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(71) Applicant(s):  
**Kelem Ashley Iregbulem**  
290 Cricklewood Lane, Childshil, LONDON,  
NW2 2PX, United Kingdom

(72) Inventor(s):  
**Kelem Ashley Iregbulem**

(74) Agent and/or Address for Service:  
**Urquhart-Dykes & Lord LLP**  
30 Welbeck Street, LONDON, W1G 8ER,  
United Kingdom

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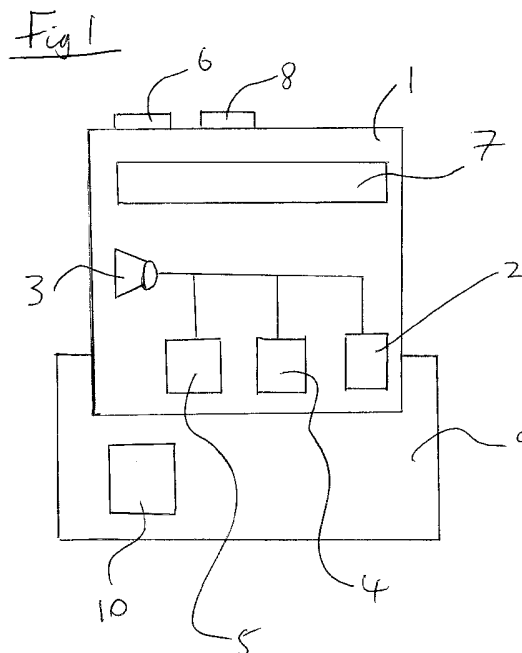
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**G4Q QCE**

(56) Documents Cited:  
**EP 1120749 A1** **WO 2005/062281 A1**  
**US 20050086100 A1** **US 20030105662 A1**

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UK CL (Edition X ) **G4Q**  
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Other: **EPODOC, WPI.**

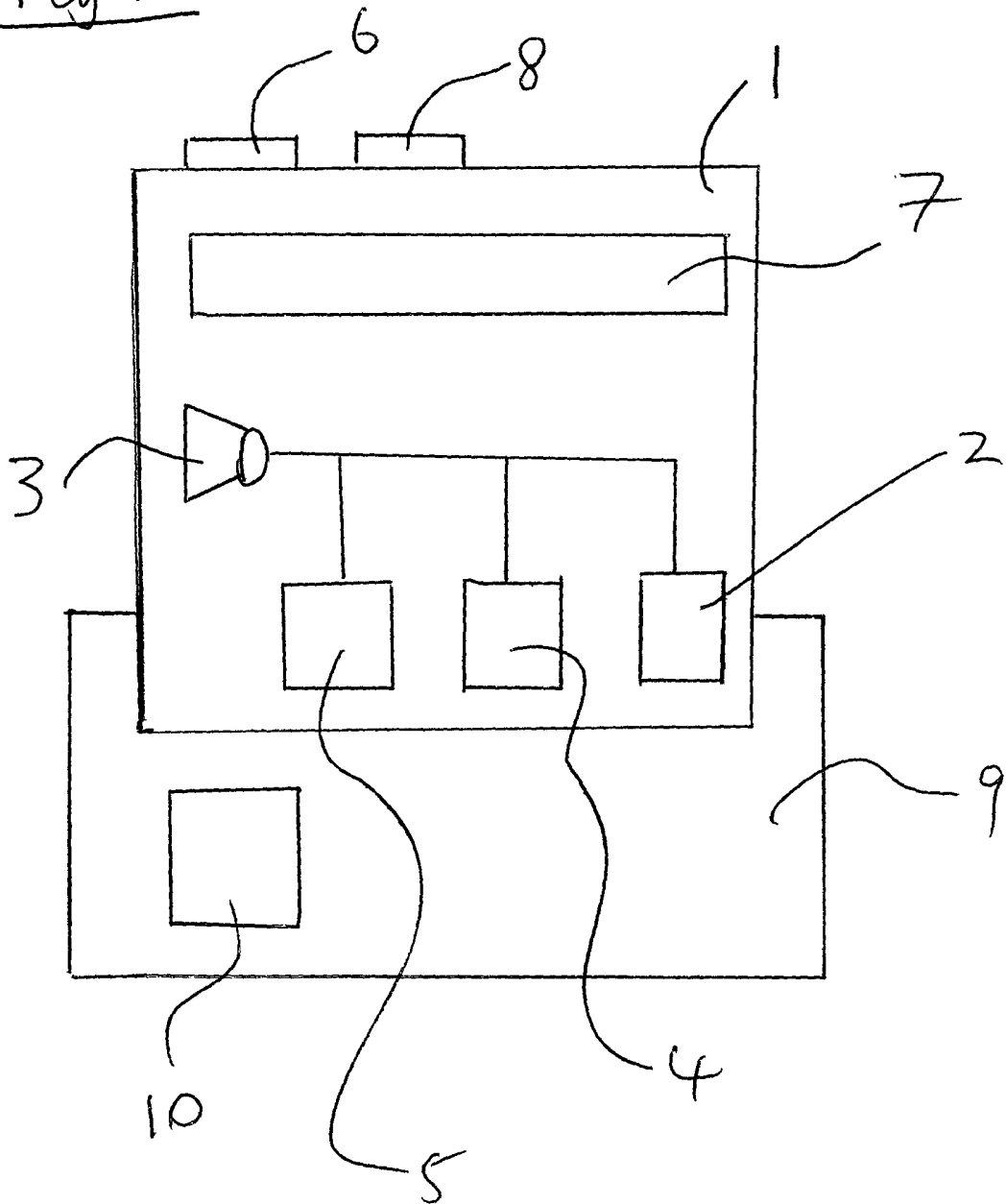
(54) Abstract Title: **Device for alerting a driver that they have entered a specific area, storing details about the entry with follow up warnings based on the stored data**

