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(54) **Automated parking system**

(57) A vehicle parking system for use at an on-street or other roadside parking area having provision for parking at least one vehicle at said area, the system comprising:

- a) primary camera means (1,4) arranged to sense and record the numberplate of any vehicle entering the area and entry time;
- b) data input means (5) for the user of a vehicle parking at the site to identify their vehicle and/or parking space;
- c) payment receiving means (5) coupled to a processing

arrangement arranged to calculate a fee due and to accept payment and optionally to issue a receipt;
d) secondary camera means (1,4) arranged to sense and record the numberplate of any vehicle leaving the area and an exit time,
wherein the processing arrangement is arranged to record vehicles entering the parking area and parking their vehicles, and so distinguish them from vehicles travelling on the road or street not using a parking space within said parking area.

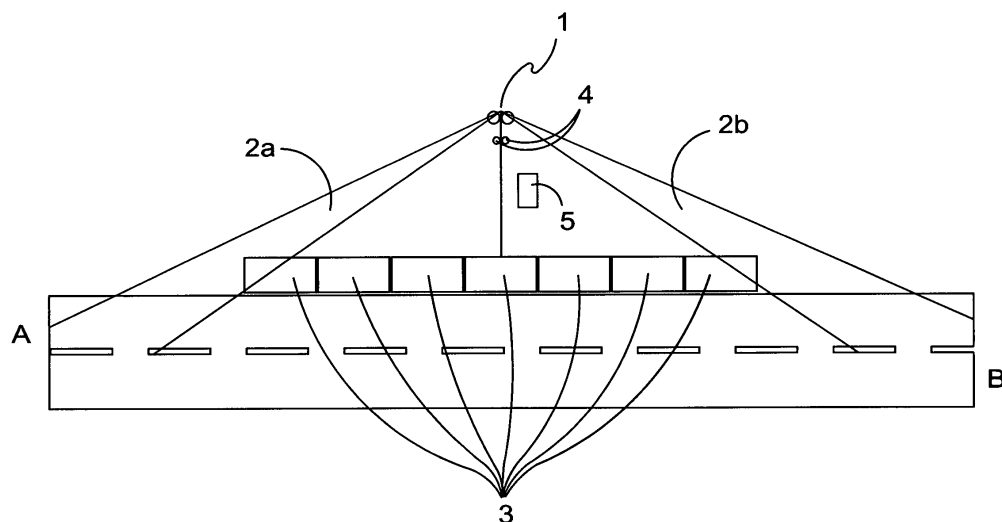


FIGURE 1

Description

[0001] The invention relates to a car parking system for on-street or other similar roadside parking areas and in particular to a parking system where the user pays a car parking fee, and may be required to pay excess charges for overstaying and/or penalty charges for non-payment.

[0002] The conventional method of monitoring on-street or road side parking to ensure that vehicle users have paid is through the use of parking wardens or other traffic patrols. There is therefore a desire to automate such fee paid parking to remove the need for staffed patrols.

[0003] There are various known automated methods of charging the user of a conventional car park including the use of barriers to ensure that only those who take a ticket and pay can get in and out of the car park. On-street parking bays or other road side car parks however have a throughput of traffic for usually short term stays which means that barriers cannot be used.

[0004] Conventional automated methods of monitoring fee paying car parks are therefore not applicable to on-street or roadside car parks, so conventional known methods will not provide an acceptable solution.

[0005] It is from a consideration of existing parking systems and their limitations which has lead to the development of the present invention.

[0006] In accordance with the present invention there is provided a vehicle parking system for use at an on-street or other roadside parking area having provision for parking at least one vehicle at said area, the system comprising:

- a) primary camera means arranged to sense and record the numberplate of any vehicle entering the area and entry time;
- b) data input means for the user of a vehicle parking at the site to identify their vehicle and/or parking space;
- c) payment receiving means coupled to a processing arrangement arranged to calculate a fee due and to accept payment and optionally to issue a receipt;
- d) secondary camera means arranged to sense and record the numberplate of any vehicle leaving the area and an exit time, wherein the processing arrangement is arranged to record vehicles entering the parking area and parking their vehicles, and so distinguish them from vehicles travelling on the road or street not using a parking space within said parking area. Preferably, the system further comprises:
- e) tertiary camera means arranged to provide CCTV coverage of the parking area entry such that vehicles

remain in field of view until exit from the relevant car parking space.

