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DESCRIPTION

[0001] The present invention relates, in general, to vehicle identification.

[0002] Identification systems for vehicles based on the marking of an alphanumeric code on the glazing of a vehicle, or on its chassis, have been known for some time. A problem of identification systems based on glazing or chassis marking is that the glazing may be replaced, while a chassis marking may be abraded. Additionally, only a small amount of information can be contained in an alphanumeric code of limited length.

[0003] Other identification systems, such as that developed by the present applicant and described in European Patent EP 2.430.624, make use of RFID components operating at high frequency (short waves or HF, with a frequency between 3 and 30 MHz) or ultra high frequency (UHF, with a frequency between 300 MHz and 3 GHz), to which are written data that can be read subsequently with a suitable reader, for example a reader in the possession of authorized repair workshops or law enforcement agencies. These identification systems, especially if integrated with glazing or chassis marking systems, are highly resistant to tampering.

[0004] The present applicant has made further improvements to an identification system of this type, described in EP 2713353, in order to make it more difficult to counterfeit vehicle identification systems, while simplifying the administrative procedures associated with vehicles, and also allowing the checking of the service history and modifications made to the motor vehicle. In particular, an improved identification system of this type comprises the use of a plurality of RFID components operating at radio frequency. A first RFID component is applied in an easily accessible or visible position in the vehicle for fast data checking. Another RFID component is applied to a registration document or other vehicle identification document. Another RFID component is placed in a hidden location on the vehicle, to prevent undesired identification and tampering with the component. Provision is also made for the use of a smart card that can include its own RFID component. All these RFID components can be interrogated and updated by means of a suitable radio frequency reading and writing device.

[0005] The provision of the aforesaid radio frequency reading and writing device imparts considerable flexibility and security of use, by preventing access to the data by unauthorized persons. However, it has been found that the large-scale distribution of the identification system described in EP 2713353 requires the manufacture and distribution of the radio frequency reading and writing device to traders, law enforcement agencies, insurers, loss adjusters, and any other persons requiring access to the information associated with the RFID components located on the vehicle, on the registration document and/or on the smart card. Such a capillary distribution of electronic devices has proved expensive, not only in terms of production costs but also as regards the need to provide for their maintenance and replacement in case of failure.

[0006] The object of the present invention is therefore to address the need to produce, distribute and maintain large numbers of radio frequency reading devices, while providing access to the data representing the vehicle by ordinary interrogation operations, and without reducing the levels of security against counterfeiting and fraud.

[0007] Another object of the present invention is to provide a simple and economical system which has ample flexibility for integration with advanced functionality, for example with an image databank such as that described in EP 1 550 966 by the present applicant.

[0008] The objects are achieved by the claims. Further characteristics and advantages of the invention will become evident from the following detailed description of a preferred embodiment of the invention, which refers to the attached drawings provided purely by way of non-limiting example, in which:

- Figure 1 shows schematically the arrangement of an improved system according to the present invention for identifying a vehicle, and
- Figure 2 shows schematically a kit for providing identification of a vehicle by means of the improved system of the present invention.

[0009] With reference to Figure 1, an illustration is given of an exemplary system for identifying a vehicle according to an embodiment of the present invention. The identification system 10 for a vehicle comprises a multiplicity of identification elements in which at least one unique identification code can be stored, the code preferably being identical for each identification element connected to the same vehicle, but differing from one vehicle to another. Preferably, but not exclusively, the unique identification code differs from the registration number or chassis of the vehicle, and from any other data element from which the data for the vehicle or for the owner can be deduced or derived.

[0010] A first accessible identification element 16 is provided, this element being intended for fixing, in use, on an easily accessible point of the vehicle, preferably on one of its glazed elements 14, so that it can be easily identified from the exterior and read without the need for access to the interior of the vehicle. An optically recognizable data code 15, for example a linear or matrix barcode, such as a matrix code marketed under the name Aztec or QR-Code, is reproduced on the accessible identification element 16. This data code 15 reproduces at least the unique identification code.

[0011] The accessible identification element 16 may also incorporate an RFID component 17. The RFID component 17 preferably transmits at HF (high frequency), so that it can be read and/or written to at close range by a radio frequency read/write device 12, the details of which are not specified further below, since they can be found in Patent Application EP 2713353 filed by the present applicant. The RFID component 17 may be provided with sufficient memory to be able to store, for example, the following data: the make, the model, the engine capacity, the chassis number, the registration number, the date of first registration, the owner's personal

data, the tax code or VAT registration number if the owner is a corporate person, and other data. In this case, the storage capacity of the RFID component 17 is preferably 8 kB. An RFID component 17 with less memory may still be used to store the unique identification code which is also included in the data code 15 of the accessible identification element 16.

[0012] A second document identification element 24, preferably similar to the identification element 16, is provided, and is to be applied permanently to the registration document 28 of the vehicle or to a similar document to certify the genuineness of the document. This is because the document identification element 24 makes it impossible or at least extremely difficult to counterfeit the registration document, an act which typically occurs in cases of vehicle theft. The document identification element 24 also comprises a data code 25 and preferably also an integrated RFID component 26, the data storage capacity of which is preferably 8 kB, to allow data identifying the vehicle and its owner to be stored. In this case also, the RFID component 26 could have a smaller data capacity, but still sufficient to store the unique identification code which is also included in the data code 25.

[0013] A concealable identification element 18 having an RFID component 19, preferably transmitting and receiving at UHF (ultra high frequency), may also be associated with the vehicle. This concealable identification element 18 can be read/written to at radio frequency at a longer distance, depending on the size of the antenna and the transmitter power relative to the RFID components 17 and 26, which are, respectively, located on the accessible identification element 16 and on the document identification element 24. A read/write distance for the RFID component 19 between about 30 cm and about 100 cm is convenient, enabling the concealable identification element 18 to be advantageously placed in a concealed location on the vehicle by the owner directly, in such a way that no-one other than he knows the exact location of the component. For example, the concealable identification element 18 can be fixed under one of the seats, or inside the dashboard, in the baggage compartment or in any other concealed position. The greater reading distance of the RFID component 19 enables the content of the component to be read from the exterior of the vehicle, even if its exact position is not known. In order to limit costs, this third RFID component 19 contains encrypted data, but preferably communicates without any encryption protocol. Furthermore, the capacity of the third RFID component 19 can be limited to only 64 bits (or 8 bytes, equivalent to 8 characters), which is sufficient to store, for example, the last eight digits of the chassis number of the vehicle or, more preferably, the unique identification code or a significant portion thereof, or a hash of the unique identification code or of other significant data relating to the vehicle and/or to the owner.

[0014] The identification system further comprises a smart card 20 comprising a backing, typically of plastic or other suitable material, on which is reproduced a data code 21 entirely similar to the data codes 15 and 25 reproduced, respectively, on the accessible identification element 16 and the document identification element 24. The smart card 20 preferably also incorporates an RFID component 22, preferably having a microchip and an HF antenna so as to be readable and writable at a close distance. The RFID component 22 is preferably of the type used, for example, in electronic passports; that is to say it has encrypted data within it and

communicates by means of an encrypted protocol, with a data storage capacity of up to 8 kbytes. Clearly, in this case also, the data storage capacity of the RFID component 22 can conveniently be reduced in order to reduce the total costs of the identification system, at least the unique identification code being storable in the RFID component.

[0015] Additionally, the smart card 20 contains a contact microchip 23 which has a microprocessor which controls the exchange (reading and/or writing) of the data, encrypted and exchanged by communication using an encrypted protocol, as well as storing the data themselves. The data storage capacity of the contact microchip 23 is preferably up to 8 kbytes, but in this case also it would be possible to provide a smaller data storage capacity which is at least sufficient to store at least the unique identification code.

