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(54) SYSTEM FOR MANAGING REGULATED PARKING AREAS

(57) According to the invention, integrated in each regulated parking space (1) is a space-monitoring device (2) having the corresponding control electronics associated with a radio frequency communications module, and with a sensor (a) for detecting vehicles, such that the different space-monitoring devices (2) communicate via radio frequency (d) with the area-controlling device (3) where all the information regarding the spaces assigned to said area is centralized, said area-controlling device being provided with a telematic network (telephone line, ADSL, Wi-Fi, etc.) from which the corresponding system operations are carried out, as well as the bank transactions and communication with a control centre (6). The users can pay via an application installed on their mobile telephone, via a device similar to those used in electronic toll payment systems, or via a chip, RFID card or circuit integrated into the vehicle and associated with the radio of same.

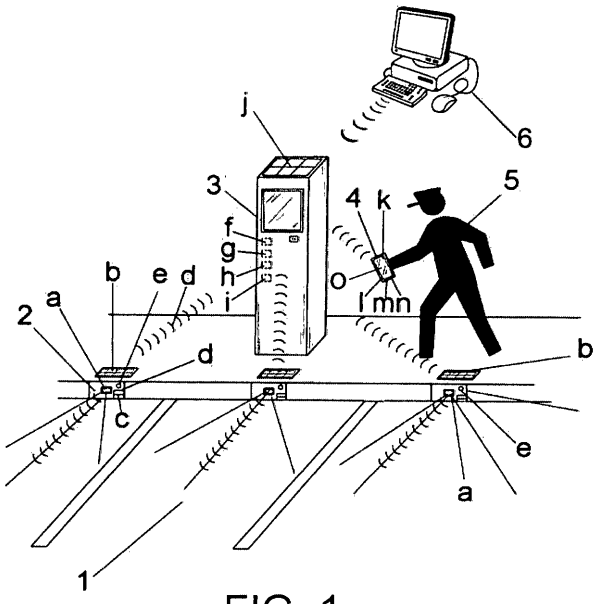

FIG. 1

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Description

OBJECT OF THE INVENTION

[0001] The present invention relates to a system for managing regulated parking areas, common in the business areas and historic centers of most cities and even in small towns.

[0002] The object of the invention is to provide a system through which the user can easily pay the fee for parking in the aforementioned areas, paying the exact amount for parking in relation to the actual time of use, without needing to have cash, searching for and going to the parking meter to pay and returning to the vehicle to leave the corresponding ticket, all of which can be done in a quick and simple way without wasting time.

BACKGROUND OF THE INVENTION

[0003] As it is known, town councils are designating an increasing number of areas as regulated parking areas, in which users must pay a certain amount of money to park during a specific period of time, and users cannot exceed a preestablished limit, except in the case of area residents or other special cases (vehicles for the disabled, official cars, ambulances, etc.).

[0004] Payment is carried out through parking meters which have a money slot to accept payment for the service, a credit/debit card reader, a new feature that allows payments to be made via a cell phone, and a thermal printer which issues the corresponding receipt or proof of purchase.

[0005] The fundamental problem presented by this system is that this type of parking meter is pre-pay, which means users have to introduce the amount of money based on the time that they "suppose" their vehicle will be in the parking area. If they introduce an amount greater than the time they are going to be parked, they lose money, since the parking meter does not reimburse the difference, and if they introduce a lesser amount, they run the risk of being fined. In the case of paying in cash, many times users do not have loose change and must look for a store that can give them change, which is not always easy or possible, with the resulting waste of time that it entails. Also, in the case of paying with a credit/debit card or with a cell phone, they are sometimes out of service due to connection problems or unusable due to vandalism. With these payment systems, the user must always find and go to the parking meter to make the payment and return to the automobile to leave the corresponding receipt, with the resulting waste of time.

DESCRIPTION OF THE INVENTION

[0006] The system for managing regulated parking areas proposed by the invention offers a completely satisfactory solution to the problem set out above thanks to its novel and highly effective structuring.