(57) The portable device and system, for alerting a driver of a vehicle that they have entered a specific controlled area or territory, that is disclosed consists of a receiver to detect the entry of boundary crossing, data storage to record the entry, warning means to alert the driver and a timer to generate further warnings at predetermined times based on the data stored. The device may have a transmitter to transmit a signal to a computer in a network, the signal including identity details stored on a chip in the device's holder. The device could detect entry into the controlled zone by receiving signals from ground based transmitters at the boundary and comparing the detected location with a stored database. The network computer may be a congestion charge computer. The device may also have display for showing messages about payment fees.



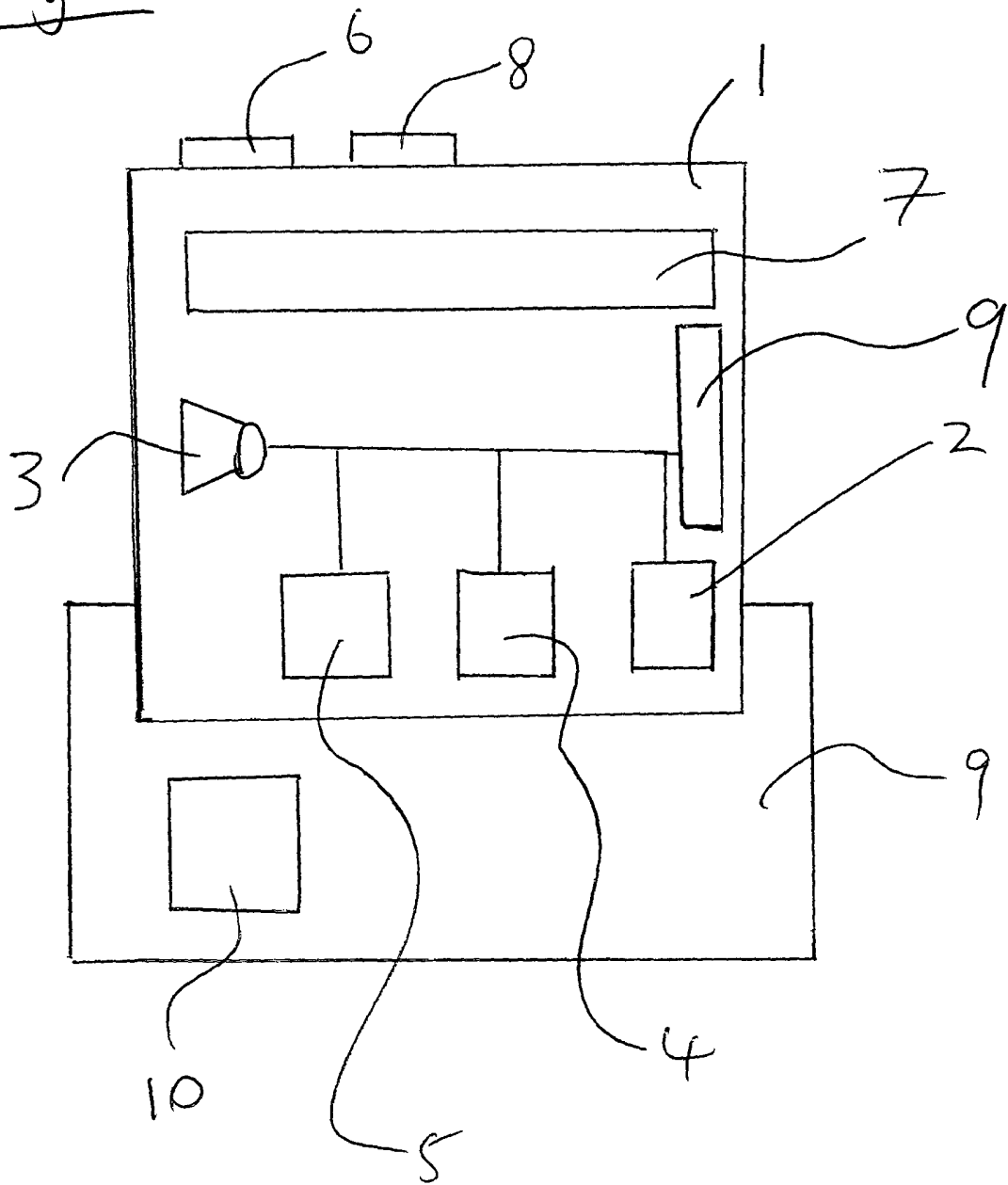
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Fig 1



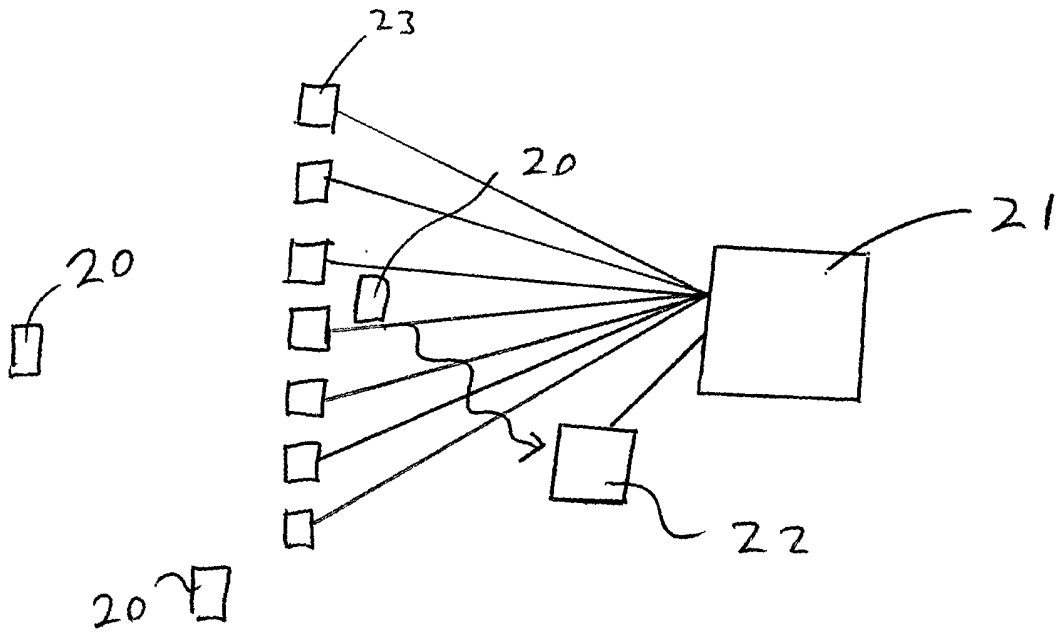
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Fig 2



3/3

Fig 3



**Zone Alert****BACKGROUND OF THE INVENTION**

The present invention relates to a portable device for alerting regarding the entry into a specific boundary limited territory. In particular, the present invention is related to a device for alerting a vehicle driver when the vehicle enters a zone where a toll or fee is payable.