[0007] Preferably, the processing arrangement comprises CCTV monitoring software arranged to track where a vehicle has parked and record when they enter and leave a parking space within the monitored area, a parking database arranged to receive information from the camera means and calculate the duration of each vehicle's stay in a space, and a payment log arranged to receive information from the payment receiving means and transmit said information to the parking data base.

[0008] Preferably, the processing arrangement further comprises an ANPR (automatic number plate recognition) engine arranged to capture an identifiable image of a vehicle or vehicle numberplate rather than log numberplate details.

[0009] Preferably, the system is arranged to accept alternative methods of payment such that payment can be accepted by 'phone, mobile 'phone, internet, voucher system, or the like, optionally arranged to accept payment in advance or within a limited period after parking.

[0010] Preferably, the system comprises an on-site personal computer arranged to receive data from all camera means, track vehicle movements, calculate parking duration and communicate with the payment receiving means to relate payments received to vehicles parked.

[0011] Preferably the system is arranged to capture and record number plate details of any vehicle which parks in a parking space within the fee paying area without paying and to forward such information to the parking area operator for onward processing.

[0012] Preferably the payment receiving means includes a pay and display parking meter comprising means for relating payments received to a particular vehicle.

[0013] Preferably, the data input means is associated with the payment receiving means.

[0014] Preferably, the data input means comprises a touch screen display from which a vehicle user may identify their vehicle from amongst a plurality of vehicle images.

[0015] Alternatively, the data input means comprises an alphanumeric key pad by which a vehicle user may enter their vehicle registration number and if required a code associated with their parking space.

[0016] In accordance with another aspect of the invention there is provided a method of obtaining payment from a vehicle user for vehicle parking charges, which involves a vehicle user using a vehicle parking system at an on-street or roadside parking area as described above.

[0017] In order that the invention may be illustrated, more easily appreciated and readily carried into effect by those skilled in the art, the following embodiments will now be described purely by way of non-limiting example with reference to the accompanying drawings where:

Figure 1 shows a simple site layout of monitored

roadside parking (where the parking spaces do not form part of the road) on one side of a road only, and

Figure 2 shows a more complex monitored car parking area of roadside parking (where the pavement has been narrowed to create parking spaces which do not encroach on the road) on one side and on-street parking (parking spaces forming part of the road surface and delineated by painted lines) on the other side.

[0018] A vehicle entering the site shown in Figure 1 from point A will be seen by Automatic NumberPlate Recognition (ANPR) camera 1 having coverage views to 2a and 2b of any vehicle point A or point B and leaving from the opposite side. A vehicle entering from point A may park in any of the empty spaces 3 or it may continue its journey. In either event it will be identified and logged by ANPR camera 1 in view 2a as it enters and 2b as it travels onward. To be effectively captured the number plate should preferably occupy between 30% and 40% of the field of view and within 50 metres of the ANPR camera.

[0019] If a vehicle parks in any of the spaces 3 it will be in the field of view (not shown) of CCTV cameras 4. Sufficient CCTV cameras 4 are provided to give overlapping coverage of the entire site. In any event, only 5% of a vehicle need occupy a CCTV camera's field of view to be covered. On-site control software (not shown) linked to CCTV cameras 4 and ANPR camera 1 will identify and track the vehicle as it moves from point A to a parking space 3 and as it leaves a parking space 3 to travel onward. The on-site control software will also note the duration of a vehicle's stay in a parking space 3 and link this with the amount paid at pay and display system 5. If the vehicle user has paid for less than the amount of time that they stayed in parking space 3 or has not paid at all, the system will note this and forward the identified vehicle's details, optionally with CCTV footage, to a central data point managed by the car parking area operator (not shown) by suitable known transmission means.

[0020] ANPR and CCTV cameras can be located anywhere within the site as long as the required field of view is maintained. Cameras can be fixed to existing lamp posts or poles or have a separate dedicated support mount. CCTV cameras may already be in place for monitoring and/or enforcement purposes and will then need only be linked to the system of the present invention.

[0021] The on-site control software may be housed in the pay and display machine 5 or elsewhere. The on-site control software comprises a payment log arranged to receive information from the pay and display machine and transmit to a parking database, said parking database arranged to receive information from the cameras and calculate the duration of a vehicle whilst in the fee paying parking area, CCTV monitoring software linked to the ANPR and CCTV cameras and arranged to track and note vehicles entering and leaving the fee paying parking area and optionally but preferably an ANPR en-

gine arranged to identify vehicles and capture an identifiable image thereof rather than just log the number plate details.