[0007] For this purpose, it is envisaged that each regulated parking space will be integrated with a numbered space-monitoring device that will preferably be of a single body, which will contain a micro-controller that is associated with a radio frequency communications module as well as an infrared, vibration, volumetric, magnetic, etc. sensor for detecting vehicles, and having a battery connected to the grid or powered by a photovoltaic solar panel.

[0008] It has been envisaged that this space-monitoring device will include a red/yellow/green LED indicator that allows the space monitoring staff to verify that the vehicle parked in said space is truly parked legally, having made the corresponding payment for the parking service. For example, "red" represents an electronic payment, "yellow" represents a cash, credit/debit card or cell phone payment (with the corresponding ticket indicating the number of the space that is occupied) and "green" represents a free space.

[0009] The radio frequency communications module detects the different envisaged payment means, and those that will be mentioned later, as well as communicating with the area-controlling device, where all the information regarding the spaces assigned to said area is centralized.

[0010] This area-controlling device may be integrated into existing parking meters, such that it incorporates the electronics necessary to communicate with the different space-monitoring devices, being provided with a telematic network (telephone line, ADSL, etc.) from which corresponding bank transactions are carried out.

[0011] Said area-controlling device is also powered by solar energy and has programming software to periodically check the communication with the different space devices that it has assigned, in order to ensure the correct connection and operation of all equipment.

[0012] The connection to the telematic network (telephone line, ADSL, etc.) of the area-controlling device not only serves to carry out the transactions (memory, entry/exit, charge, issuance of receipts, etc.) of the corresponding services provided, but also allows users to find out the status of said area in real time via the application installed on their cell phone. In other words, they can find out the number of free spaces, which is of considerable help to drivers when deciding whether to travel to a specific area by car or in public transportation, depending on the availability of spaces.

[0013] Likewise, the area-controlling devices store statistical information, incidents, etc. that will be periodically transmitted to a control center, although they can also be consulted remotely. This control center is designated to control all of the town's area-controlling devices, checking the connection and operation of all of the devices that participate in the network.

[0014] The staff responsible for monitoring the spaces via a cell phone or via a device specifically designed for this purpose, with its corresponding screen and means of connection to the area-controlling device and with

means of geolocation, will receive information related to the status of each one of the spaces (occupancy, payment type, time left until the end of service, etc.) from the area-controlling device, the latter being in charge of imposing fines, when appropriate.

[0015] As previously mentioned for the payment of required services, the system admits the methods used to date, whether it be cash or credit/debit card, and further envisages that the user has what we call an electronic payment device, which can be any of those which are described below.

- A device, TAG, or one similar to those used in electronic toll payment systems.
- An application installed on the user's smartphone.
- A chip or RFID card integrated into the vehicle.

[0016] In the first case, the use of a device or TAG, of the type used in electronic toll payment systems, will be duly adapted, providing the complementary means of reading space-monitoring devices available. This operates in the same way as conventional means by including user/vehicle information, as well as the associated bank account number.

[0017] In the case of paying with a smartphone, the phone should have the application installed that is designed for this purpose, which is detected by the space-monitoring device through Wi-Fi, thus starting the service (arrival time, vehicle information and bank account number). The LED indicator will turn "red" for electronic payment. The system envisages collecting payment at the time when the vehicle leaves the space, the space-monitoring device communicates to the area-controlling device that the vehicle has left the space, sending the corresponding message of the end of service (exit time), while the color of the LED indicator also changes to "green" for the free space. The area-controlling device will carry out the corresponding bank transaction with its installed memory.

[0018] Once payment has been made, the area-controlling device will send a message to the user with the billing information.

[0019] For the third payment method, the vehicle can incorporate a chip or circuit associated with the car radio, which will serve for radio frequency communications with the area-controlling device, so that user and vehicle information and the bank account number can be introduced via the radio interface itself.

[0020] In any of the three cases, at the time of carrying out the entry/exit operation, the codes approving the operation will be requested, respecting the entry/exit times established by the system, for greater security in transactions, although this option may be decided by the user.

[0021] As for the space-monitoring device, it will be preferably integrated into a single body, in which all of its components are established.

[0022] In parallel, the system may incorporate image capturing devices (photography, video, etc.) such as cameras or video cameras as a security measure.

DESCRIPTION OF THE DRAWINGS

[0023] As a complement to the description provided herein, and for the purpose of helping to make the characteristics of the invention more readily understandable, the present specification is accompanied by a set of drawings constituting an integral part of the same, which, by way of illustration and hot limitation, represent the following:

Figure 1 is a schematic representation of the system for managing regulated parking areas object of the present invention.

Figure 2A is a schematic representation of the space-monitoring device in regulated parking areas with parallel parking.

Figure 2B is a schematic representation of the space-monitoring device in regulated parking areas with perpendicular parking.

Figure 3 shows a schematic representation corresponding to a variant embodiment of the area-controlling device, which may be integrated into an existing parking meter.

Figure 4 shows a schematic representation of the space-monitoring device installed on the entry and exit lane of a toll highway.

PREFERRED EMBODIMENT OF THE INVENTION

[0024] As can be seen in Figure 1, the system of the invention is expected to have a space-monitoring device (2) integrated into each numbered regulated parking space (1). Figure 2

[0025] This device (2) is equipped with:

a) Vehicle detector. (Vibration, sound, volume, etc.)
b) Battery connected to the grid or powered by a photovoltaic source.
c) Payment device reader
d) Radio frequency communications module that sends and receives information (I)
e) LED indicator.

[0026] Thus, the space-monitoring device (2) is equipped with the corresponding control electronics associated with a sensor for detecting vehicles (a), having a battery connected to the grid or powered by a photovoltaic solar panel (b), a payment device reader (c), a radio frequency communications module that sends and receives information (d) and a red/yellow/green LED indicator (e), which the system uses to indicate the payment method chosen by the user, which gives more control to the staff responsible for monitoring.

[0027] The different space-controlling devices (2) communicate through radio frequency (d) with the area-controlling device (3), in which all information about the spac-

es assigned to said area is centralized.

[0028] This area-controlling device (3) is equipped with:

f) Telematic network (telephone line, ADSL, Wi-Fi, etc.).
g) Radio frequency communications module that sends and receives data (II).
h) Computer with memory to store information about the different spaces.
i) Message delivery to users.
j) Photovoltaic solar panel.
k) USB outlet for updating data.

[0029] As mentioned previously, the area-controlling device (3) can be integrated into currently existing parking meters (7) as shown in figure 3, such that it incorporates the electronics necessary to communicate with different space-monitoring devices (2), since it has a telematic network (telephone line, ADSL, Wi-Fi, etc.) through which different system operations and the corresponding bank transactions can be carried out.

[0030] The area-controlling device (3) has a photovoltaic solar panel (j), and programming software to periodically check communication with the different space-monitoring devices (2) in order to ensure the correct connection and operation of all equipment.

[0031] The area-controlling device (3) makes it possible to store statistical information, incidents, etc. which will be periodically transmitted, although they can also be consulted remotely. A control center (6) with a server is designated, which is also in charge of controlling all of the town's area-controlling devices, checking the connection and operation of all of the devices that participate in the network.

[0032] Likewise, the area-controlling device (3) keeps up-to-date, real-time information on the free spaces assigned, so that users can consult their status and location via the application installed on the payment device or through any navigation system introduced into the system.

[0033] The staff responsible for monitoring (5) the spaces will have a cell phone or device specifically designed for this purpose (4). This device (4) is equipped with:

l) Screen.
m) Telematic network (telephone line, ADSL, Wi-Fi, etc.) that sends and receives data.
n) Geolocation system.
o) Computer system to impose fines.