In many cities, a congestion fee is payable by vehicle drivers when entering a specific zone, e.g. the city centre. In order to pay the congestion fee, it is important to know where you are and in particular, whether the zone where a fee is payable has been entered. This can sometimes be difficult to figure out, especially when the vehicle enters and leaves the zone when travelling between locations outside the zone. In general, if the fee is not paid by a deadline when the vehicle has been within the congestion zone, the driver should expect to pay fines, and will usually not be notified until after the payment deadline has passed.

Accordingly, the problems are caused by a lack of alert to the vehicle driver that warns that the vehicle is entering into a congestion zone.

**SUMMARY OF THE INVENTION**

The objective of the present invention is to solve the above problems and to alert the driver when a vehicle enters into the congestion zone.

To attain the above object, according to a first aspect of the present invention, there is provided a portable device for alerting on entry of a vehicle into a specific boundary limited territory, and comprising: a receiver adapted to detect entry into the territory; a storage means adapted to store that entry has occurred; a warning means adapted to generate a warning that entry has occurred; and a timer adapted to cause the warning means to generate the warning a predetermined times based on the contents of the storage means.

To attain the above object, according to a second aspect of the present invention, there is provided a portable device for alerting on entry of a vehicle into a specific boundary limited territory, and comprising: a receiver adapted to detect entry into the territory; a transmitter adapted to transmit a first signal to a computer in a network; wherein said first signal registers said vehicle into said computer in said network.

Preferably, the portable device comprising a holder placed in a vehicle for holding the device and including a chip, which contents are associated with the identity of the vehicle and interfaced with the network.

Preferably, the first signal is based on the contents of the chip and is transmitted as a radio signal or relay message to a congestion charge computer.

Preferably, the second signal is a radio signal.

Preferably, the portable device comprises a display for displaying messages with information about payment fees.

According to the second aspect of the present invention, there is there is provided a system for alerting the entry of vehicles into a specific boundary limited territory comprising: a portable device placed in a vehicle including means adapted to detect entry into the territory; second receiving means for receiving signals from said portable devices to a congestion computer. switching means for switching on and off said first receiving means or said transmitters depending on the receiving time of the communication; identifying means for registering said vehicles and their identity in a computer network; transmitting means for transmitting signals from said portable devices to said computer network

Preferably, the portable devices comprise a holder for holding each device and a chip placed inside each holder having identifying means.

Preferably, the transmitting signals are based on the contents of the chip and are transmitted as radio signals or relay messages to a congestion charge computer.

Preferably, the receiving signals are radio signals.

Preferably, the system comprises displaying means for displaying messages with information about payment fees to each owner of the vehicles.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a schematic view of a portable device according to a first embodiment of the invention.

FIG. 2 is a schematic view of a portable device according to a second embodiment of the invention.

FIG. 3 is a schematic view of a system according to the second embodiment of the invention.

## **DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Preferred embodiments of the present invention will now be explained with reference to the accompanying drawings.

According to a first embodiment of the invention, FIG. 1 is a schematic view showing a portable operational device 1 with a pager-like appearance for alerting about vehicle entry into a specific bound limited territory, such as a congestion zone in a town centre.

The device 1 includes position detection means 2 able to detect when the device 1 enters the specific bound territory. In this embodiment the position detecting means 2 is a receiver able to receive signals from electronic chips, or other transmitters, placed strategically around the perimeter of the congestion zone, e.g. streets or entry points of the congestion charge zones and along charge zone sections of motorways in order to detect entry into the charge zone and the driver to be alerted.