[0016] The radio frequency read/write device 12 is programmed so that it is always possible to read the RFID components 17, 19, 22 and 26 as well as the microchip 23. However, it is preferable for it to be programmed in such a way that the read and write device 12 has to be connected to a computer 32 for the purpose of adding new data or modifying stored data in the smart card 20, that is to say in the microchip 23 and in the RFID component 22. The computer 32 is connected through a network, via the internet 30 for example, to a remote node 34 communicating with a database 36. The connections are made by systems of cryptography, authentication, certification and security in general which are known in the field of computer networks. The remote node 34 may consist of a computer, a computer cluster, an embedded system, an all-hardware or all-software system or a combination thereof, or any other solution known to persons skilled in the art relating to the field of networks and databases.

[0017] The database 36 contains a plurality of data relating to each vehicle, each being identified by means of its own unique identification code carried by the smart card 20 and on the accessible identification element 16 and the document identification element 24. The respective data codes 21, 15 and 25 can be read by an application that can be activated on a smartphone 40 using its videocamera. The smartphone can communicate in a known way, for example by means of terrestrial antennae 41 or by means of wireless (WiFi) links, or in any other known way, with the internet 30 in order to communicate with the remote node 34 and therefore with the database 36. There are known programs, routines and algorithms for this purpose, which can be integrated into smartphone applications for using the videocamera commonly present in such smartphones for the purpose of optically reading a data code and converting its pattern to alphanumeric data and internet addresses, in order to interrogate a data server integrated into the remote node 34, which can be programmed to execute specific procedures and programs, including the retransmission to the smartphone 40 of significant data, regarding the vehicle identified by the unique identification code, retrieved from the database 36.

[0018] According to one operating mode of the identification system described herein, a user, for example a motor vehicle trader, a repair workshop, or a law enforcement agent, who needs to identify a vehicle activates a data interrogation application on a smartphone 40. In a first step, the application activates the videocamera on the smartphone 40 and waits until a data

code appears in the frame. When it appears in the frame, the image of the data code is acquired, and the data incorporated therein is decoded from this image. The data extracted from the data code comprise at least the unique code of the vehicle to be identified, which is sent to the remote node 34 which only keeps a map of the data relating to the vehicle associated with the unique identification code.

[0019] Depending on the type of user, previously identified on the remote node 34, for example by entering a user name and a password via the smartphone 40, the remote node 34 can execute various applications. For example, if the user is a law enforcement agent, the remote node 34 could send in response to the smartphone 40 data retrieved from the database 36 relating to the vehicle's owner, to the validity of the third-party insurance cover, and any information on reports of theft of the vehicle. On the other hand, if the user is a repair workshop, the data sent to the smartphone 40 from the remote node 34 may relate to the service history. If the user is the owner of the vehicle, the remote node 34 could send in response to the smartphone data relating to the forthcoming expiry of insurance cover and service periods, or data relating to useful contact telephone numbers or addresses, such as those of roadside assistance services. Other data useful to different categories of users may include data on changes of ownership of the vehicle, data on any fire and theft insurance cover, images of the vehicle before and after an insured event, and any other data that may relate to the present condition or the history of the vehicle and its owners.

[0020] In response to the identification of the vehicle via the transmission of the unique identification code retrieved from the data code read by means of the smartphone 40, the remote node 34 can also activate a procedure for updating data in the database 36. Examples of data updating are the activation or updating of an insurance policy, the uploading of photographs or video footage relating to the condition of the vehicle, possibly taken by means of the same smartphone, and the updating of data on the ownership or servicing of the vehicle.

[0021] In the case of operations requiring greater certainty as to the identification of the vehicle, for example in the case of confirming the retrieval of a stolen vehicle, or providing a guarantee to a buyer wishing to examine the past history of the vehicle, it is possible to carry out radio frequency reading of the data contained in the RFID components of the identification elements, including the reading of the identification code, or a part or a hash of this code, from the concealable identification element 18.

[0022] According to another aspect of the present invention, the accessible identification element 16, the document identification element 24, the concealable identification element 18 and the smart card 20 can be supplied in the form of a kit, being for example grouped in a package 50, preferably a sealed plastic package such as that shown in Figure 2. A data code 52, reproducing at least the unique identification code associated with the identification elements 16, 24 and with the smart card 20, is applied to the package 50 in a position clearly visible from the exterior. As mentioned previously, the concealable identification element 18, provided with only the RFID component 19, could also contain a stored version of the unique identification code, but could also contain a portion or a hash of this code, depending on the

data storage capacity available in this element. The application of the data code 52 to the package of the kit of identification elements facilitates the activation of a new vehicle registration procedure at the time of sale by a trader, based on the simple identification of the kit in the package 50 and the corresponding activation of a procedure by the remote node which proceeds to create a new data record in the database 36.

[0023] Clearly, provided that the principle of the invention is retained, the forms of embodiment and the details of construction can be varied widely from what has been described and illustrated, without departure from the scope of the invention.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- [EP2430624A \[0003\]](#)
- [EP2713353A \[0004\] \[0005\] \[0011\]](#)
- [EP1550966A \[0007\]](#)

Patentkrav**1.** Identifikationssystem til et køretøj, omfattende:

- 5 - mindst et tilgængeligt identifikationselement (16) der skal påføres, i brug, på en let tilgængelig eller synlig position på et køretøj, og en tilgængelig datakode (17), gengivet på det tilgængelige identifikationselement (16), indeholdende mindst en unik identifikationskode,
- 10 - mindst et dokumentidentifikationselement (24) der skal påføres, i brug, til et identifikationsdokument af køretøjet, en dokumentdatakode (25) gengivet på dokumentidentifikationselementet (24) indeholdende på en identisk måde mindst førnævnte unikke identifikationskode,
- 15 - mindst et fjernknudepunkt (34) forbundet til en database (36) der kan blive forespurgt via et datanetværk (30) af en brugerterminal (40) i stand til optisk læsning af både den tilgængelige datakode (17) og dokumentdatakoden (25) med henblik på af afkode den unikke identifikationskode deraf, idet databasen (36) er konfigureret til at lagre data relateret til en flerhed af køretøjer, hver identificeret med sin egen unikke identifikationskode.
- 20 **2.** Identifikationssystem ifølge krav 1, yderligere omfattende mindst et skjult identifikationselement (18) der skal placeres, i brug, i en skjult position på køretøjet, omfattende en RFID-komponent (19) der opererer ved radiofrekvens, omfattende lagret data der omfatter den unikke identifikationskode eller fra hvilket denne kode kan afledes.
- 25 **3.** Identifikationssystem ifølge et hvilket som helst af de foregående krav, hvor det tilgængelige identifikationselement (16) og/eller dokumentidentifikationselementet (24) omfatter en RFID-komponent (17, 26) der opererer ved radiofrekvens.
- 30 **4.** Identifikationssystem ifølge kravene 2 og 3, hvor RFID-komponenten (19) af det skjultbare identifikationselement (18) opererer ved UHF- og RFID-komponenter

(17, 26) af det tilgængelige identifikationselement (16) og dokument-identifikationselementet (24) respektivt opererer ved HF.

5. Identifikationssystem ifølge et hvilket som helst af de foregående krav, 5 yderligere omfattende et smart card-identifikationselement (20) på hvilket er gengivet en smart card-datakode (21) indeholdende på en identisk måde mindst den unikke identifikationskode.

6. Identifikationssystem ifølge krav 5, hvor smart card-identifikationselementet 10 (20) yderligere omfatter en RFID-komponent (22), der fortrinsvis opererer ved HF, og/eller en kontakt-microchip (23).