[0034] This device (4), with its corresponding screen (1) and means of geolocation (n), will receive information relating to the status of each one of the spaces from the area-controlling device, which will control their correct use. In the event that a user incurs a fine, the agent can use the corresponding system to act accordingly (o).

[0035] Payment methods are based on communication through radio frequency with the communications module of the space-monitoring device (2), which sends information to the area-controlling device (3) both when the vehicle arrives and when it leaves. In this way, said communication and payment management can be carried out through a frequency emitter that is similar to the ones used in electronic toll payment systems. It is carried out through an application installed on the user's smartphone or via a chip, RFID card or circuit integrated into the vehicle and associated with the radio of the same.

[0036] Regarding system operation, the space device (2) detects the arrival of a vehicle that occupies a regulated parking space and sends the information to the area-controlling device (3), which memorizes the entry information (arrival time). If the space-monitoring device (2) detects an electronic payment device (1), it automatically asks for consent from the user, who then authorizes the operation, with the space-monitoring device sending the information (bank account number, vehicle information, etc.) to the area-controlling device (3) so that it memorizes that information and activates the LED indicator, signaling the electronic payment method chosen by the user. In this case, it would be a red LED light.

[0037] When the vehicle leaves the regulated parking space, the space-monitoring device (2) sends the information to the area-controlling device (3), and this device carries out the charge operation, while at the same time sending a message to the user with the transaction details.

[0038] In the event that the users do not have an electronic payment device, they will have to go to the area-controlling device (3) and make a prepayment, whether in cash or with a credit/debit card, just as it is carried out today, and indicate the number of the space their car occupies. This way, the area-controlling device (3) can associate the information emitted by the space-monitoring device (2) and send the relevant information to the space-monitoring device (2), which will use the yellow LED indicator to signal the payment method chosen by the user of the space. At the same time, it will send a message to the staff responsible for monitoring (5) so that they carry out the appropriate control measures.

[0039] If, after a reasonable amount of time, the system determines that no payment process has taken place, it advises the monitoring staff of the incident so that they act accordingly.

[0040] Thus, a system for managing parking areas that is incredibly easy to use is achieved, without needing to have cash, go to the parking meter and return to leave the ticket in the car, pay more money than necessary, risk being fined for exceeding the prepaid time, etc., but which nevertheless is compatible with current payment methods.

[0041] According to another characteristic of the invention, it is envisaged that the space-monitoring device (2) is integrated into a single body, in which are established an infrared, magnetic, volume, vibration, etc. sensor for

detecting vehicles (a), a battery that could be connected to the grid or powered by' a photovoltaic source (b), a radio frequency payment device reader (c), a radio frequency communications module that sends and receives data (d) and an LED indicator (e) of the payment method.

[0042] The area-controlling device (3), which can be integrated into existing parking meters, has a single body with the electronics necessary, such as a computer, an ADSL or similar telematic network, programming, etc., to communicate with the different numbered space-monitoring devices.

[0043] The system may incorporate image capturing devices (photography, video, etc.) such as cameras or video cameras as a security measure.

[0044] Likewise, it is envisaged that all information will be sent through the computer of the area-controlling device (3) and its associated memory (h) to the control center (6) via the radio frequency communications module (d), in order to be able to gather all types of statistics, and thereby be able to obtain information about the times of maximum occupancy, average time, type of vehicle, etc.

[0045] According to another characteristic of the invention, it is envisaged that the system may be installed on the entry and exit lanes of toll highways that are associated with the device, which will be available or located at a point decided upon by the service operator, acting in the same way as the system for managing regulated parking areas, so that the user pays for the actual distance and use of the toll highway. This also prevents the excessive use of fuel caused by cars waiting in line to pay and it allows traffic to move.

[0046] Through the system of the invention, it is possible to charge users according to the actual time they used the parking area, unlike that which happens with conventional systems, where it is common to leave with the vehicle before the time period paid for has ended, and this money is never returned.