The device 1 further includes a sound generator 3, such as a loudspeaker, to alert the driver of the vehicle, e.g. with an audible peep every time the device 1 enters into a congestion zone. A warning message is then stored in a storage means 4 for later retrieval and the device 1 starts a timer 5 to count down the time remaining to the cut off point for payment.

When convenient, the driver can retrieve any warning message stored in the portable device 1. For example by pressing a first button 6 on the exterior of the device 1. The device 1 will then display the warning message on a display element 7 identifying that the device has entered into the zone, when this occurred and the time remaining for payment. This warning may alternatively, or additionally be made as an audio message.

When the driver has paid the charge, or knows that the charge has already been paid, the driver can delete the warning message and stop the timer 5 by pressing a second button 8. If desired, a specified sequence of actions such as multiple button pushes may be required to do this, in order to protect against accidental deletion.

If the warning message is not deleted the device 1 repeats the warning message periodically at preset threshold times before the payment deadline, for example hourly until 1 hour before the deadline and then every 10 minutes. The thresholds are stored in the storage means 4. Preferably, the user can set the thresholds to a desired sequence.

This storage and later display of the warning message ensures that the driver is aware of entry into the zone even if the audible peep is missed or forgotten.

The display of the time of entry is preferred in order to prevent unnecessary payment of the charge on subsequent days if the driver fails to delete the message.

In a second embodiment the position detection means 2 is able to determine the absolute position of the device 1 instead of receiving threshold signals. The position of the boundaries of the charge zone are stored in the storage means 4 and compared to determined position of the device to detect entry into the charge zone.

A preferred position detecting means in the second embodiment would be a global position system (GPS) or similar satellite navigation device. However, other means such as inertial navigation could be used.

In a third embodiment of the invention shown in Figure 2, the portable device 1 also comprises a transmitter 9 for transmitting a network signal such as GSM, radio signal or relay message to a congestion charge computer or radio station to inform that the vehicle is entering the charge zone. When the computer obtains this information from the device 1, the vehicle is immediately registered into the computer as having entered the congestion zone.

The display 7 of the portable device 1 then shows a message asking whether the driver wants to make a payment or not. The driver has the choice to either accept the message by selecting the button 6 or decline it by pressing the button 8. Alternatively, these functions of the buttons 6 and 8 could be carried out by touch sensitive parts of the display 7 marked "accept" or "decline" on the display screen.

If the driver accepts to make a payment the fee is automatically charged to a registered nominated card. However, if the driver declines immediate payment, the pager-like device will automatically remind the driver at predetermined threshold times as described for the earlier embodiments and provide further opportunities for payment.

The congestion charge computer may be operated by the congestion charge authority and directly receive the payment. Alternatively, the congestion charge computer may be operated by a third party and make the payments to the congestion charge authority on behalf of the driver.

In many cases, congestion charges apply only to limited hours. Accordingly, in all embodiments it is preferred that the timer 5 of the portable device 1 is also able to act as a switch. The timer 5 is programmed to automatically switch off the operation of the position detection means 2 at times when the congestion charge does not apply. However the reminder and payment functions will remain functional.

In UK, the congestion hours are normally Monday to Friday between 7am and 7pm. However, the present invention is not limited to UK and the predetermined time programmed in the device may vary for different countries or zones.

Furthermore, a holder/cradle 9 can be provided for holding the device 1 in place in the vehicle. The holder 9 contains a chip 10 which stores a unique serial number, which is registered to the owner of the pager and against the registration plate of the vehicle.

The advantage of placing the chip 10 in the holder 9 rather than in the portable device 1 is that no unneeded registration is made to the congestion charge computer, for instance if the portable device 1 is carried in public transport or by a passenger in another vehicle, or if the device 1 is stolen.

FIG. 3 is a schematic view of a system according to a third embodiment of the present invention.

The system of the third embodiment of the invention comprises a plurality of portable devices 20 according to the second embodiment, a congestion computer 21 and



receiving means 22 for receiving signals from the portable devices 20 and passing them to the congestion computer 21.

The received and forwarded signals can be radio signals or any other signal.

