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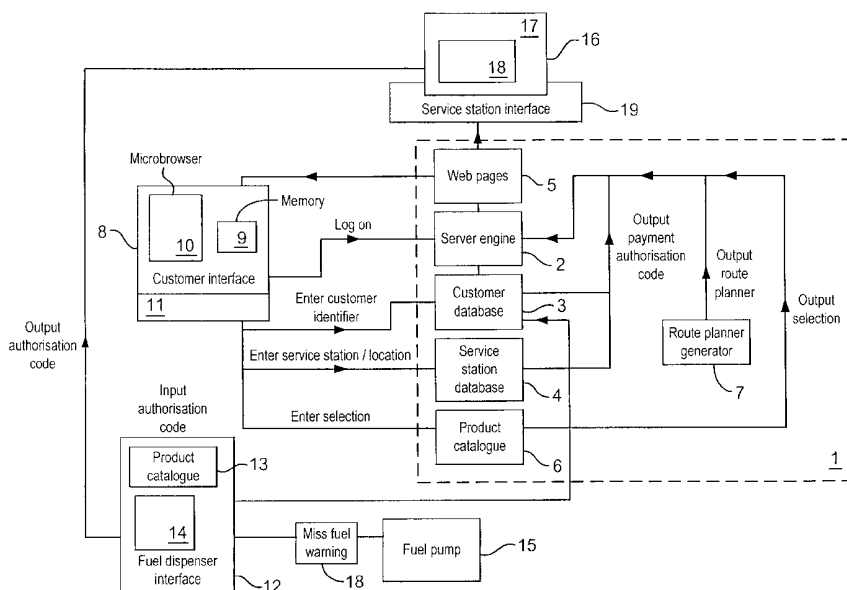
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(54) Title: METHOD AND APPARATUS FOR FUEL RETAIL



(57) Abstract: The present invention provides a method which enables a customer to purchase fuel from a service station which utilises a computer system wherein said computer system comprises a central controller which is accessible for interactive communication with a fuel dispenser interface connected to a fuel dispenser and with a customer interface. The central controller outputs to the customer interface a specific payment authorisation code e.g. pin number or password in response to a customer identifier inputted into the central controller via the customer interface. The fuel dispenser interface then allows the dispensing of fuel from the fuel dispenser in response to the specific payment authorisation code inputted into the fuel dispenser interface.

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METHOD AND APPARATUS FOR FUEL RETAIL

The present invention relates to a computer based method and apparatus for supplying fuel to customers.

The usual method for supplying fuel to customers dictates that the customer dispenses the fuel at the fuel dispenser located on the forecourt of a service station and then the amount and cost of the fuel dispensed is communicated to a cash register
5 located in the service station shop. The customer must then enter the shop and pay for the fuel using cash or a credit or debit card.

This method can result in the customer's time being wasted whilst waiting in a queue to complete the fuel purchase and causes loss of amenity of the forecourt space
10 due to the queuing which reduces the efficiency of the forecourt. In addition this method requires that the customer has a means of payment in their possession. The obvious problems would arise if, due to the lack of a payment means, the customer could not purchase sufficient fuel to reach his/her destination.

More recent methods of supplying fuel to customers involve a dispensing pump
15 and a keypad and card scanning unit located next to the pump. This system dictates that the customer enters the required data into the key pad and places his/her card into the scanning unit prior to dispensing fuel. Such a method is described in US-A-4,395,627.

A further method of fuelling has been described in WO 98/54678. This method allows a customer to use a mobile phone and requires the customer to enter a unique
20 code relating to a specific dispensing pump into a central controller via the mobile phone which then instructs the pump to deliver fuel.

These systems also suffer from the fact that the customers must be in possession

of a card or a mobile phone at the service station. Furthermore the latter two methods remove the requirement that the customer must enter the service station shop. Whilst it is desirable for the service station and the customer to increase the speed of the transaction it is also evident that service stations have a desire to sell to the customer
5 additional products other than fuel.