[0047] If, after a reasonable amount of time, the system determines that no payment process has taken place, it advises the monitoring staff of the incident so that they act accordingly.

[0048] With the system of the invention, it is also possible to issue a detailed monthly bill of the parking services used.

Claims

1. A system for managing regulated parking areas, in which a series of numbered spaces (1) are designated and can be occupied during a predetermined period of time depending on a series of rates, **characterized in that** each regulated parking space (1) integrates a numbered space-monitoring device (2), with a sensor (a) for detecting vehicles, a mini-battery powered by a photovoltaic source (b), a radio frequency payment device reader (c), a radio frequency communications module that sends and receives data (d) and an LED indicator (e), it being envisaged that the numbered space-monitoring devices (2) are linked to the area-controlling device (3) through the radio frequency communications module (d), and this device is where all the information regarding each one of the spaces assigned is centralized, such that said area station (3) incorporates the electronics necessary to communicate with different numbered space-monitoring devices (2), having a memory (h) associated with each one of these devices (2) to carry out the charge operation once the vehicle has left the space; it likewise being envisaged that the system has a telephone line (f), through which the corresponding bank transactions are carried out, as well as sending the message (i) to the user regarding the completed transaction or to the staff responsible for monitoring, in the event that their services are required, with the special feature **in that** it includes means of communication with a control center (6) to send a summary of the different options that have been carried out, likewise having envisaged that the area station be provided with a photovoltaic solar panel (j) to power it, while the radio frequency communications module in each area-controlling device (3) acts as a means of charging users, since it is via an application installed on their cell phone, a Teletac similar to those used by electronic toll payment systems or a chip or circuit integrated into the vehicle and associated with the radio of the same.

2. The system for managing regulated parking areas according to claim 1, **characterized in that** the area station (3) has a photovoltaic solar panel (j) and programming software to periodically check communication with the different space-monitoring devices (2) in order to ensure the correct connection and operation of all equipment.

3. The system for managing regulated parking areas according to claim 1, **characterized in that** the space-monitoring devices (2) incorporate a red/yellow/green LED light.

4. The system for managing regulated parking areas according to claim 1, **characterized in that** the area stations (3) can be integrated into currently existing parking meters.

5. The system for managing regulated parking areas according to claim 1, **characterized in that** the staff responsible for monitoring the spaces (5) have a device specifically designed for this purpose (4), with its corresponding screen and means of connection to the area station and with means of geolocation, in which it receives information from the area station related to the status of each one of the spaces.

6. The system for managing regulated parking areas according to claim 1, **characterized in that** it has a system for reading information through radio frequency for the different devices used by the user.

7. The system for managing regulated parking areas according to claim 1, **characterized in that** it has a system to locate the availability of free spaces in specific areas.

8. The system for managing regulated parking areas according to claim 1, **characterized in that** it has a vehicle detector/locator.

9. The system for managing regulated parking areas according to claim 1, **characterized in that** the spaces are numbered through the numbered space devices.

10. The system for managing regulated parking areas according to claim 1, **characterized in that** in regulated parking areas with controlled entry and exit of vehicles, it will only be necessary to install at its entrance and exit a radio frequency payment reader, connected to a telephone line.

11. The system for managing regulated parking areas according to claim 1, **characterized in that** the control device (2) is integrated into a single body, in which are established an infrared, magnetic, volume, vibration, etc. sensor for detecting vehicles (a), a battery that can be connected to a grid or powered by a photovoltaic source (b), a radio frequency payment device reader (c), the radio frequency communications module that sends and receives data (d) and the LED indicator (e) of the payment method.

12. The system for managing regulated parking areas according to claim 1, **characterized in that** the area-controlling device (3) can be integrated into existing parking meters and has a single body with the electronics necessary, such as a computer, an ADSL or similar telematic network, programming, etc. to communicate with the different numbered space-monitoring devices.

13. The system for managing regulated parking areas according to claim 1, **characterized in that** that it incorporates image capturing devices such as photographic and/or video cameras.