Where the portable devices 20 receive signals to detect entry into the charge zone, preferably, the system also comprises a plurality of signal transmitters 23 located around the perimeter of the charge zone and switching means arranged for switching the signal transmitters 23 on and off depending on the time so that the transmitters 23 only operate when the congestion charge applies.

In order to transmit information from the portable devices 20 to the congestion computer 21 via the network, the system has transmitting means that are radio signals or relay messages based on the contents of each chip 10 inside each portable device 20 and has identifying means for registering said vehicle and its identity in the computer 21 in said network.

The system also comprises displaying means for displaying messages with information about payment fees to each owner of the vehicles. The displaying means are normally part of each portable device.

## CLAIMS

What is claimed is:

1. A portable device for alerting on entry of a vehicle into a specific boundary limited territory, and comprising:
  - a receiver adapted to detect entry into the territory;
  - a storage means adapted to store that entry has occurred;
  - a warning means adapted to generate a warning that entry has occurred;
  - and a timer adapted to cause the warning means to generate the warning a predetermined times based on the contents of the storage means.
  
2. A portable device for alerting on entry of a vehicle into a specific boundary limited territory, and comprising:
  - a receiver adapted to detect entry into the territory;
  - a transmitter adapted to transmit a first signal to a computer in a network;wherein said first signal registers said vehicle into said computer in said network.
  
3. A portable device according to claim 1 or claim 2, in which the receiver detects entry into the territory by receiving a second signal from a plurality of transmitters located at the boundary.
  
4. A portable device according to claim 1 or claim 2, in which the receiver detects entry into the territory by sensing the position of the device and comparing this to stored boundary data.

5. A portable device according to any one of claims 1 to 4, and further comprising a switch adapted to switch the alerting function on or off at predetermined times.
6. A portable device according to claim 5, in which the switch switches the alerting function on or off at times when a congestion charge comes into or out of force respectively.
7. A portable device according to claim 5 or claim 6, in which the switch switches the function of detection of said boundary on or off.
8. A portable device according to claim 2, comprising a holder placed in a vehicle for holding said device and including a chip which contents are associated with the identity of said vehicle and interfaced with said network.
9. A portable device according to claim 2, where said first signal is based on the contents of said chip.
10. A portable device according to claim 3, wherein the second signal is a radio signal.
11. A portable device according to any of claim 2, wherein the first signal is transmitted as a radio signal or relay message to a congestion charge computer.
12. A portable device according to any preceding claim, which also includes a display for displaying messages with information about payment fees.
13. A system for alerting the entry of vehicles into a specific boundary limited territory comprising:
  - a portable device placed in a vehicle including means adapted to detect entry into the territory;
  - second receiving means for receiving signals from said portable devices to a congestion computer.
  - switching means for switching on and off said first receiving means or said transmitters depending on the receiving time of the communication;

identifying means for registering said vehicles and their identity in a computer network;  
transmitting means for transmitting signals from said portable devices to said computer network.

14. A system according to claim 13, where said means for detecting entry into the territory comprises first receiving means for receiving signals from transmitters.
15. A system according to claim 14, where said portable devices comprise a holder for holding each device and a chip placed inside each holder having identifying means.
16. A system according to claim 15, where said transmitting signals are based on the contents of said chip.
17. A system according to any of claims 14 to 16 wherein the receiving signals are radio signals.
18. A system according to any of claims 14 to 17, wherein the transmitted signals are transmitted as radio signals or relay messages to a congestion charge computer.
19. A system according to any of claims 14 to 17, which also comprises displaying means for displaying messages with information about payment fees to the owner of each vehicle.

**Amendments to the claims have been filed as follows**

1. A portable device for alerting on entry of a vehicle into a specific boundary limited territory, and comprising:
  - a receiver adapted to detect entry into the territory;
  - a storage means adapted to store that entry has occurred;
  - a warning means adapted to generate a warning that entry has occurred;
  - a timer adapted to cause the warning means to generate the warning a predetermined times based on the contents of the storage means; and
  - a switch adapted to switch the alerting function on or off at predetermined times.
2. A portable device according to claim 1 further comprising selective means for selecting whether to accept or decline to pay a congestion charge.
3. A portable device according to claim 2, in which the congestion charge is automatically paid after the congestion charge has being accepted by the selected means.
4. A portable device according to 2 or 3, in which the warning means is activated at predetermined threshold times after the congestion charge has been declined by the selected means.