Many service stations now provide a service station shop that offers a range of goods for purchase e.g. ranging from car products to almost a complete range of supermarket goods. Consequently the service stations would be reluctant to encourage customers to pay without entering the service station shop because the opportunity to
10 sell the products to the customer is removed.

The present invention overcomes the above problems by providing a computer based method for supplying fuel to customers and providing customers with authorisation to purchase fuel from a particular service station prior to the arrival at said service station. The method may also provide the customer with the opportunity to
15 purchase products from the service station shop prior to arrival and without entering the service station shop.

Accordingly the present invention provides a method which enables a customer to purchase fuel from a service station which utilises a computer system wherein said computer system comprises a central controller which is accessible for interactive
20 communication with at least one fuel dispenser interface connected to a fuel dispenser and with at least one customer interface wherein the method comprises

- a) outputting from the central controller to the customer interface a specific payment authorisation code e.g. pin number or password in response to a customer identifier inputted into the central controller via the customer interface and
- 25 b) the fuel dispenser interface allowing the dispensing of fuel from the fuel dispenser in response to the specific payment authorisation code inputted into the fuel dispenser interface and
- c) outputting to the central controller via the fuel dispenser interface the amount to be charged to the customer.

30 The present invention also provides a method which enables a customer to purchase fuel from a service station which utilises a computer system wherein said computer system comprises a central controller which is accessible for interactive

communication with at least one fuel dispenser interface connected to a fuel dispenser and with at least one customer interface wherein the method comprises

a) inputting into the central controller via the customer interface a customer identifier

b) outputting to the customer interface via the central controller a specific payment

5 authorisation code

c) inputting the specific payment authorisation code into the fuel dispenser interface

d) dispensing fuel from the fuel dispenser and

e) outputting to the central controller via the fuel dispenser interface the amount to be charged to the customer.

10 The invention further provides a first computer useable medium having a computer readable program code embodied therein to enable the generation of a specific payment authorisation code in response to a customer identifier, said code comprising:

computer readable program code for causing a computer to accept a customer identifier inputted via a customer interface, computer readable program code for causing

15 the computer to access a database to generate a specific payment authorisation code in response to the customer identifier and computer readable program code for causing the computer to transmit the specific payment authorisation code to said customer interface

and a second computer useable medium having a computer readable program code embodied therein to enable the generation of an instruction to allow a fuel

20 dispenser to dispense fuel, said code comprising:

computer readable program code for causing a computer to accept a specific payment authorisation code inputted via a fuel dispenser interface, computer readable program code for causing the computer to generate an instruction to allow a fuel dispenser to dispense fuel in response to the specific payment authorisation code, and

25 computer readable program code for recording the amount of fuel dispensed and causing the second computer useable medium to transmit the amount payable to the first computer readable medium.

The customer identifier is usually specific to at least one customer interface and may be specific to a group of customer interfaces e.g. 1-10 and this enables the central
30 controller to verify that the specific customer identifier is being inputted into the central controller by a specific customer interface. Advantageously the same customer identifier may be inputted into the central controller by at least one specific mobile phone

interface, at least one specific computer interface at home or at work and/or at least one specific digital interface.

The customer may be provided with a customer identifier by registering with the central controller. The customer identifier may also be a code or password or may
5 simply be the name and/or the address of the customer. The registration requires the customer to provide details of the customer interfaces to which the customer identifier will relate and also typically involves supplying details of the customer's digital cash account, credit card details or the customer's bank account details from which payment for the transaction may be debited. The customer may advantageously supply further
10 details such as the usual fuel type purchased to prevent fuel contamination due to the incorrect grade of fuel being used.

In an alternative embodiment of the invention the customer identifier may be used from any customer interface and in such an embodiment the customer must have pre-registered with the central controller and provided answers to a number of security
15 questions. A specific payment authorisation code will only be outputted if the customer provides answers to the security questions that tally with those stored by the central controller.