[0022] The pay and display system 5 can be of a known type having alpha-numeric key pad upgraded to permit a vehicle user to input the identity of the vehicle by entering the registration number of the vehicle and/or the number of the parking space, e.g. A24. The vehicle user will also input the time they expect to stay for and a payment and may receive a receipt. Alternatively, the pay and display system may comprise a touch screen display showing an image of any vehicles for which payment is due and the vehicle user may select their vehicle by touching the relevant part of the screen.

[0023] The system may provide for alternative methods of payment, e.g. by phone, mobile phone, internet, vouchers or other means, either in advance or within a certain interval after parking.

[0024] The central data point (not shown) is generally an IT system which receives information on vehicles where inadequate or no payment has been received, and may forward this information for onward PCN processing and evidence gathering/presentation. The central data point will also log and report on the revenue generated.

The system can be arranged to automatically generate and issue PCNs.

[0025] The video evidence generated can be used in the event of prosecution in pursuit of a claim and it is hoped to reduce the number and cost of appeals against fines.

[0026] Figure 2 shows the same system in operation to cover two separate sites; A and B.

[0027] ANPR cameras 1 situated at either end of the site ensure that a vehicle 6 travelling along the road is identified by reading and recording the numberplate details regardless of whether they subsequently park. Note that ANPR cameras optionally may be located to cover only an entrance or exit rather than both. Sufficient CCTV cameras (not shown) are provided to give complete overlapping coverage 2 of both sites A and B.

[0028] The system in Figure 2 works as exactly as previously described.

Claims

1. A vehicle parking system for use at an on-street or other roadside parking area having provision for parking at least one vehicle at said area, the system comprising:

- a) primary camera means arranged to sense and record the numberplate of any vehicle entering the area and entry time;
- b) data input means for the user of a vehicle parking at the site to identify their vehicle and/or parking space;
- c) payment receiving means coupled to a

processing arrangement arranged to calculate a fee due and to accept payment and optionally to issue a receipt;

d) secondary camera means arranged to sense and record the numberplate of any vehicle leaving the area and an exit time,

wherein the processing arrangement is arranged to record vehicles entering the parking area and parking their vehicles, and so distinguish them from vehicles travelling on the road or street not using a parking space within said parking area.

2. A system as claimed in Claim 1, which further comprises:

e) tertiary camera means arranged to provide CCTV coverage of the parking area entry such that vehicles remain in field of view until exit from the relevant car parking space.

3. A system as claimed in either preceding Claim, wherein the processing arrangement comprises CCTV monitoring software arranged to track where a vehicle has parked and record when they enter and leave a parking space within the monitored area, a parking database arranged to receive information from the camera means and calculate the duration of each vehicle's stay in a space, and a payment log arranged to receive information from the payment receiving means and transmit said information to the parking data base.

4. A system as claimed in any preceding Claim, wherein the processing arrangement further comprises an ANPR (automatic number plate recognition) engine arranged to capture an identifiable image of a vehicle or vehicle numberplate rather than log numberplate details.

5. A system as claimed in any preceding Claim, wherein the system is arranged to accept alternative methods of payment such that payment can be accepted by 'phone, mobile 'phone, internet, voucher system, or the like, optionally arranged to accept payment in advance or within a limited period after parking.

6. A system as claimed in any preceding Claim, wherein the system comprises an on-site personal computer arranged to receive data from all camera means, track vehicle movements, calculate parking duration and communicate with the payment receiving means to relate payments received to vehicles parked.

7. A system as claimed in any preceding Claim, wherein the system is arranged to capture and record number plate details of any vehicle which parks in a

parking space within the fee paying area without paying and to forward such information to the parking area operator for onward processing.

8. A system as claimed in any preceding Claim, wherein the payment receiving means includes a pay and display parking meter comprising means for relating payments received to a particular vehicle.

9. A system as claimed in any preceding Claim, wherein the data input means is associated with the payment receiving means.

10. A system as claimed in any preceding Claim, wherein the data input means comprises a touch screen display from which a vehicle user may identify their vehicle from amongst a plurality of vehicle images.

11. A system as claimed in any one of Claims 1 to 8, wherein the data input means comprises an alpha-numerical key pad by which a vehicle user may enter their vehicle registration number and if required a code associated with their parking space.

12. A method of obtaining payment from a vehicle user for vehicle parking charges, which involves a vehicle user using a vehicle parking system at an on-street or roadside parking area as claimed in any preceding Claim.

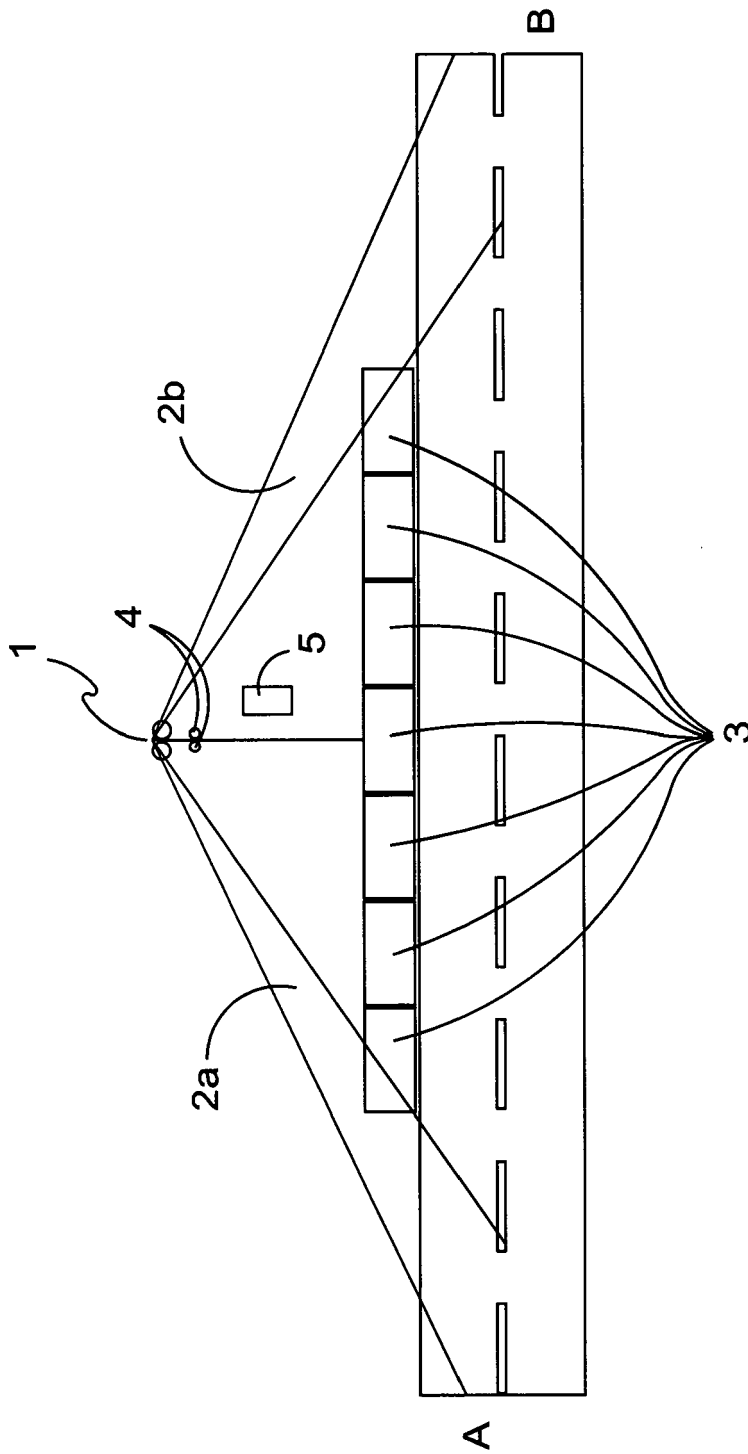


FIGURE 1

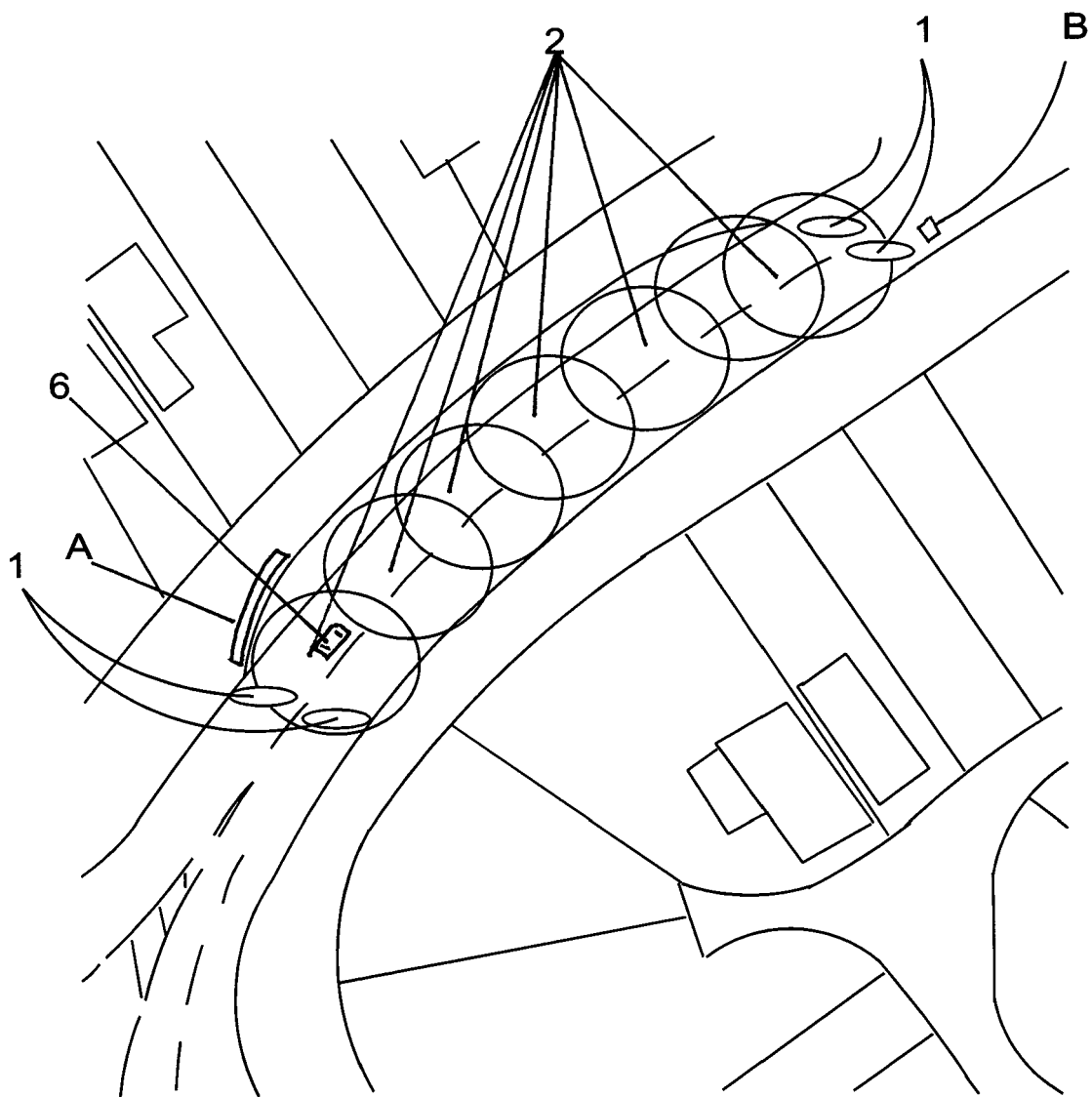


FIGURE 2



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 25 3405

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* abstract * * page 5, line 1 - page 6, line 2; figure 1 * * page 9, line 14 - line 18 * * page 13, line 20 - line 24; figure 9 * * page 13, line 30 - page 14, line 19; figure 11 * * page 15, line 5 - page 16, line 36 * -----	2,5,10	
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A	* abstract * * column 3, line 49 - column 4, line 35; figures 2,3 * * column 5, line 31 - column 6, line 15; figure 4 * * column 7, line 19 - line 38; figure 5 * -----	2,8,11	
X	GB 2 415 820 A (RANGER SERVICES LTD [GB]) 4 January 2006 (2006-01-04)	1,3,4, 7-12	TECHNICAL FIELDS SEARCHED (IPC) G08G G07B
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 8 November 2007	Examiner Heß, Rüdiger
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

3

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 07 25 3405

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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