14. The system for managing regulated parking areas according to claim 1, **characterized in that** the system can also be installed in tollbooths at the entrance/exit of toll highways.

15. The system for managing regulated parking areas according to claim 1, **characterized in that** the control device (2) delimits the individual spaces.

16. The system for managing regulated parking areas according to claim 1, **characterized in that** the system regulates the actual time of use of the service.

17. The system for managing regulated parking areas according to claim 1, **characterized in that** the system advises the monitoring staff when no payment method has been activated.

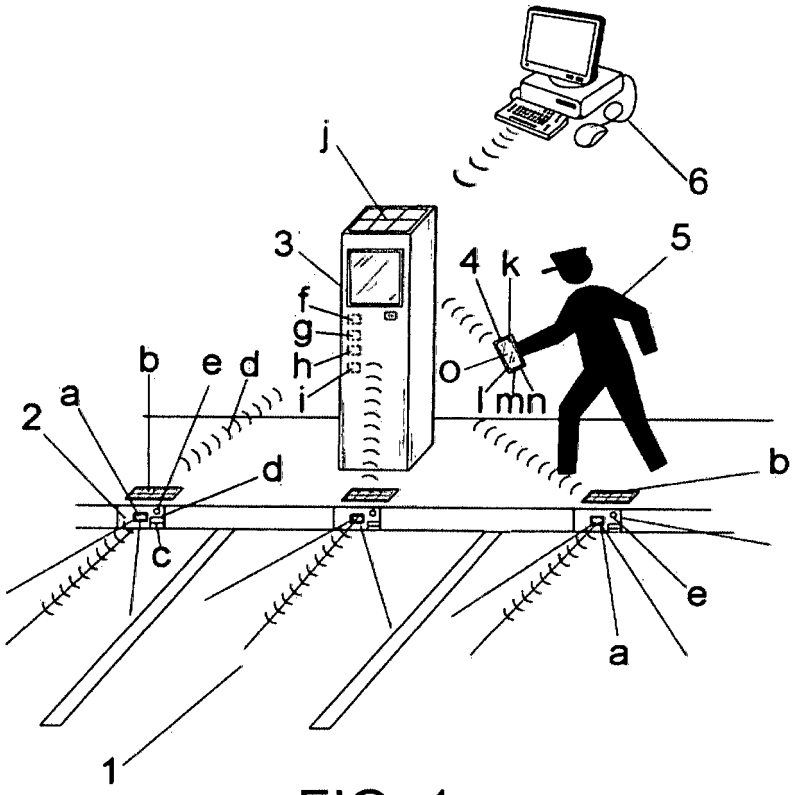

FIG. 1

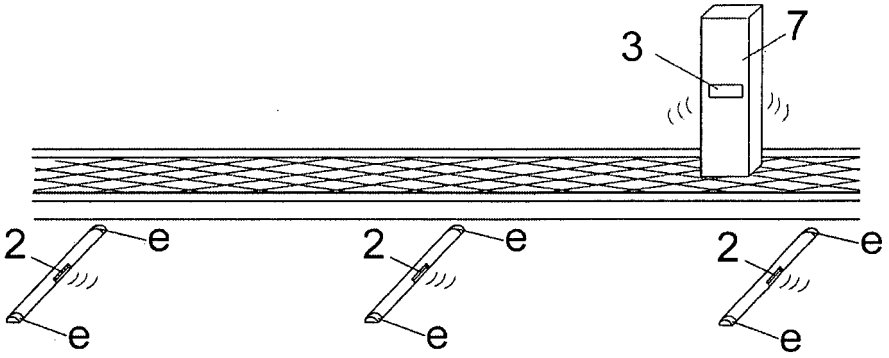

FIG. 2A

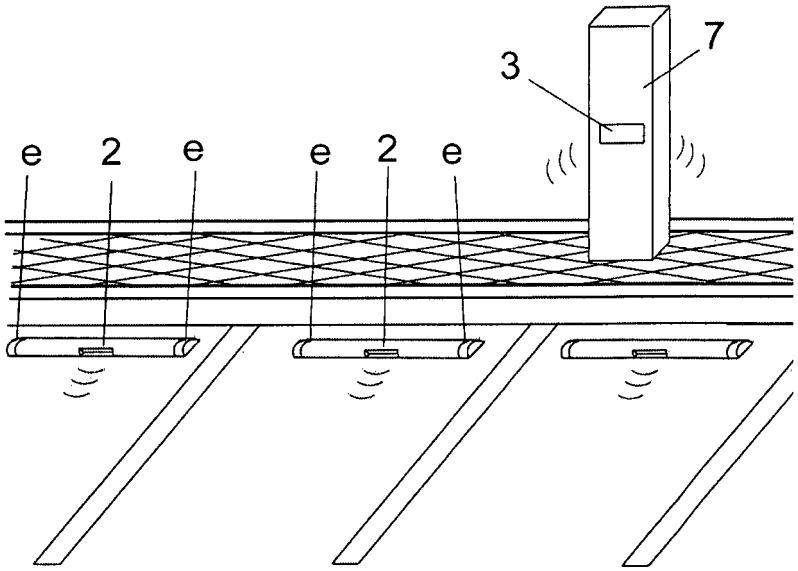

FIG. 2B

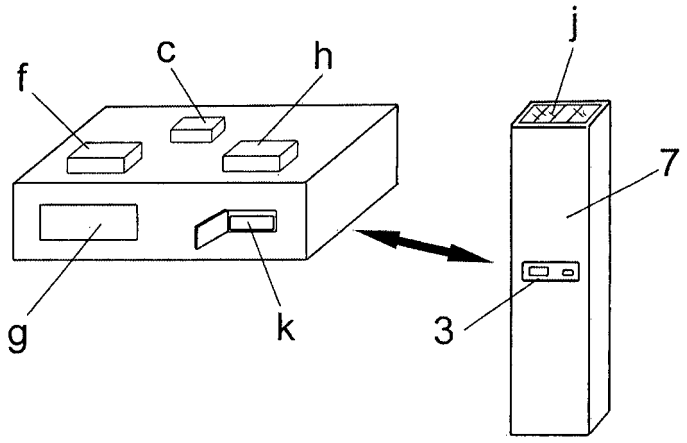

FIG. 3

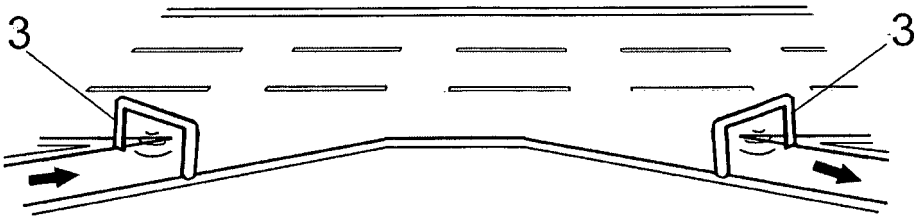

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2015/070102

A. CLASSIFICATION OF SUBJECT MATTER

G08G1/14 (2006.01)

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)
G08G

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 practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2372627 A2 (ROWE RICHARD E ET AL.) 05/10/2011, paragraph [0006]; paragraphs[0031 - 0033]; paragraph [0039]; paragraph [0046]; paragraphs[0050 - 0059]; paragraphs[0060 - 0064]; paragraph [0069]; paragraph [0071]; paragraphs[0078 - 0083]; figure 1.	1-17
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A	US 2004252034 A1 (SLEMMER JOHN BLAKE ET AL.) 16/12/2004, the whole document.	1-17
A	US 2003112154 A1 (YOAKUM JOHN H ET AL.) 19/06/2003, the whole document.	1-17

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
20/03/2015	**(23/03/2015)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer D. Cavia del Olmo Telephone No. 91 3498488

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
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