Usually the central controller comprises a list of all the service stations and allows the customer to select a specific service station by inputting the selection into the
20 central controller via the customer interface. The central controller may then output to the customer interface a specific payment authorisation code relating to the selected service station and may provide further information about the selected station location e.g. address, phone number, hours of operation, services available, and the current fuel prices.

25 Alternatively the central controller may output to the customer interface a specific payment authorisation number relating to a specific service station in response to the customer entering a location and wherein the central controller nominates the service station closest to said location.

Usually the first computer useable medium comprises computer readable
30 program code for causing the computer to access a database to generate a specific payment authorisation code in response to the customer identifier and either a location or a nominated service station inputted into the first computer medium via the customer

interface.

The specific payment authorisation code may be a pin number or password and may be only valid for a specific station and/or within a certain time period and may only be valid for a fuel type or total cash value.

5 The customer interface may be a landline telephone, a mobile phone, a wireless application protocol (WAP) enabled phone, a digital interface e.g. interactive television, a personal computer, a laptop or a personal digital assistant (PDA) interface e.g. Palm Pilot or other device running Windows CE and allows the customer to interact with the central controller no matter where he or she is located, be it in the office, at home, or on
10 the road.

 Preferably the method is conducted over the Internet and the World Wide Web (WWW). The WWW allows a server computer system to act as the central controller which can send Web pages of information to the customer interface. Each customer interface can then display the Web pages and the Web pages are uniquely identifiable by
15 a Uniform Resource Locator (URL). To view the Web page the customer interface specifies the URL for that Web page in a request e.g. a Hyper Text Transfer Protocol (HTTP) request.

 The customer interface is preferably a WAP enabled phone which provides a link between a mobile phone network e.g. global system for mobile communications
20 network (GSM), universal mobile phone telephone system (UTMS) or wideband code division multiple access (W-CDMA) and the Internet and allows WAP enabled mobile devices to request WAP services and information from World Wide Web (WWW) servers. The WAP services are developed using the wireless markup language (WML) and WML Scrip which is similar to hypertext markup language (HTML) and JavaScript,
25 but optimized for the mobile devices. The customer interface can download information from the Internet server, which is then sent through a WAP Gateway which encodes the WAP content into a compact binary form and forwards the encoded content to the mobile device. The mobile device usually comprises a microbrowser which can display the information to the customer.

30 Advantageously when the central controller outputs the specific payment authorisation code to the customer interface it also outputs said code to the fuel dispenser interface. When the specific payment authorisation code is inputted into the

fuel dispenser interface the second computer readable medium, having a computer readable program code embodied therein to enable the generation of an instruction to allow a fuel dispenser to dispense fuel, establishes if the code inputted into the fuel dispenser interface is the same as that outputted to the fuel dispenser interface via the
5 central controller.

Alternatively the fuel dispenser interface may already possess a database comprising specific payment authorisation codes such that the central controller outputs these codes to the customer interface. Preferably these codes are changed periodically e.g. monthly, weekly, daily or hourly to avoid security breaches. Advantageously the
10 specific payment authorisation code may only be used once and as such after the code is inputted into a fuel dispenser interface that specific code will be removed from the database or become invalid.

The fuel dispenser interface may further interact with the central controller to establish if the customer has provided details of the usual fuel type purchased. If the
15 usual fuel type does not match the fuel type that is to be pumped the fuel dispenser interface may prevent that type of fuel being pumped or alternatively issue a warning. After receiving the warning the fuel dispenser can be instructed to pump any fuel type upon a further instruction of the customer.

In a preferred embodiment of the invention the customer may also be provided
20 with a route planner e.g. turn by turn instructions from the customer's location to the service station wherein the central controller generates and outputs a route planner from a location inputted into the central controller via the customer interface to a service station in response to the location and/or the selection of a service station inputted into the central controller via the customer interface.

25 The customer may be asked to enter a zip code, a street address or the customer's location may be ascertained using global positioning.

The route planner may be outputted via the central controller to the customer interface which may then be displayed. If the customer is at the office or at home and can not take the customer interface to the service station the route planner and the
30 specific payment authorisation code may be printed out or the customer interface can request the central controller to output the information to a particular mobile phone which can then display the route planner using the short message service (SMS) of the

mobile phone. Alternatively the customer interface can request the central controller to output the information to a computer system located in the customer's car. Preferably the computer can then provide the customer with oral directions whilst the customer is driving to the service station.

- 5 In a preferred embodiment of the invention the customer may provide the central controller with the vehicle whereabouts during any part and preferably all of the customers journey by using location pin-pointing technology e.g. global positioning. The system may then output to the customer interface a real-time dynamic route planning interaction with the customer as he/she travels along a pre-determined route.
- 10 Advantageously the customer may be provided via said customer interface with traffic up-dates and suggested route diversions to avoid any suddenly occurring traffic jams. The present invention also provides a method which enables a customer to purchase products from the service station, wherein the computer system also comprises at least one service station interface for interactive communication with the central controller
- 15 and wherein said method comprises
- a) outputting from the central controller to the customer interface a specific payment authorisation code and a product catalogue in response to the customer identifier inputted into the central controller via the customer interface
 - b) outputting from the central controller to the service station interface a selection of
 - 20 products in response to the selection of products inputted into the central controller via the customer interface and outputting the specific payment authorisation code relating to the selection of products to the service station interface
 - c) supplying the customer with the selection of products upon receipt of the specific payment authorisation code and
 - 25 d) outputting from the service station interface to the central controller the amount to be charged to the customer.

- The present invention also provides a method which enables a customer to purchase products from the service station, wherein the computer system also comprises at least one service station interface for interactive communication with the central
- 30 controller and wherein said method comprises
- a) inputting a customer identifier into the central controller via the customer interface
 - b) outputting from the central controller to the customer interface a specific payment

authorisation code and a product catalogue

c) inputting a selection of products into the central controller via the customer interface

d) outputting the selection of products and the specific payment authorisation code to the service station interface via the central controller interface

5 e) supplying the selection of products upon receipt of a specific payment authorisation number and

f) outputting from the service station interface to the central controller the amount to be charged to the customer.

The invention further provides the first computer useable medium as herein
10 described above having a computer readable program code embodied therein to enable the generation of a product catalogue and a specific payment authorisation code in response to a customer identifier said code comprising:

computer readable program code for causing a computer to accept a customer
identifier inputted via a customer interface, computer readable program code for causing
15 the computer to access a database to generate a specific payment authorisation code and a product catalogue in response to the customer identifier, computer readable program code for causing the computer to transmit the specific payment authorisation code and the product catalogue to said customer interface, computer readable program code for
causing the computer to accept a selection of products from said catalogue inputted via
20 the customer interface and computer readable program code for causing the computer to transmit the specific payment authorisation code and the selection of products to a service station interface which comprises a third computer useable medium having a computer readable program code embodied therein to display the product selection and computer readable program code for recording the amount of products supplied and
25 causing the third computer useable medium to transmit the amount payable to the first computer readable medium.

The invention may also provide a method wherein the computer system
comprises at least one service station interface for interactive communication with at
least one fuel dispenser interface and wherein said method comprises
30 a) displaying from the fuel dispenser interface a product catalogue in response to the specific payment authorisation code inputted into the fuel dispenser interface

- b) inputting into the service station interface a selection of products via the fuel dispenser interface in response to a selection of products inputted into the fuel dispenser interface
- c) providing the customer with the selection of products
- 5 d) outputting from the service station interface or the fuel dispenser interface to the central controller the amount to be charged to the customer.

The central controller usually provides the service station interface with a customer identifier e.g. a code or password or name and/or the address of the customer such that the attendant can distinguish the customer and supply him/her with their

10 selection of products upon receipt of said identifier The central controller may output the specific payment authorisation number to the service station interface which can then display it such that when the customer discloses the specific payment authorisation number to the attendant he/she can authorise the supply of the selection of products to the customer. Alternatively upon entering the specific payment authorisation code into

15 either the service station interface or the fuel dispenser interface the service station interface may generate an authorisation for the supply of said selection of products to the customer upon receipt of the specific payment authorisation code.

