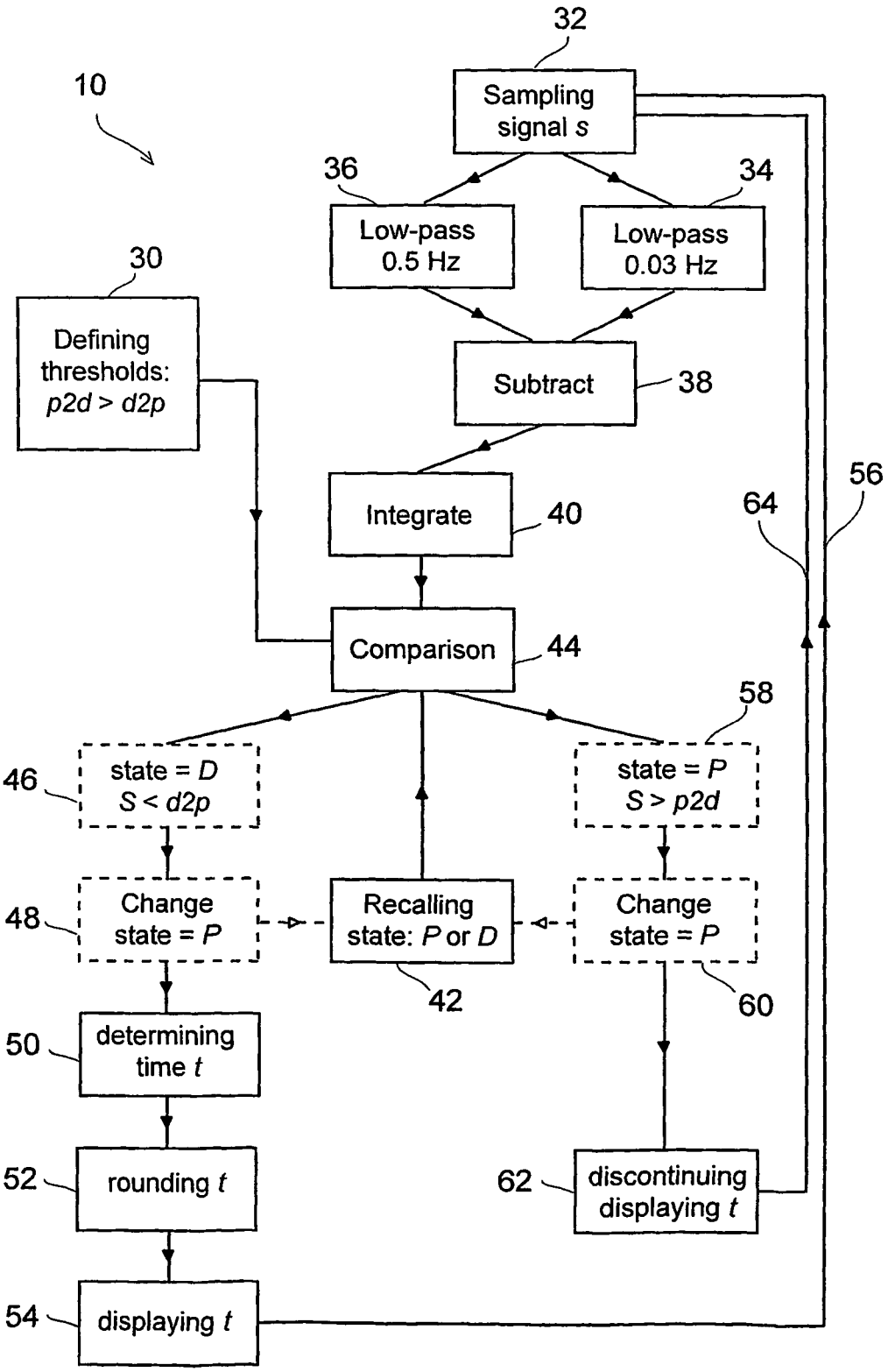
10
32
Sampling signal s
36
34
Low-pass 0.5 Hz
Low-pass 0.03 Hz
30
Defining thresholds: p2d > d2p
Subtract
38
Integrate
40
56
64
Comparison
44
58
46
state = D S < d2p
state = P S > p2d
48
Change state = P
Recalling state: P or D
Change state = P
42
60
50
determining time t
52
rounding t
62
discontinuing displaying t
54
displaying t

Figure 1

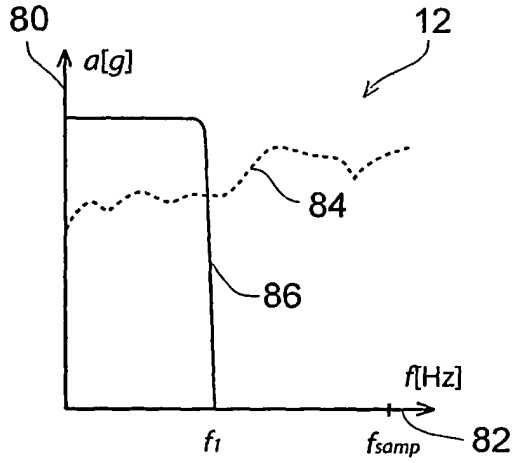

Figure 2

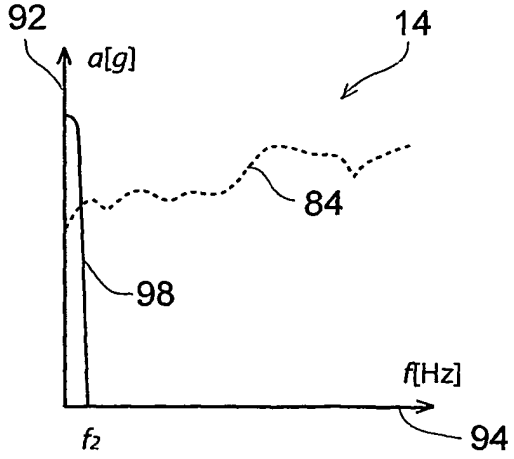

Figure 3

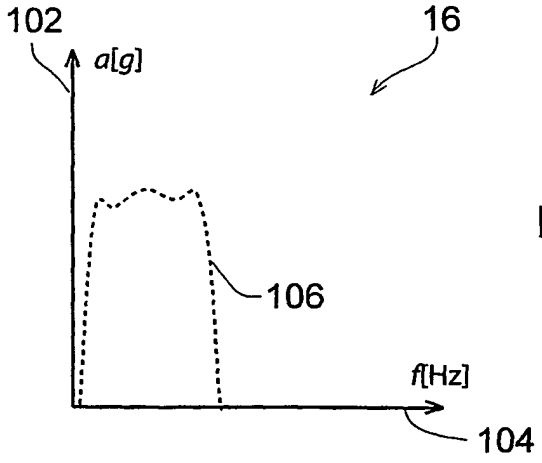

Figure 4

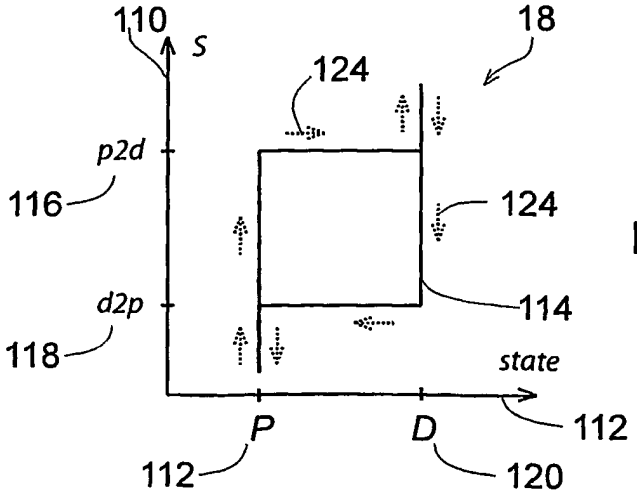

Figure 5

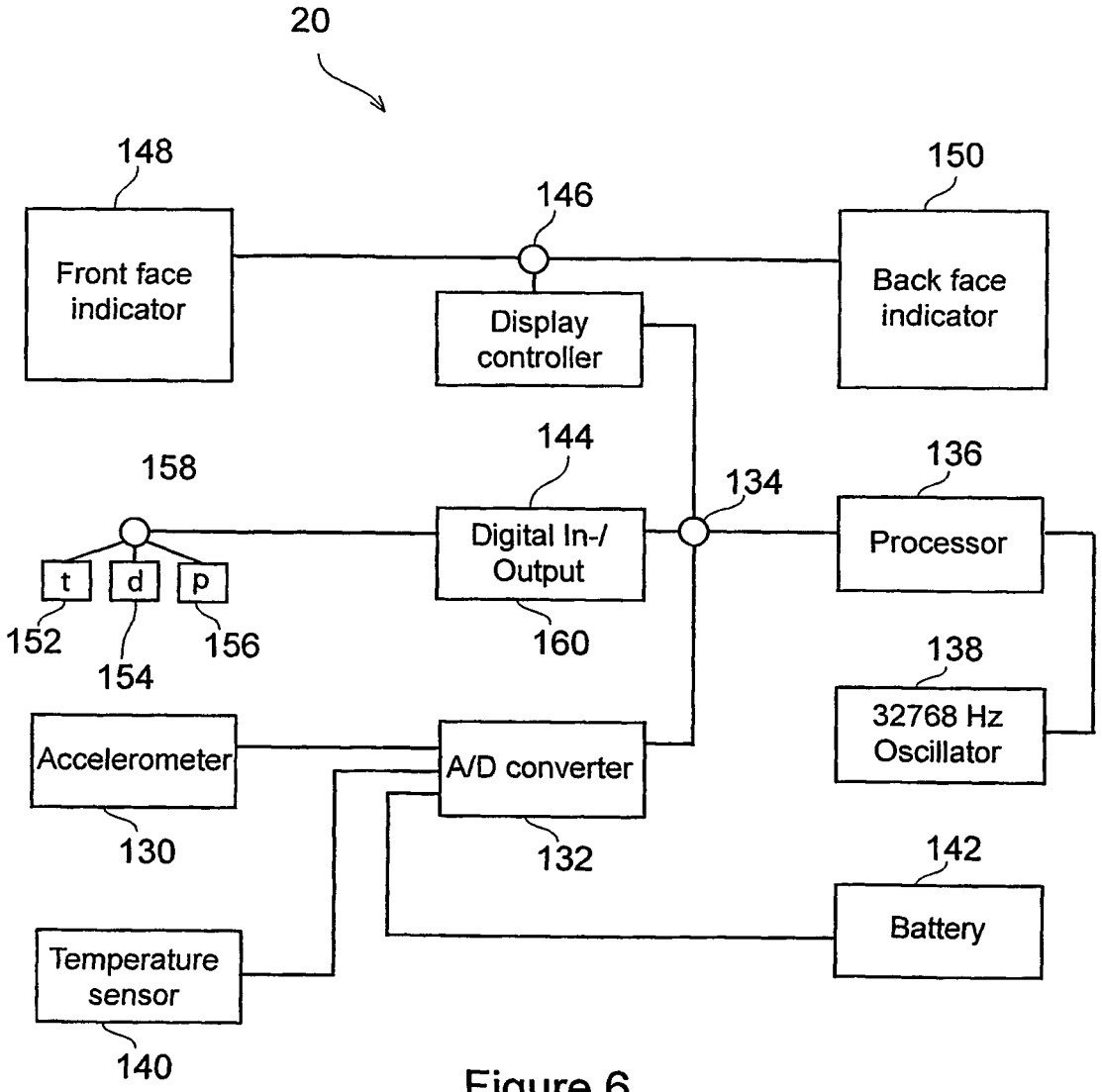
20
148
Front face indicator
146
Display controller
150
Back face indicator
144
Digital In-/ Output
158
t
d
p
152
154
156
160
134
136
Processor
138
32768 Hz Oscillator
Accelerometer
130
A/D converter
132
142
Battery
Temperature sensor
140

Figure 6

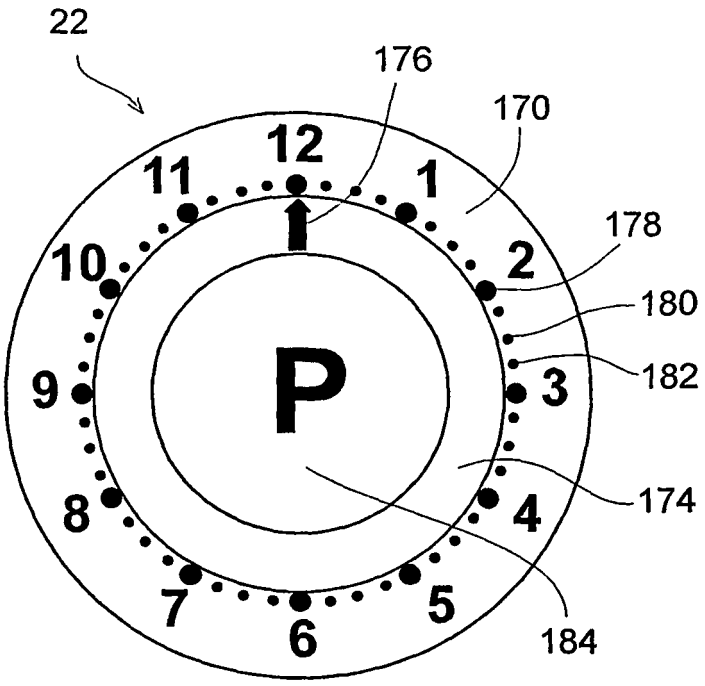

Figure 7

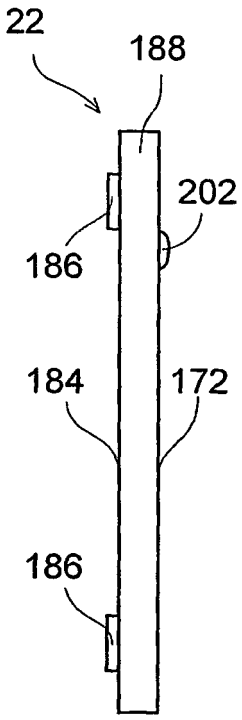

Figure 8

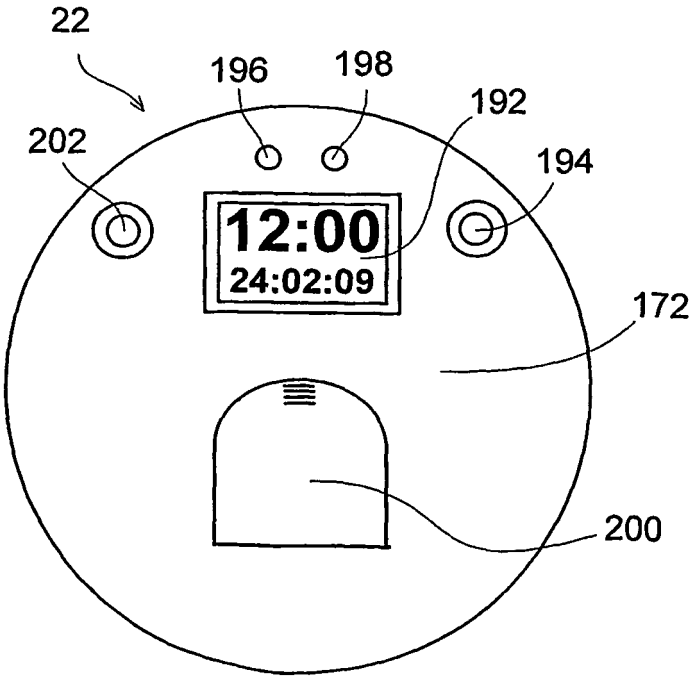

Figure 9

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1221676 A2 **[0004]**
- EP 1231572 A **[0004]**
- DE 4305266 A1 **[0005]**
- WO 2004114225 A **[0006]**