7. Identifikationskit til et køretøj, omfattende:

15 - mindst et tilgængeligt identifikationselement (16) der skal påføres, i brug, på en let tilgængelig eller synlig position på et køretøj, bærende optisk og/eller elektronisk data omfattende mindst en unik identifikationskode,

20 - mindst et dokumentidentifikationselement (24) der skal påføres, i brug, til et identifikationsdokument af køretøjet, bærende optisk og/eller elektronisk data omfattende på en identisk måde mindst den unikke identifikationskode, idet det tilgængelige identifikationselement (16) og dokumentidentifikationselementet (24) er kombineret i en pakke (50) på hvilken er gengivet en datakode (52) omfattende på en identisk måde mindst den unikke identifikationskode.

25 **8.** Identifikationskit ifølge krav 7, yderligere omfattende et skjult identifikationselement (18) der skal placeres, i brug, i en skjult position på køretøjet, bærende elektronisk data der omfatter den unikke identifikationskode, eller fra hvilket denne kode kan afledes.

30 **9.** Identifikationskit ifølge et af kravene 7 og 8, yderligere omfattende et smart card-identifikationselement (20) der bærer optisk og/eller elektronisk data omfattende på en identisk måde mindst den unikke identifikationskode.

10. Fremgangsmåde til identifikation af et køretøj ved hjælp af identifikationssystemet ifølge krav 1, omfattende trinnene at:

- 5 - påføre mindst et tilgængeligt identifikationselement (16) på en let tilgængelig eller synlig position på et køretøj, en tilgængelig datakode (17) gengivet på det tilgængelige identifikationselement (16) indeholdende mindst en unik identifikationskode,

- 10 - påføre mindst et dokumentidentifikationselement (24) til et identifikationsdokument af køretøjet, en dokumentdatakode (25), gengivet på dokumentidentifikationselementet (24), indeholdende på en identisk måde mindst førnævnte unikke identifikationskode,

- optisk læse den tilgængelige datakode (17) eller dokumentdatakoden (25) og afkode dens unikke identifikationskode via en brugerterminal (40),

- 15 - sende den unikke identifikationskode via et datanetværk (30) til et fjernknodepunkt (34) forbundet til en database (36) der er i stand til at lagre data relateret til en flerhed af køretøjer, hver identificeret med sin egen unikke identifikationskode, og behandle data, lagrede eller lagerbare i databasen (36), der er associeret med den unikke identifikationskode.

20

DRAWINGS

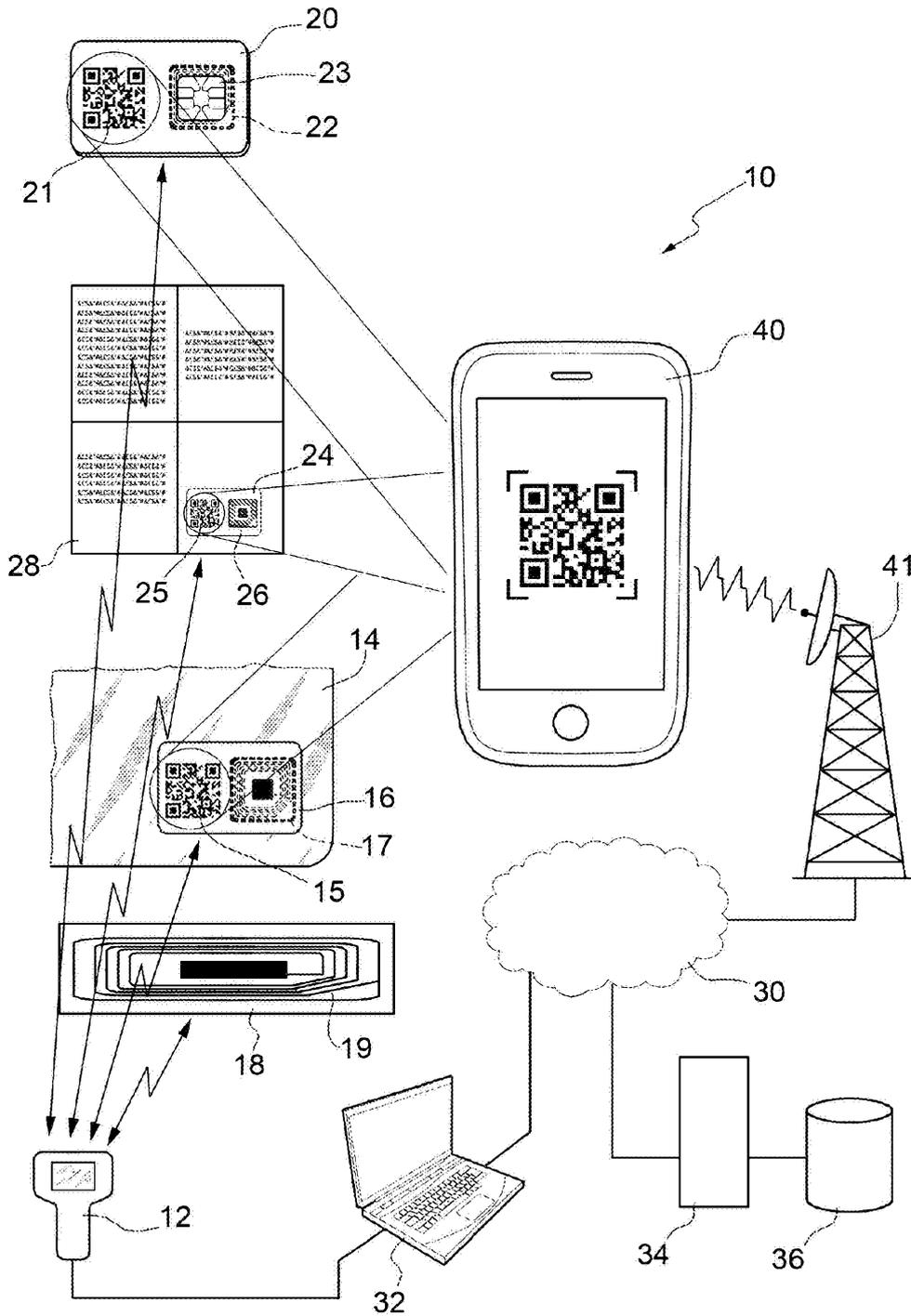


FIG. 1

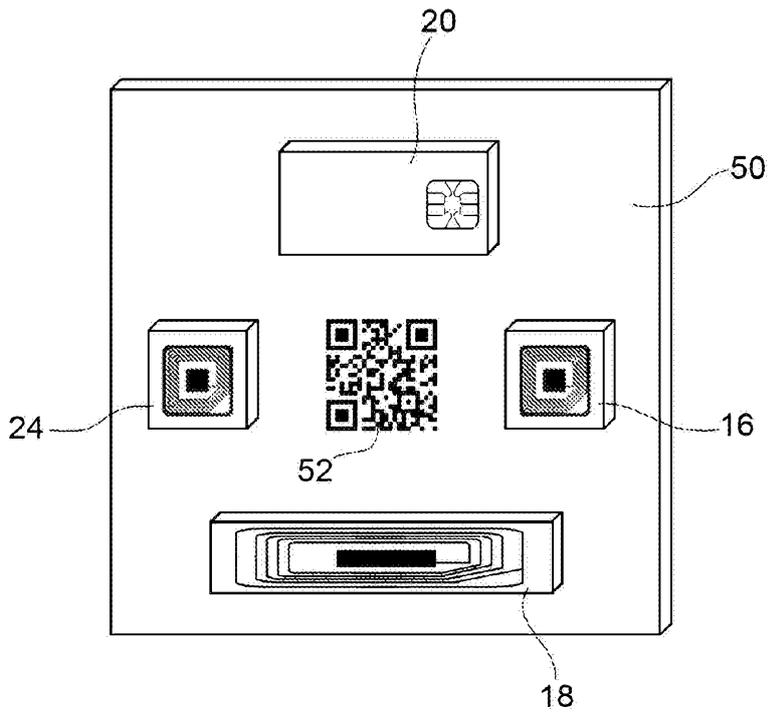


FIG. 2