Usually the central controller comprises a list of all the service stations and the specific products available for purchase at each individual service station and preferably

20 the method comprises outputting from the central controller to the customer interface a list of service stations and inputting into the central controller via the customer interface a specific service station or location. The central controller may then output to the customer interface a product catalogue specific to a particular service station. This information is advantageously kept up to date via information outputted to the central

25 controller via the service station interface.

Preferably the method enables the customer to select products prior to arrival at the service station via a product catalogue displayed by the central controller and also provides the option of adding to the selection whilst at the service station from a product catalogue displayed by the fuel dispenser interface. Advantageously the customer can

30 interact with the central controller via the customer interface to search the availability of specific products throughout the network of service stations.

In a preferred embodiment of the invention the method also comprises outputting from the central controller to the service station interface of the specific outlet an estimated time of arrival such that the products may be packaged prior to the customer arriving at the station. The customer may also be able to select other services from the forecourt e.g. a car wash. When the customer arrives at the fuel dispenser the customer inputs into the fuel dispenser interface the specific payment authorisation code. The fuel dispenser interface indicates to the service station interface that the customer has arrived and preferably the products are delivered to the customer's car.

The estimated time for arrival may be based upon the information inputted into the central controller via the customer interface i.e. wherein a time period is specifically entered into the central controller or alternatively wherein a location is entered into the central controller and wherein said controller can then estimate the arrival time based on the distance between the entered location and specific outlet. Advantageously the central controller sends an email to the service station interface giving them the order and an estimated time when the customer will arrive and therefore allows an attendant time to bundle together the order so that it will be ready when the customer arrives.

When the customer arrives at the fuel dispenser the dispenser interface offers the option of payment using the specific payment authorisation code. If the customer selects this option the fuel dispenser interface will prompt the customer to enter their payment authorisation code. This code may then be transferred to the service station interface via the fuel dispenser interface and thereby notify the attendant that the customer has arrived. Preferably as the customer is fuelling additional requests may be placed for products via the fuel dispenser interface and the customer may also get weather and news updates and access the internet at the dispenser while waiting for fuelling to finish.

Preferably the central controller may also send the customer an email providing confirmation/receipt for the order and/or the purchase of fuel and advantageously the selection of products via the customer interface. In a preferred embodiment of the invention the customer may be further provided with incentive vouchers for discounts on future purchases resultant from his/her earlier transactions.

The present invention also provides a system for providing customers with fuel comprising a computer system accessible for interactive communication with customers, said system comprising

- a) a central controller for storing customer identifiers and customer account details, generating a specific payment authorisation code and outputting said code to a customer interface and debiting the customers account
- b) a fuel dispenser interface for recognising a specific payment authorisation code,
5 allowing an amount of fuel to be dispensed from a fuel dispenser and inputting into the central controller an instruction to debit the customers account usually by a designated figure based upon the amount of fuel dispensed from the fuel dispenser.

Preferably the central controller is also for storing and displaying a list of service stations and advantageously storing and displaying product catalogues for each service station and outputting a selection of products to a service station interface.
10

Alternatively the fuel dispenser interface may also be for storing and displaying product catalogues for the service station, storing customer's selection inputted into it and outputting the selection to the service station interface.

Usually the fuel dispenser interface and the central controller may both be for storing and displaying product catalogues and preferably the fuel dispenser may also be for outputting to the service station interface additional selections of products and information indicating that the customer has arrived upon recognition of the specific payment authorisation number.
15

Advantageously the customer interface may also be for generating a route planner to the nearest service station from a location and outputting the route planner to the customer interface in response to an inputted location into the central controller via the customer interface.
20

The invention will now be described with reference to the accompanying drawing. FIG 1 is a block diagram illustrating an embodiment of the invention. This embodiment allows the customer to acquire a specific payment authorisation code over the Internet using the World Wide Web. The central controller is a server system (1) which includes a server engine (2), a customer profile database (3), a service station database (4) various Web pages (5), a product catalogue database (6) and a memory area (7) for the generation of a route planner. The customer interface (8) comprises a digital computer having memory (9) a microbrowser (10), and a keypad (11), whilst the fuel dispenser interface (12) comprises a product catalogue (13) and a touch sensitive screen (14) and is interconnected to a fuel dispenser (15). The service station interface
25
30

(16) comprises a digital computer having memory (17), a monitor (18), and a keyboard (19). The central controller (1), the customer interface (8), the fuel dispenser interface (12) and the service station interface (16) are in online interactive communication via the Internet.

5 The server engine (2) receives HTTP requests to access Web pages identified by URLs and provides Web pages (5) to the customer interface (8). The Web pages displayed can be accessed by the computer (9) and displayed on the microbrowser (10). Information from the product catalogue database (6) and the customer profile database (3) can also be accessed by the computer (9) and displayed on the microbrowser (10).

10 The customer interface (8) can then input into the server engine (2) a customer identifier which is recognised by the customer profile database (3) and allows the server system (2) to charge the customer for any purchases. Upon receiving the customer identifier the server engine (2) can then access the customer database (3), the service station database (4) and the product catalogue database (6) which can then be displayed
15 on the microbrowser (10) upon request.

 The customer interface (8) can then input into the server engine (2) a nominated service station or a location and the server engine (2) can then access the memory area (7) and generate a route planner which can be outputted to the customer interface with a specific payment authorisation code . The customer may then select products from the
20 product catalogue database (6). The product selection is then communicated to the service station interface (16) via the server engine (2) with an estimated time of arrival.

 When the customer arrives at the fuel dispenser (15) he/she can enter the specific payment authorisation code into the fuel dispenser interface (12) via the touch sensitive screen (14). The fuel dispenser interface (12) will then output the information to the
25 service station interface (16) which informs the attendant that the customer has arrived.

 Upon receiving the specific payment authorisation code the fuel dispenser interface (12) can then access the product catalogue database (13) and the customer can add further products to his/her selection via the touch sensitive screen (14) and the selection is then communicated to the service station interface (16) via the fuel
30 dispenser interface (12). The fuel dispenser interface (12) then allows the customer to dispense fuel and can issue a fuel warning if the customer attempts to use a fuel that is not the same as that entered in the customer database (3). Once the fuel is dispensed the

cost of the fuel and the total cost of the products selected is debited from the customers account.

Claims:

1. A method which enables a customer to purchase fuel from a service station which utilises a computer system wherein said computer system comprises a central controller which is accessible for interactive communication with at least one fuel dispenser interface connected to a fuel dispenser and with at least one customer interface
5 wherein the method comprises
 - a) outputting from the central controller to the customer interface a specific payment authorisation code e.g. pin number or password in response to a customer identifier inputted into the central controller via the customer interface,
 - b) the fuel dispenser interface allowing the dispensing fuel from the fuel dispenser in
10 response to the specific payment authorisation code inputted into the fuel dispenser interface and
 - c) outputting to the central controller via the fuel dispenser interface the amount to be charged to the customer.
2. A method according to claim 1 wherein the central controller comprises a list of
15 service stations and allows the customer to select a specific service station by inputting the selection into the central controller via the customer interface.
3. A method according to claim 1 wherein the central controller comprises a list of service stations and allows the customer to select a specific service station wherein the selection is made by the central controller based upon the nearest service station to a
20 location inputted into the central controller via the customer interface.
4. A method according to claim 3 wherein the central controller generates and outputs a route planner from a location inputted into the central controller via the

customer interface to a service station in response to the location inputted into the central controller via the customer interface.

5. A method according to anyone of the preceding claims which enables a customer to purchase products from the service station, wherein the computer system also
- 5 comprises at least one service station interface for interactive communication with the central controller and wherein said method comprises
- a) outputting from the central controller to the customer interface a product catalogue in response to the customer's identifier inputted into the central controller via the customer interface
- 10 b) outputting from the central controller to the service station interface a selection of products in response to the selection of products inputted into the central controller via the customer interface
- c) supplying the customer with the selection of products upon receipt of the specific payment authorisation code and
- 15 d) outputting from the service station interface to the central controller the amount to be charged to the customer.