5. A portable device according to claim 2, in which the timer starts to countdown the time remaining to the cut-off point for paying the congestion charge.
6. A portable device for alerting on entry of a vehicle into a specific boundary limited territory, and comprising:
  - a receiver adapted to detect entry into the territory;
  - a transmitter adapted to transmit a first signal to a computer in a network;
  - a switch adapted to switch the alerting function on or off at predetermined times;
  - wherein said first signal registers said vehicle into said computer in said network.
7. A portable device according to claim 1 or claim 6, in which the receiver detects entry into the territory by receiving a second signal from a plurality of transmitters located at the boundary.
8. A portable device according to claim 1 or claim 6, in which the receiver detects entry into the territory by sensing the position of the device and comparing this to stored boundary data.
9. A portable device according to any preceding claim, in which the switch switches the alerting function on or off at times when a congestion charge comes into or out of force respectively.

10. A portable device according to any preceding claim, in which the switch switches the function of detection of said boundary on or off.
  
11. A portable device according to claim 6, comprising a holder placed in a vehicle for holding said device and including a chip which contents are associated with the identity of said vehicle and interfaced with said network.
  
12. A portable device according to claim 6, where said first signal is based on the contents of said chip.
  
13. A portable device according to claim 7, wherein the second signal is a radio signal.
  
14. A portable device according to claim 6, wherein the first signal is transmitted as a radio signal or relay message to a congestion charge computer.
  
15. A portable device according to any preceding claim, which also includes a display for displaying messages with information about congestion charges.
  
16. A system for alerting the entry of vehicles into a specific boundary limited territory comprising:
  - a portable device placed in a vehicle including means adapted to detect entry into the territory;
  - receiving means for receiving signals from said portable devices to a congestion computer;

identifying means for registering said vehicles and their identity in a computer network;

transmitting means for transmitting signals from said portable devices to said computer network;

switching means for switching on and off said transmitting means depending on the receiving time of the communication.

17. A system according to claim 16, where said means for detecting entry into the territory comprises second receiving means for receiving signals from said transmitting means.
18. A system according to claim 16, where said portable devices comprise a holder for holding each device and a chip placed inside each holder having identifying means.
19. A system according to claim 18, where said transmitting signals are based on the contents of said chip.
20. A system according to any of claims 16 to 19 wherein the receiving signals are radio signals.
21. A system according to any of claims 16 to 20, wherein the transmitted signals are transmitted as radio signals or relay messages to a congestion charge computer.



22. A system according to any of claims 16 to 21, which also comprises displaying means for displaying messages with information about payment of a congestion charge to the owner of each vehicle.
23. A system according to any of claims 16 to 22 further comprising selective means for providing the owner of each vehicle the possibility to accept or decline to pay the congestion charge.
24. A system according to claim 23, where each congestion charge is automatically paid after the congestion charge has being accepted by the owner of each vehicle.
25. A system according to 23 or 24, in which the warning means is activated at predetermined threshold times after the congestion charge has been declined by the owner of a vehicle.

**Application No:** GB0518479.1

**Examiner:** Mr David Maskery

**Claims searched:** 1 - 19

**Date of search:** 14 November 2005

**Patents Act 1977: Search Report under Section 17**

**Documents considered to be relevant:**

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1 - 4, 10 - 14, 17 - 19	EP 1120749 A1 (TOYOTA) See paras 14 - 45, 58, 114, 445 - 448, 464 and 554.
X	2- 4 and 8 - 19	US 2003/105662 A1 (KOKETSU et AL) See paras 12 - 18 and figs.
X	2 - 4 and 8 - 19	US 2005/086100 A1 (TOYOTA) See paras 25 - 35
X	2 - 4 and 8 - 19	WO 2005/062281 A1 (ELECTRONIC DATA SYSTEMS) See page 2.

**Categories:**

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup> :

G4Q

Worldwide search of patent documents classified in the following areas of the IPC<sup>07</sup>

G08G

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI.