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(54) **Automated car-park management system**

Automatisiertes Parkplatz-Verwaltungssystem

Système automatisé d'administration d'un parking

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(73) Proprietor: **Extel S.r.l.**  
**35129 Padova PD (IT)**

(72) Inventor: **Franceschini, Leopoldo**  
**35133 Padova PD (IT)**

(74) Representative: **Perani, Aurelio et al**  
**Perani Mezzanotte & Partners**  
**Piazza San Babila 5**  
**20122 Milano (IT)**

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**EP 1 331 620 B9**

## Description

**[0001]** The present invention relates to an automated car-park management system.

**[0002]** It is known that conventional car-parks managed by service personnel are tending to be replaced by unattended car-parks with automatic or semiautomatic management, the running cost of which is much less and also can operate continuously 24 hours a day.

**[0003]** Substantially, in automated car-parks it is foreseen that one gains access to an enclosed car-park area through an entrance equipped with a mobile barrier.

**[0004]** At the entrance a ticket dispensing device is also foreseen which automatically, detecting the presence of a vehicle, or when a button is pressed, issues the user with an entry ticket upon which the entry time is applied, recorded on a magnetic strip or printed with codes which can be read optically or magnetically. The opening of the barrier depends upon the removal of the ticket from the dispenser device, carried out by the user.

**[0005]** To leave the car-park the user must first of all take care of payment, carried out at an automatic till device or at a pay booth, where the ticket is read, in general automatically, to calculate the amount due. Once the payment has been made the authorised exit time is automatically registered and the ticket is returned to the user.

**[0006]** At the exit from the car-park area a mobile control barrier is opened only with the introduction of the ticket in an automatic reading device which, having detected the authorised exit time and that the payment has been made, commands the barrier to open.

**[0007]** Systems of this type have various limits: there are the costs connected to the consumption material (tickets with a magnetic strip and the like) the supply of which must be taken care of periodically.

**[0008]** The dispensing of the ticket and its removal, by the user, involve a relative slowness of the entry operations and a certain inconvenience for the user who is obliged to open and close the car window. The same drawbacks are present at the exit.

**[0009]** Finally, the level of security is very low and theft and the swapping of automobiles cannot be excluded.

**[0010]** In document US5,638,302 it has been proposed, to avoid these drawbacks at least in part, to associate with a car-park entrance barrier, in addition to the conventional ticket dispensing device, a camera for reading the plate number of the entering car and possibly other features, such as car length.

**[0011]** A data processing system, suitably programmed, provides for the plate number recognition and to its storing, together with a corresponding code or number of the dispensed ticket.

**[0012]** As an alternative or at the same time, the data which identify the car may be recorded onto the ticket.

**[0013]** At the exit of the parking area a ticket reading device and a camera are present too, the camera providing car recognition.

**[0014]** The read out information is compared with the one stored and/or recorded on the ticket and the exit barrier is opened only in case of matching information.

**[0015]** In case of mismatch alarm systems are activated for signalling and intervention of public or private surveillance services.

**[0016]** The inconvenience for the user is not avoided, the operative costs associated with the ticket dispensing are not eliminated, nor is the input/output operation speeded up.

**[0017]** Besides these disadvantages there is a limit in the plate number recognition: to obtain a good reliability of recognition it is necessary to be equipped with particularly complex software, capable of operating efficiently only in particularly powerful data processing systems. These resources are therefore expensive and every car-park must be equipped with such resources.

**[0018]** For example, US 4,603,390 teaches a computerized parking system able to determine the time of entry and time of exit of a vehicle and the time a vehicle remained in the parking area. The parking fee due for each vehicle is computed on the basis of a predetermined rate or rates and on the time in which the particular vehicle remained in the parking area. Also, US 6,340,935 teaches a computerized parking facility management system able to identify the specific vehicle parked in any parking space of a car-park area. The system provides computer searching means to locate vehicles within the parking facility.

**[0019]** The present invention eliminates such drawbacks and provides an automated car-park management system which has the following advantages:

- simplification of the user operations;
- speed of the entry and exit operations which avoids the formation of queues;
- reduction in the fixed investment costs and of the management costs;
- elimination of the costs for consumption materials;
- simplification of the local management and control apparatuses;
- remote, single and centralised control of many car-park areas, through Internet, with the possibility of offering additional services, like reservation, subscription, prepaid management and other auxiliary services;
- possibility, also by choice, of associating whatever secret recognition code (PID) with every number plate upon the simple request of the user and thus of reducing the risk of theft and illegal exit of the vehicle to the minimum.

**[0020]** The invention is defined in independent claim 1.

**[0021]** The features and the advantages of the invention shall become clearer from the following description of a preferred embodiment, given with reference to the attached drawings in which:

- figure 1 is an overall block diagram of the system;
- figure 2 is an overall block diagram of the resources dedicated to a car-park area;
- figure 3 is an overall block diagram of the resources dedicated to an entry gate to a car-park area of the system;
- figure 4 is a schematic functional view of an automatic till for a car-park area of the system;
- figure 5 is an overall block diagram of the resources dedicated to an exit gate from a car-park area of the system;
- figure 6 is a flow diagram of the operations carried out by an entry gate;
- figure 7 is a flow diagram of the operations carried out by an exit gate;
- figure 8 is a flow diagram of the operations carried out by a remote control centre of the system for controlling an entry gate;
- figure 9 is a flow diagram of the operations carried out by a remote control centre of the system for controlling the most common operations carried out at the automatic till;
- figure 10 is a flow diagram of the operations carried out by a remote control centre of the system for controlling an exit gate.

**[0022]** With reference to figure 1 the system comprises a plurality of local resources LOC.RS. 1,2,3, respectively dedicated to and located at a corresponding plurality of car park areas PARK1, PARK2, PARK3 in communication via Internet, by means of high-speed transfer connections 5,6,7,8,9 (optical fibres, ADSL or other), with a management centre 10 (CENTR.MNGMT) and a manned supervision centre 11 (SPV. CENTER).

**[0023]** In the management centre 10 all of the processing and control operations are carried out which are necessary for the management of different car-parks, which are more than one in number and which do not necessarily belong to the same company.

**[0024]** In other words the management centre 10 can constitute a legally and administratively autonomous resource the functions of which are offered as a service to many users.

**[0025]** As a centralised resource, the investment and running costs of which are thus distributed over many car-parks, the management centre 10 can consist of many high calculating power processors or "servers" and mass memories capable of dealing with all of the necessary image recognition and data memorisation operations, as well as of providing the necessary "back-up" of resources in the case of malfunction of some of the units of which it is composed.

**[0026]** In the same way the local resources and the management centre communicate, via Internet, with the operating supervision centre 11, where qualified personnel is capable of communicating with the users of the car-parks to solve problems and emergency situations, as well as of arranging interventions by personnel

on the different car-parks when necessary.

**[0027]** Figure 2 is a block diagram of the structure of the local car-park resources which form the system: in each car-park one or more automated entry gates 12 (PARK.ENTR), one or more automatic tills 13 (CSH) and one or more automated exit gates 14 (PARK. EXIT) are foreseen.

**[0028]** The structure of these units shall be seen in greater detail in the following figures.

**[0029]** Blocks 12, 13, 14 are equipped with an IP (Internet Protocol) connection interface which, through a hub 15 (HUB) and a high speed transfer (bidirectional) communication channel 16, puts them in connection with both the remote control centre 10 (Fig. 1) and with the operating supervision centre 11 (Fig. 1).

**[0030]** Figure 3 represents the structure of an entry gate like 12 of Fig. 2 in greater detail.

**[0031]** The entry gate comprises:

- a *per se* conventional mobile barrier 17,
- a first device 18 for detecting the presence of a vehicle, arranged immediately upstream of the barrier and *per se* conventional (variable reluctance coil),
- a second device 20 for detecting the presence of a vehicle, arranged immediately downstream of the barrier 17, which is also conventional,
- a high resolution camera 19, preferably of the CCD digital type with 1200X800 or more pixels, for capturing the rear number plate of a vehicle positioned upstream of the barrier 17, and
- a data acquisition and command system 21, with a microprocessor  $\mu$ P, RAM working memory and an input-output interface with IP protocol for communication with the remote control centre 10.

**[0032]** Preferably, the entry gate is also equipped with a display 22 for indicating to the user the status of the car-park, whether there are spaces or it is full or open only for subscribers or for reserved places.

**[0033]** This information is provided, without the need for local processing, by the remote control centre which, according to the capacity of the car-park, the number of vehicles which have entered and left and the possible reservations or subscriptions, in case for predetermined time bands, can determine the local status of the car-park area.

**[0034]** The entry gate operates essentially as a data gatherer, without particular processing burdens, for example according to the flow diagram of figure 6: if authorisation is given to let in vehicles (block 40: SET PARK STATUS-EN. DET. 18 IF FREE) when it receives from the device 18 a signal indicating the presence of a vehicle (block 41: DET 18 ACT?) it activates the camera 19 to read the number plate and to send the image to the control centre (block 42: PLATE PICTURE & SEND), without any processing, apart from a possible compression.

**[0035]** If the status of the car park is free (block 43:

FREE?), depending upon the condition that no vehicle is present downstream of the barrier (block 44: DET 20 ACT?), it makes the barrier open (block 45: OPEN 17) and returns to monitor the presence of vehicles on their way in (block 41), after having previously verified the transit of the vehicle into the area downstream of the barrier (block 50: DET.20 ACT?) and after having re-closed the barrier, confirming to the management and control centre that the vehicle has actually entered (block 51: CLOSE 18 & CONFIRM).

**[0036]** If the car-park is available only for reservations or subscribers the data gathering system passes from block 43 to a status of waiting for the authorisation to open the barrier (block 46: AUTHORISED?) and should it be received it proceeds to the opening as already seen.

**[0037]** In the opposite case (a reply is necessary in any case to avoid a deadlock of the flow) it commands the display (block 47: DISPLAY) to indicate entry not permitted and having verified that the vehicle has left the entry area (block 48), it resets the conditions of the display device (block 49) and again starts monitoring the presence of new vehicles coming in.

**[0038]** Therefore, for these operations minimum and low cost resources are necessary at the entry gate and there is no need for ticket dispensers, with relative clocks, printers or magnetic band recorders.

**[0039]** Moreover, entry is particularly fast and does not involve inconvenience for the user, who does not have to withdraw any entry ticket and open and close the car window.

**[0040]** When the car-park has free spaces the entry time depends solely upon the practicability of the area immediately downstream of the gate and therefore is reduced to a few seconds: just the time necessary to stop the vehicle, allow the reading (not the recognition) of the number plate and to move on.

**[0041]** Also in the case of entry being dependent upon authorisation from the remote control centre, due to the speed of data transfer and of processing, the speed of the entry flow is not subject to substantial reductions.

**[0042]** Figure 4 represents the structure of an automatic till like 13 of Fig. 2 in greater detail.

**[0043]** The automatic till can be used directly by the user for different operations, like the payment of one-off stops, subscription and the prior payment of periodical or scalar passes, prepaid reservation and in particular the identification of the vehicle with a secret PID code, in addition to the number plate data.

**[0044]** In relation to these functions and others which can be foreseen the automatic till, which operates simply as a terminal, without particular processing tasks, comprises:

- a TS data entry key-pad 23, possibly of the touch screen type which is used for entering number plate information, a possible PID code, of the requested service/operation type, or other information which

is necessary from time to time;

- a possible display 24 (DISPL) for showing information, if not already constituted by the touch screen 23;
- 5 - a bank note recognition and handling device 25,
- a coin recognition and handling device (26) (COIN) with a possible change return (RET),
- a credit and debit card recognition and handling device 27 (CR.CARD),
- 10 - a reader/writer device for contactless cards of the ISO 14443 standard, for payments using a citizens card,
- a receipt printer 28 (PRNT), activated only by request of the user,
- 15 - an intercom system (29) (INTERPH) for communication with the operating supervision centre, when necessary,
- a possible control television camera 30 (WEBCAM),
- an electronic logic 31 for controlling the automatic till, with a microprocessor, memory and the related application software for the management of the payment operations and of the interface with the user in general,
- 20 - a connection interface 32 (IP), via Internet, with the remote control centre and the operating supervision centre.

**[0045]** All of these elements are *per se* known and do not require explanations. It is only necessary to note that the electronic logic must only carry out elementary interface functions, with the complex processing functions, which require access to data files, being carried out by the management centre.

**[0046]** The fundamental operations required by the user at the automatic till are two in number:

1) association of a PID code with the number plate data: the user who wishes to protect himself from theft or car-switching, immediately after having parked his car (or even before) goes to the automatic till and by using the key-pad selects the PID function, inputs the number plate and then the secret PID code.

The information is sent to and managed by the remote control centre. A time limit can be foreseen, from the moment when the vehicle enters the car-park, to carry out this operation, which can be overcome with more complex procedures and with the intervention of the operating control centre, to reduce to the minimum the risk of improper attribution of PID codes to vehicles which do not have one. The association of the PID code is, indeed, optional for the user.

In the same way, in the case of attempts at subsequent attribution of a PID code to the same vehicle the subsequent operations can be subordinated to the identification of the user, via webcam, intercom or other appropriate instruments (credit card, iden-

tity documents which can be read automatically and the like).

Moreover, with the same security procedures, commonly used in internet transactions, the user can request the automatic association of a PID code with the number plate of the vehicle, in a permanent or semi-permanent manner, even when not actually parking, so as to avoid the burden of having to associate a PID to the number plate every time he parks in an area managed by the same system.

In this case the association of the PID code to the vehicle can, after the first time, be carried out automatically by the remote control centre, upon the recognition of the number plate.

2) Authorisation for the vehicle to exit, dependent upon possible payment: the user who intends to exit with his vehicle from the car-park goes to the automatic till and by using the key-pad selects the exit function, inputs the number plate and the possible PID code.

**[0047]** The information is sent to and managed by the remote control centre which, having recognised the vehicle and the particular conditions which it is subject to (subscription, prepayment reservation by third parties or other) and the time spent in the car-park, if the parking cost is by time, confirms on the display the authorisation to exit or the prior requirement for payment in bank notes, coins or other, after completion of which authorisation is granted.

**[0048]** At this point the user has nothing more to do but to drive the vehicle to the exit (within a certain time limit) where the vehicle is recognised and authorised to leave with the opening of the barrier and without any other formalities.

**[0049]** Figure 5, in the same way as figure 3, represents the structure of an exit gate like 14 of Fig. 2 in greater detail.

**[0050]** The exit gate comprises:

- a first 33 and second 34 high operating frequency vehicle barrier, installed in a cage configuration;
- a first device 35 for detecting the presence of a vehicle, arranged upstream of the first barrier 33;
- a second device 36 for detecting the presence of a vehicle in the cage;
- a camera 37 for reading the number plate,
- an intercom system 38 (SOS) for communication with the operating supervision centre 11 (Fig. 1) and
- a gathering and command system 39 with a microprocessor  $\mu P$ , RAM working memory and connection interface, with IP protocol, for the exchange of signals (data or information), via Internet, with the remote control centre and the operating supervision centre.

**[0051]** The exit gate also essentially operates as a data gatherer/transferor, without particular processing bur-

dens, according to the flow diagram of Fig. 7: it receives from the device 35 a signal indicating the presence of a vehicle (block 52: DET.35 ACT?), it makes the barrier 33 open (block 54: OPEN33) on condition that a vehicle is not already present in the cage (Block 53: DET.36 ACT?), it receives from the device 36 a signal indicating the presence of a vehicle (block 55), it re-closes the barrier 33, it activates the camera 37 for reading the number plate and, without any processing, apart from a possible compression, transmits the image taken to the remote control centre (block 56: CLOSE33 - PLATE PICTURE & SEND) and, having received an authorisation signal from the remote control centre (Block 57: AUTHORISED?), it opens the second exit barrier 34 (block 58: OPEN34).

**[0052]** Finally, having verified that the vehicle has left the cage (block 59: DET.36 ACT?), it re-closes the barrier 34 (block 60: CLOSE34) and returns to the initial monitoring state of the area upstream of the first barrier.

**[0053]** In the case in which authorisation to exit is not received, the gathering system puts itself into an inactive state: it is the job of the operating supervision centre, in cooperation with the remote control centre, to resolve the problem, to open the barrier 34, after having carried out all of the necessary security procedures and to thus conclude the process. To ease the task, the system can be equipped with the intercom system 38 (Fig. 5) which connects the user directly with the supervision centre.

**[0054]** All of the operations of number plate recognition, verification of the completed payment (or of the existence of forms of subscription or other special conditions) and of the exit time, are delegated to the remote control centre which, in the case in which a circumstance arises which requires the intervention of an operator, activates the intercom device 38 and places the exit gate in communication with the supervision centre.

**[0055]** Therefore, minimum and inexpensive data processing resources are necessary at the exit gate which can be more than one in number without substantial investment costs to avoid interruptions of the exiting traffic in the case of a vehicle trying to exit without authorisation.

**[0056]** Moreover, in normal conditions, access to the gate is particularly fast and does not involve inconvenience for the user.

**[0057]** All of the basic data processing resources for the management and control of the system are essentially concentrated in the processing and control centre 10 (Fig. 1) where, only for reasons of efficiency and operating speed, a plurality of servers are foreseen which are respectively dedicated and specialised in terms of programs to carry out.

**[0058]** A first server, named as ANPR, is dedicated to the management of the functions of automatic recognition of number plates and recording of the relative images in suitable files.

**[0059]** An ordinal number and a code (or codes, in the

case of ambiguity in recognition) representing the number plate recognised are associated with every image recorded, so as to be able to be quickly traced in the file, in the case of need.

**[0060]** It is also possible to associate the date and the entry/exit time into/from the car-park, downloading the image, with the date, time of exit and a car-park code, into a history archive, when the exit from the car-park is recognised.

**[0061]** A second server, named as PARK SERVER is specifically dedicated to the car-parks own functions or those of different managed car-parks, such as:

- recording of entry/exit transits and therefore real-time identification of the available/full status of the car-park;
- recording of payments;
- recording and management of the secret security codes (PID) associated with the number plates,
- interfacing with the local devices for permission of entry/exit transits, for the activation of the payment procedures, for the updating and the management of the status of the car-park areas and for detecting alarms and emergencies.

**[0062]** A third server, named as APPLICATION SERVER essentially carries out the auxiliary application functions, capable of being accessed through a web browser, which can be grouped together in the following types:

- help desk functions for the manual correction of the number plate in the exceptional case of an error or difficulties in the automatic recognition process, which cannot even be overcome with criteria of data redundancy (in this case the number plate image can be presented to the manned supervision centre), to open/close the barriers in the case of an emergency, to support the user in difficulty and the like;
- management functions, such as definition of the prices, possible opening hours of the car-park, issuing of subscriptions, calculation and completion of payments according to the permitted methods, acceptance of reservations by third parties like hotels and the like;
- accounting and statistical report functions.

**[0063]** Clearly, the three servers carry out the different tasks in an integrated manner, cooperating and interacting with each other carrying out their specific jobs.

**[0064]** Without going into a detailed description of the different processes carried out by the control centre, figures 8,9,10 are flow diagrams showing, purely as an example which is susceptible to many variants, the three most common processes which are carried out.

**[0065]** Figure 8: management of the entrances.

**[0066]** The process is activated when an entry gate

sends the image of a number plate and a car-park code to the control centre (block 61: PLATE IMAGE & PARK No.). The code is needed to identify the car-park, in the case in which many car-parks are managed by the same control centre.

**[0067]** The control centre, specifically the ANPR server recognises the number plate and passes it to the PARK server (block 62: RECOGNITION - SEND TO PARK SERVER).

**[0068]** The PARK server verifies the status of the car-park (block 63: PARK STATUS).

**[0069]** If the car-park is free (FR), it goes directly to waiting for confirmation, from the entry gate, that the vehicle on its way in has actually passed through. When the confirmation is received (block 67: CONFIRMED) it memorises the number plate in a list of vehicles present in the car-park and associates it with the time of entry (block 68: STORE PLATE No. WITH TIME).

**[0070]** The ANPR server also memorises the entire image.

**[0071]** If the car-park is available only for reserved places (RES: reservations and subscriptions) the process steps from block 63 to block 64 (RES?) and the PARK server verifies that the number plate of the vehicle is present in a list of subscribed or reserved number plates.

**[0072]** In the affirmative case it sends to the entry gate authorisation to open (block 65: SEND AUTHOR) and passes to block 67.

**[0073]** In the negative case, it sends to the entry gate the refusal of authorisation and the process ends (block 66: SEND NO-END).

**[0074]** In output from block 68 the PARK server verifies if it is necessary to update the status of the car-park, due to the entry of another vehicle (block 69: PARK STATUS CHANGE?) and in the affirmative case the change in status is communicated to the entry gate (or gates, if there are more than one) (block 70: SEND CHANGE). At this point the process ends.

**[0075]** Figure 9: management of the automatic till.

**[0076]** The process is activated (block 71) with the sending to the control centre, by an automatic till, of a number plate code (PLATE), of a function code (FUNCT.), of a till and car-park code (PARK No.), as well as, when required, of a secret code (PID).

**[0077]** According to the function required (block 72: FUNCTION?) the process is carried out over many lines.

**[0078]** If the function required is PID, that is the association of the secret code with the number plate, the control centre associates (block 73: RELATE PID TO PLATE) the PID with the already memorised number plate, as required and subordinate, as already stated, with respect to a time limit and to the verification that a PID has not already been assigned to the same vehicle. After which the process ends.

**[0079]** If the basic conditions are not respected the process develops in a different manner which it is not

worth representing.

**[0080]** If the function required is EXIT, that is the authorisation to exit, the PARK server compares (COMP. WITH DATA FILE) the number plate and the possible PID with the list of vehicles (and relative PID's) present in the car-park, calculates the amount due in relation to the time spent in the car-park (COMPUTE FARE), updates the balance of possible prepayments or indicates to the till (SEND PAY INFO) the amount due (block 74).

**[0081]** If a payment is due it waits for confirmation from the till that the payment has been made (block 75: PAY OK?) and, having received it, sends to the till a confirmation that the transaction has been completed (block 76: CONFIRM) and associates an authorised exit time to the number plate in the list of vehicles present (block 77: RELATE EXIT TIME TO PLATE).

**[0082]** Obviously, if the PID differs from the one possibly associated with the number plate, or if the payment is not made, more complex procedures are activated, to allow the correction of the possible error, to urge payment and in the extreme case to deny authorisation to exit and alert the operating supervision centre.

**[0083]** For other functions which can be required (block: 72 OTHER) there is no point developing here a detailed analysis of the multiple, different procedures which can be activated.

**[0084]** Figure 10: management of the exit gate.

**[0085]** The process is activated with the reception of the image of the number plate and of the car-park code, sent by the exit gate (block 78: PLATE IMAGE & PARK No.).

**[0086]** The ANPR server takes care of the recognition of the number plate and of the transfer of the number plate code to the PARK server (block 79: RECOGNITION \_ SEND TO PARK SERVER).

**[0087]** It also memorises the image for possible future need (block 80: STORE).

**[0088]** The PARK server compares the number plate code with the list of vehicles present in the car-park (block 81: COMP WITH DATA FILE) and verifies the authorised time of exit of the vehicle.

**[0089]** If the vehicle is authorised to exit (block 82: EXIT AUTHORISED), it sends to the exit gate authorisation to open the gate (block 83: SEND AUTHOR). In the opposite case it activates an interactive communication procedure between the exit gate and the operating supervision centre (block 84: START INTERACT. PROC. ALERT SPV CENTRE).

**[0090]** With authorisation sent it verifies if it is necessary to update the status of the car-park (block 85: STATUS CHANGE?) and in the affirmative it sends to the entrance gates the relevant information (block 86: SEND CHANGE). After which the process ends.

**[0091]** It is clear that the flow diagrams presented are given as examples and that many variants can be brought.

**[0092]** In any case, they show that all of the data processing and number plate image recognition func-

tions are concentrated at the remote control centre, reducing to the minimum the tasks of the local units (gates and tills).

**[0093]** Moreover, it is clear that the interconnection of the local units with the control centre, through internet, allows the control centre to communicate, via internet, with all of the users of the network, from any point of the network.

**[0094]** It is thus possible to subscribe, to make car-park reservations and to check availability from any location and thus give an optimal exploitation of resources, with the maximum comfort for the user.

**[0095]** Regarding which, it can be observed that it is possible to offer to the user more advantageous parking conditions in the case that, when entering or even before, he defines the foreseen parking time (operation of which can also be made at the automatic till) and he respects the foreseen time limit.

**[0096]** Indeed, this allows a more efficient planning in the use of resources.

**[0097]** In addition to the local automatic tills, or in replacement thereof, it is also possible to integrate the till service, or simply the exit authorisation service, with that already foreseen in supermarkets and superstores, in many of which, to take advantage of the use of private car-park areas, it is now necessary to present a car-park entry ticket, issued by an automatic distributor, and to obtain its stamping at the till, to be authorised to exit.

## Claims

### 1. Car-park management system, comprising:

a plurality of car-park areas equipped with local resources (1,2,3);

said local resources (1,2,3) having at least one entry gate (12) with a camera (19) for taking an image of the number plate of a car incoming in a car-park area of said plurality of car-park areas, at least one till (13) and with at least one exit gate (14) with a camera (37) for taking an image of the number plate of a car leaving said car-park area;

#### characterized in that

said local resources (1,2,3) of said plurality of car-park areas are in communication with a remote centralized control centre (10) via internet (4), said remote control centre (10) being able to receive from said local resources (1,2,3) the image of the number plate of said car incoming in the car-park area, to receive from said till (13) a code representing the number plate of said car for which authorization to exit is requested, to recognize said image of the number plate of said car incoming in the car-park area and to cause the opening of the exit gate if a payment has been made at said till (13), and if there

is a correspondence between the car number plate recognized of said car leaving said car-park area and the code received from said till (13).

2. System according to claim 1 in which said control centre (10) comprises means (68) for memorising the number plate code of a car and its time of entry. 5
3. System according to claim 1 or 2 comprising means (23,31,32) for requesting said control centre to associate a secret code (PID) with a number plate and for sending to said control centre a request for authorisation to exit for a car identified by said code representing the number plate in combination with said secret code (PID). 10 15
4. System according to claim 3, in which said means for requesting the association of said secret code (PID) with a number plate comprises said till (13). 20
5. System according to any one of the previous claims, in which said control centre (10) comprises means for accepting parking reservations and/or subscriptions for a car identified by a number plate and means for reserving a parking space for said car and for allowing the access of said car to said car-park area depending on the recognition of its number plate as corresponding to that of a reserved or subscribed car. 25 30
6. System according to any one of the previous claims comprising a manned operating supervision centre (11) in communication, via internet, with said plurality of car-park areas (1,2,3) and said control centre (10). 35
7. System according to any one of the previous claims in which said exit gate (14) comprises two barriers (33,34) arranged as a cage. 40

#### Patentansprüche

1. Parkplatzverwaltungssystem, welches aufweist:

mehrere Parkplatzbereiche, welche mit örtlichen Hilfsmitteln (1, 2, 3) ausgestattet sind; wobei die örtlichen Hilfsmittel (1, 2, 3) zumindest einen Eingangstor (12) mit einer Kamera (19) haben, um ein Bild des Nummernschilds eines Fahrzeugs aufzunehmen, welches in einen Parkplatzbereich der mehreren Parkplatzbereiche hinein fährt, zumindest eine Kasse (13) und mit zumindest einem Ausfahrtstor (14) mit einer Kamera (13), um ein Bild des Nummernschilds eines Fahrzeugs, welches den Parkplatzbereich verlässt, aufzunehmen; d a-durch gekennzeichnet, dass

die örtlichen Hilfsmittel (1, 2, 3) der mehreren Parkplatzbereiche in Kommunikation mit einem zentralisierten Fernsteuerungszentrum (10) über das Internet (4) sind, wobei das Fernsteuerungszentrum (10) in der Lage ist, das Bild des Nummernschilds des Fahrzeugs, welches in den Parkplatzbereich hinein fährt, von den örtlichen Hilfsmitteln (1, 2, 3) zu empfangen, um von der Kasse (13) einen Code zu empfangen, der das Nummernschild des Fahrzeugs darstellt, für welches Genehmigung, herauszufahren, angefordert ist, um das Bild des Nummernschilds des Fahrzeugs zu erkennen, welches in den Parkplatzbereich hinein fährt, und das Öffnen des Ausgangstors zu veranlassen, wenn eine Bezahlung an der Kasse (13) getätigt wurde, und, wenn es eine Übereinstimmung zwischen dem Fahrzeugnummernschild, welches vom Fahrzeug erkannt wird, welches den Parkplatzbereich verlässt, und dem Code, der von der Kasse (13) empfangen wird, gibt

2. System nach Anspruch 1, wobei das Steuerungszentrum (10) eine Einrichtung (68) aufweist, um den Nummernschildcode eines Fahrzeugs und dessen Einfahrtzeit zu speichern.
3. System nach Anspruch 1 oder 2, welches eine Einrichtung (23, 31, 32) aufweist, um das Steuerungszentrum aufzufordern, einen Geheimcode (PID) mit einem Nummernschild zu verknüpfen und um zum Steuerungszentrum eine Anforderung zur Genehmigung zum Herausfahren zu senden, für ein Fahrzeug, welches durch den Code identifiziert wird, der das Nummernschild in Kombination mit dem Geheimcode (PID) darstellt.
4. System nach Anspruch 3, wobei die Einrichtung zum Anfordern in Verbindung mit dem Geheimcode (PID) mit einem Nummernschild die Kasse (13) umfasst.
5. System nach einem der vorhergehenden Ansprüche, wobei das Steuerungszentrum (10) eine Einrichtung aufweist, um Parkreservierungen und/oder Abonnements für ein Fahrzeug zu akzeptieren, welches durch ein Nummernschild identifiziert wird, und eine Einrichtung, um einen Parkplatz für das Fahrzeug zu reservieren, und den Zugang des Fahrzeugs zum Parkplatzbereich in Abhängigkeit von der Erkennung seines Nummernschilds entsprechend zu dem eines reservierten oder abonnierten Fahrzeugs, zu erlauben.
6. System nach einem der vorhergehenden Ansprüche, welches ein mit Personen besetztes Betriebsüberwachungszentrum (11) in Kommunikation - über das Internet - mit den mehreren Parkplatzebe-



reichen (1, 2, 3) und dem Steuerungszentrum (10) aufweist.

7. System nach einem vorhergehenden Ansprüche, wobei das Ausfahrtor (14) zwei Schranken (33, 34) aufweist, die als Käfig angeordnet sind.

## Revendications

1. Système d'administration d'un parc de stationnement de voitures, comprenant :

une pluralité de zones de stationnement de voitures équipées de ressources locales (1,2,3); lesdites ressources locales (1,2,3) ayant au moins une porte d'entrée (12) avec une caméra (19) pour photographier la plaque minéralogique d'une voiture entrant dans une zone de stationnement de voitures de ladite pluralité de zones de stationnement de voitures, au moins un tiroir-caisse (13) et au moins une porte de sortie (14) avec une caméra (37) pour prendre une image photographique de la plaque minéralogique d'une voiture quittant ladite zone de stationnement de voitures; **caractérisé en ce que** lesdites ressources locales (1,2,3) de ladite pluralité de zones de stationnement de voitures sont en communication avec un centre de télécommande centralisé (10) via Internet (4), ledit centre de télécommande (10) étant à même de recevoir desdites ressources locales (1,2,3) l'image de la plaque minéralogique de ladite voiture entrant dans la zone de stationnement de voitures, de recevoir de ledit tiroir-caisse (13) un code représentant la plaque minéralogique de ladite voiture pour laquelle une autorisation de sortie est requise, de reconnaître ladite image de la plaque minéralogique de ladite voiture entrant dans la zone de stationnement de voitures pour provoquer l'ouverture de la porte de sortie si un paiement a été effectué à ledit tiroir-caisse (13) et s'il y a une correspondance entre la plaque minéralogique identifiée de ladite voiture quittant la zone de stationnement de voitures et le code reçu de ledit tiroir-caisse (13).

2. Système selon la revendication 1, dans lequel ledit centre de commande (10) comprend des moyens (68) pour mémoriser le code de la plaque minéralogique d'une voiture et son heure d'entrée.

3. Système selon la revendication 1 ou 2, comprenant des moyens (23,31,32) pour demander audit centre de commande d'associer un code secret (PID) à une plaque minéralogique et pour envoyer audit centre de commande une demande d'autorisation

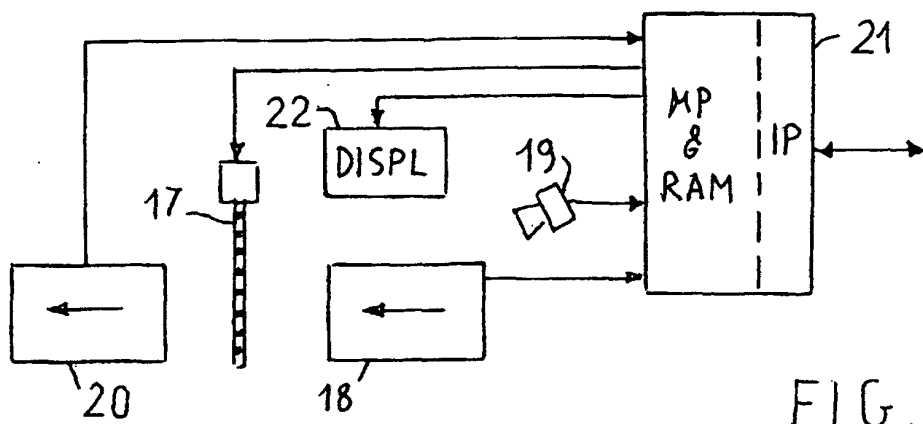
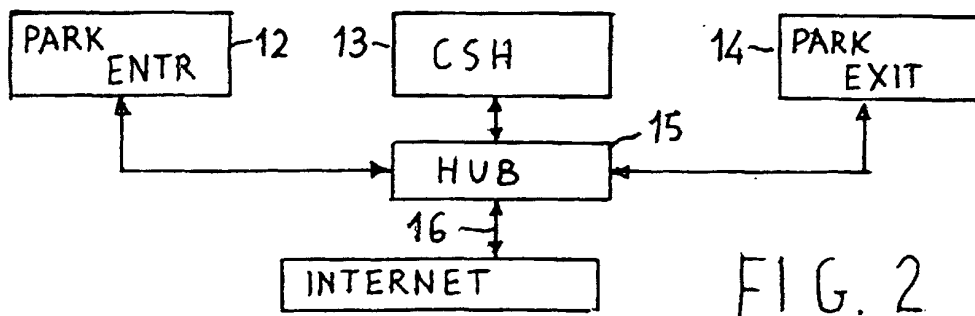
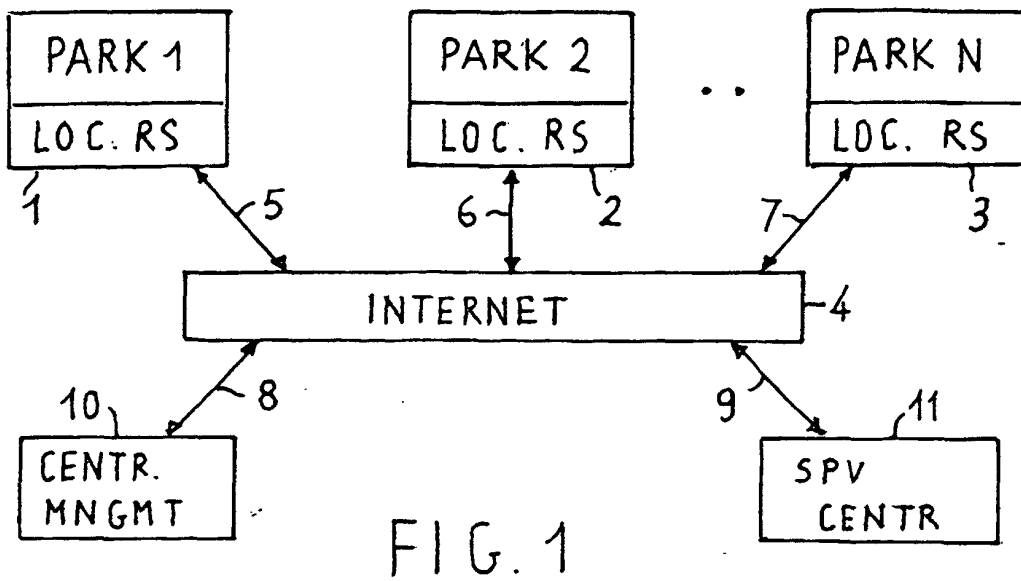
de sortie pour une voiture identifiée par ledit code représentant la plaque minéralogique conjointement avec ledit code secret (PID).

4. Système selon la revendication 3, dans lequel lesdits moyens pour demander l'association dudit code secret (PID) à une plaque minéralogique comprennent ledit tiroir-caisse (13).

5. Système selon l'une quelconque des revendications précédentes, dans lequel ledit centre de commande (10) comprend des moyens pour accepter des réservations et/ou des abonnements d'emplacements de stationnement pour une voiture identifiée par une plaque minéralogique et des moyens pour réserver un emplacement de stationnement pour ladite voiture et pour permettre l'accès à ladite voiture dans ladite zone de stationnement en fonction de la reconnaissance de sa plaque minéralogique comme correspondant à celle d'une voiture réservée ou d'une voiture d'abonné.

6. Système selon l'une quelconque des revendications précédentes, comprenant un centre de supervision (11) exploité par du personnel, en communication, via Internet, avec ladite pluralité de zones de stationnement (1,2,3) et avec ledit centre de commande (10).

7. Système selon l'une quelconque des revendications précédentes, dans lequel ladite porte de sortie (14) comprend deux barrières (33,34) aménagées en cage.



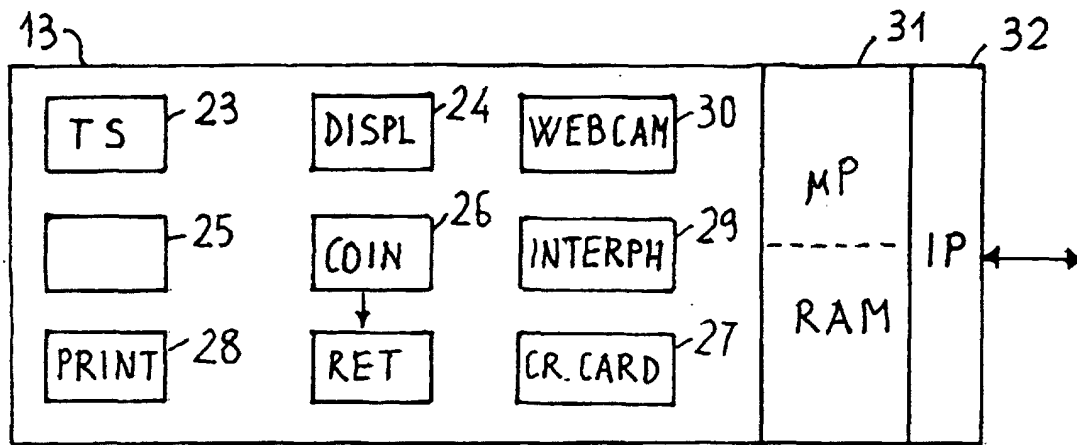


FIG. 4

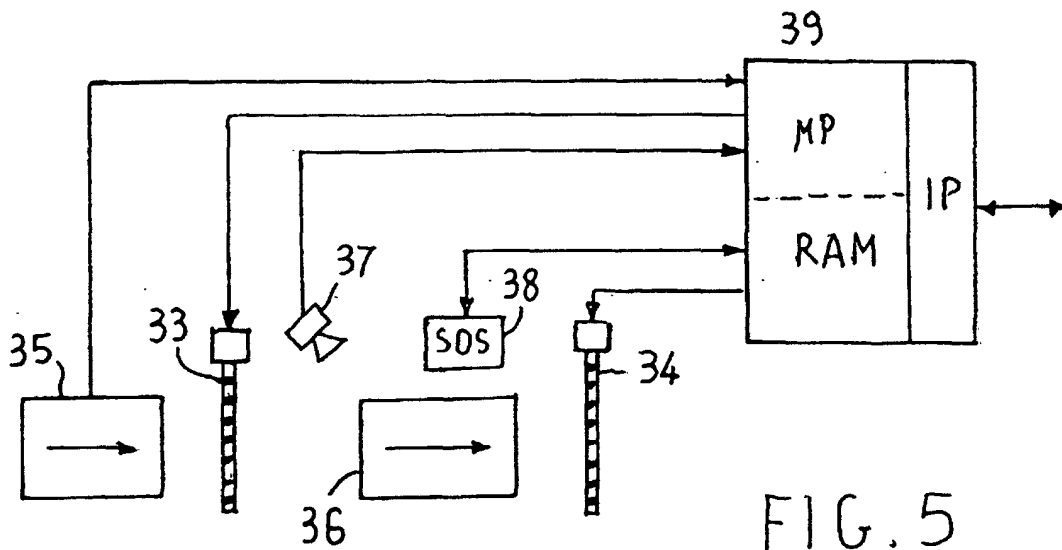


FIG. 5

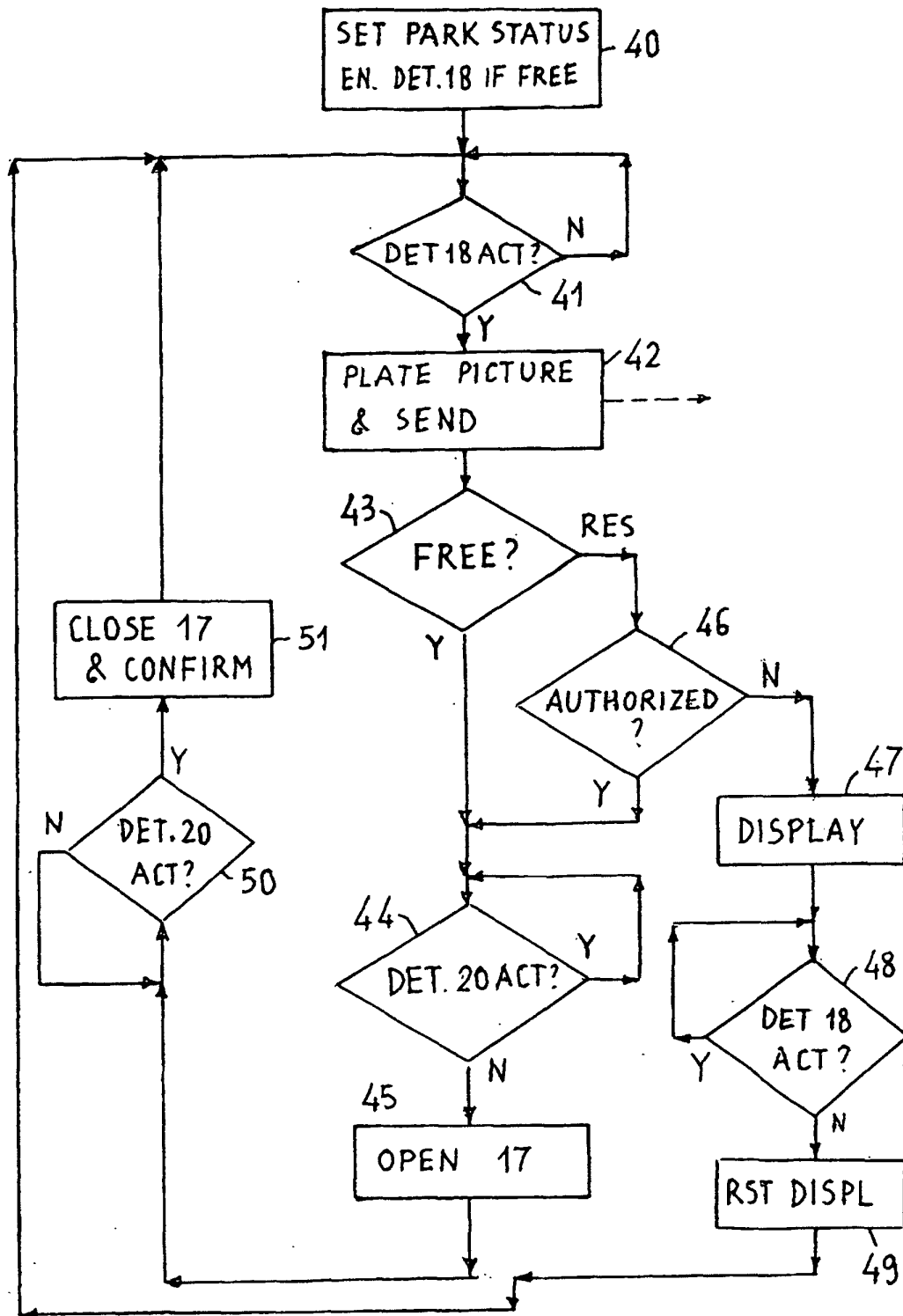


FIG. 6