6. A method according to claim 5 which enables a customer to purchase products from the service station, wherein the computer system also comprises at least one service station interface for interactive communication with at least one fuel dispenser
- 20 interface and wherein said method comprises
- a) displaying from the fuel dispenser interface a product catalogue in response to the specific payment identifier inputted into the fuel dispenser interface
- b) inputting into the service station interface a selection of products via the fuel dispenser interface in response to a selection of products inputted into the fuel dispenser
- 25 interface
- c) providing the customer with the selection of products
- d) outputting from the service station interface or the fuel dispenser interface to the central controller the amount to be charged to the customer.

7. A method according to claim 6 wherein an additional selection is outputted to
- 30 the service station interface via the fuel dispenser interface in response to the additional selection being inputted into the fuel dispenser interface.

8. A method according to anyone of claims 5-7 wherein the service station controller is notified that the customer has arrived in response to the inputted customer authorisation code.
9. A method according to claims 5 comprising outputting from the central controller to the service station interface an estimated time of the customers arrival and packaging the products prior to the customer arriving at the station.
10. A method according to claim 9 wherein the estimated time for arrival is based upon the information inputted into the central controller via a mobile customer interface.
11. A method according to claim 9 wherein the central controller generates an estimated time for arrival based on a location relative to the service station and outputs the estimated time of arrival to the service station interface in response to the customer's location inputted into the central controller via the customer interface.
12. A method according to anyone of claims 5-11 wherein the products are delivered to the customers car.
13. A system for providing customers with fuel comprising a computer system accessible for interactive communication with customers, said system comprising
- a) a central controller for storing customer identifiers and customer account details generating a payment authorisation code and outputting said code to a customer interface and debiting the customers account
 - b) a fuel dispenser interface for recognising a payment authorisation code, allowing an amount of fuel to be dispensed from a fuel dispenser and inputting into the central controller an instruction to debit the customers account.
14. A system according to claim 13 wherein the central controller is also for storing and displaying a list of service stations, product catalogues for each service station, storing customer orders inputted via a customer interface and outputting the order to a service station interface.
15. A system according to claim 13 or 14 wherein the fuel dispenser interface is also for storing and displaying product catalogues for the service station, storing customer orders inputted into it and outputting the order to a service station interface.
16. A system according to claim 15 wherein both the fuel dispenser interface and the central controller are for storing and displaying product catalogues.

17. A system according to anyone of claims 13-16 wherein the fuel dispenser is also for outputting to the service station interface instructions to provide the customer with his selection of products upon recognition of the payment authorisation code.

18. A system according to anyone of claims 13-17 wherein the customer interface is
5 for generating a route planner to the nearest service station from a location and
outputting the route planner to a customer interface in response to an inputted location
into the central controller via a customer interface.

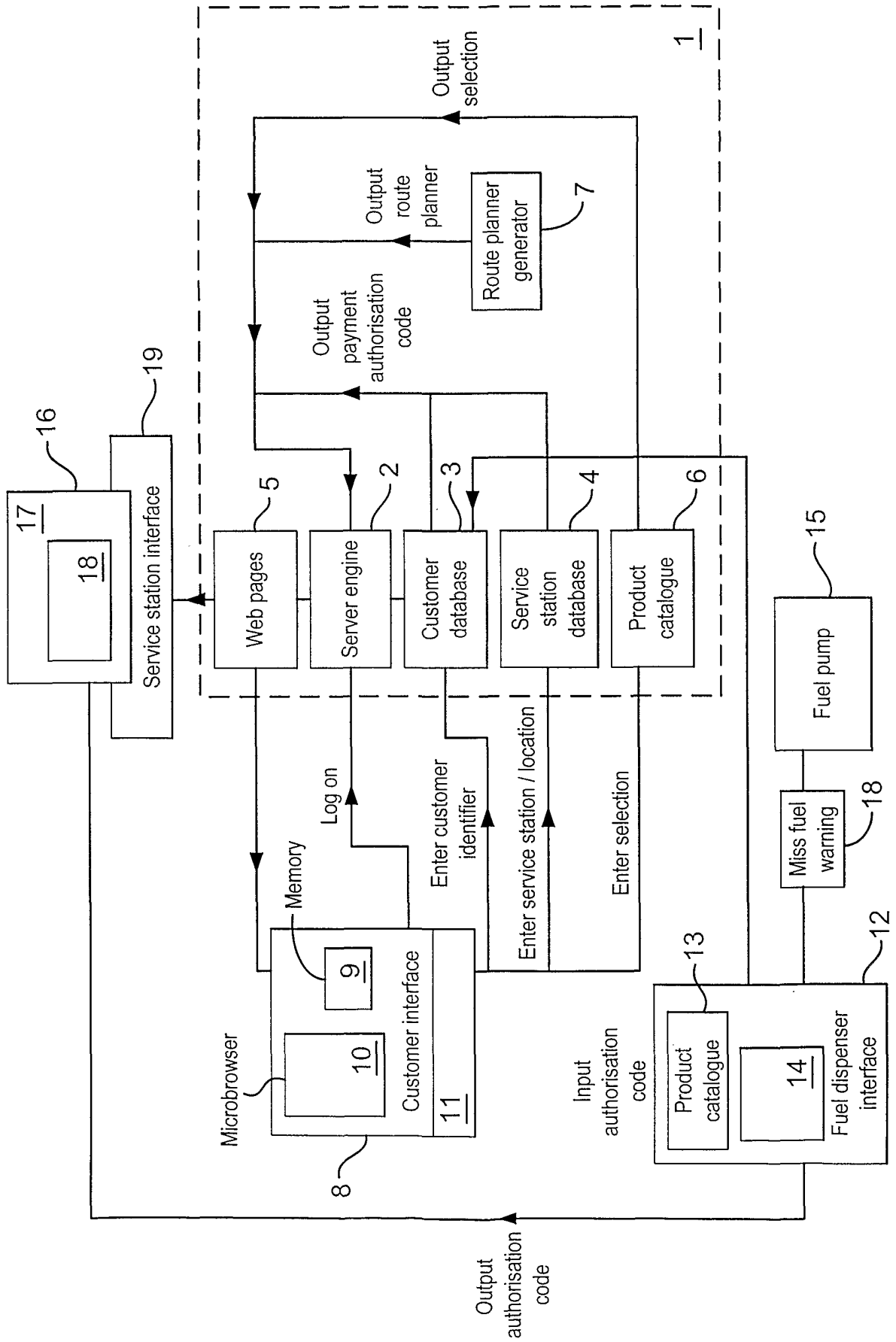
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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
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Minimum documentation searched (classification system followed by classification symbols)

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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 practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 070 156 A (HARTSELL JR HAL CRAIG) 30 May 2000 (2000-05-30)	1,13
Y	page 10, line 23 -page 14, line 9	4,18
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A	page 2, line 41 -page 3, line 49 page 4, line 79 -page 4, line 90 page 20, line 446 -page 23, line 529 claims 1,2,4,7,8; figures 6,9,10	5-7

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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

 International Application No
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P,X	US 6 116 505 A (WITHROW BENJAMIN S) 12 September 2000 (2000-09-12) column 9, line 52 -column 13, line 34 figures 9,12,13 ---	1,13
A	WO 98 54678 A (METAX OLIE A S ;JENSEN ANDERS BUUS (DK)) 3 December 1998 (1998-12-03) cited in the application page 8, line 7 -page 9, line 20; figures ---	1-3,13, 14
A	EP 0 974 940 A (GILBARCO INC) 26 January 2000 (2000-01-26) paragraph '0012! - paragraph '0018! paragraph '0041! - paragraph '0043! figures 1-3 -----	1,13

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