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(54) **System for verification of a document**

(57) A system for verification or authentication of a document is provided, wherein the system comprises a transponder positionable or placeable on the document, an optical display, in particular a device that presents information in visual form positionable, placeable or at-

tachable on the document, wherein the transponder is adapted to generate, create or produce a verification signal, and wherein the verification signal is adapted to change, alter, modify or vary a state, in particular a condition, a mode or a status of the optical display.

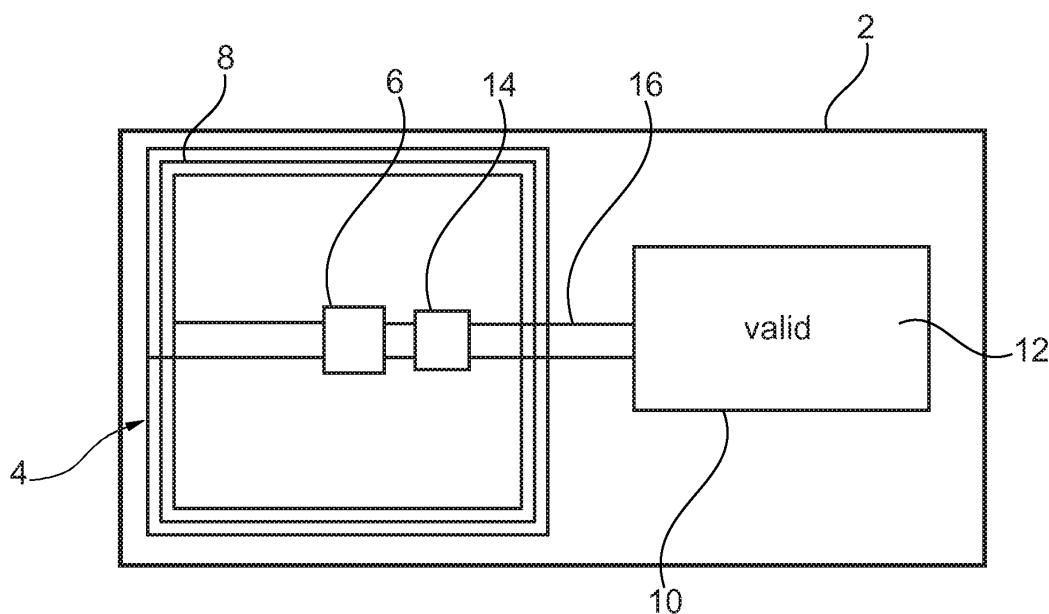


Fig. 1

Description

FIELD OF THE INVENTION

[0001] The invention relates to a system for a verification of a document, in particular a system comprising a transponder generating a verification signal to change a state of an optical display.

[0002] Moreover, the invention relates a method of verifying a document.

BACKGROUND OF THE INVENTION

[0003] Documents comprise verification features to secure validity when being exchanged or being proofed. These verification features include e.g. on banknotes paper quality, print quality, holographic strips, microlettering, metallic threads, watermarks and other security strips.

OBJECT AND SUMMARY OF THE INVENTION

[0004] However, there may be a need for a system that enables an efficient verification of a document.

[0005] In order to meet the need defined above, a system for verification of a document and a method of verifying a document according to the independent claims are provided. Further embodiments are disclosed in the dependent claims.

[0006] According to an exemplary aspect, a system for verification or authentication of a document is provided, wherein the system comprises a transponder positionable or placeable on the document, an optical display, in particular a device that presents information in visual form positionable, placeable or attachable on the document, wherein the transponder is adapted to generate, create or produce a verification signal, and wherein the verification signal is adapted to change, alter, modify or vary a state, in particular a condition, a mode or a status of the optical display. In particular, the verification signal may be indicative for the authenticity of the document.

[0007] The term "system" may particularly denote a whole made up of diverse but related parts or items. The term "system" may particularly denote an arrangement or an aggregation of item or elements.

[0008] The term "verification" may particularly denote a process of attesting the authenticity, genuineness or validity of something. Something may be verified, validated or authenticated by a process of verification.

[0009] The term "document" may particularly denote something that serves as evidence. In particular "document" may denote a tangible medium or a subject matter that serves as evidence. Examples for documents may be banknotes, official papers, ID cards, share certificates, credit cards, bank cards, money cards, contract documents et cetera. Documents may be made of diverse materials, like paper, plastic et cetera.

[0010] The term "transponder" may be literally a com-

bination of a "transmitter" and a "responder" and may particularly denote a device receiving and/or transmitting electromagnetic waves and/or optic waves that upon receiving a designated signal emits an electromagnetic signal of its own and that may be used especially for the detection, identification, and location of objects. Examples for a transponder may be an RFID-tag and a contactless chip card.

[0011] The term "positionable" may particularly denote that something may be put on, fixed to or embedded in something else. For example, the transponder may be embedded in paper or a plastic card. Moreover the optical display may be fixed on paper or a plastic card.

[0012] The term "generate a verification signal" may particularly denote that an electrical or an electromagnetic signal or sign is produced. In particular a voltage signal may be produced by the transponder in order to modify the optical display. More particularly a digital signal may be produced by the transponder.

[0013] The term "change a state of the optical display" may particularly denote that the visual appearance of the device may alter which presents visual information. For example the colour may become different or the device may change from bright to dark, from transparent to opaque, or vice versa. Also written information may be visible on the optical display. The written information that is displayed may be an information about the validity of the document, like "valid", "non valid" et cetera.

[0014] According to another exemplary embodiment, a method of verifying a document is provided, wherein the method comprises:

- providing a system according to an exemplary aspect
- generating a verification signal by the transponder, wherein the verification signal changes a state of the optical display.

[0015] A gist of an exemplary aspect may particularly be seen in a system which may enable a secure usage of documents. The documents may be provided with a transponder and an optical display coupled with the transponder. The transponder may be adapted to send out an electronic signal to the optical display, which electronic signal may be particularly an electrical or electromagnetic signal, or more particularly a voltage signal or a digital signal. The signal may initiate the optical display to show a visible verification signal. In this sense, the signal send out by the transponder may be called a "verification signal". However, the state of the optical display may depict information which may indicate the truth of the document as well as a state of the document wherein the document is disabled or not valid. It may be advantageous to show the disabling state in case the document is being transported or in case that it is not necessary to proof the authenticity for a longer period of time. Thus, even if the document is authentic, genuine, or real it makes no sense for a thief to steal the document when

it shows the disabling state. The transponder technology, for example the RFID-tag or a contactless chip, together with the reactive optical display may be too difficult to be counterfeited. The status of the document, however, may be indicated easily by the optical display on the document. The combination of a difficult forgery and a clear, apparent and evident optical display may provide an effective verification proof for the combination of a transponder technology and an optical display coupled to the transponder technology. Both, the transponder and the optical display may be associated with the document and/or may be embedded into the document. Thus, the transponder and the optical display may be integrated parts of the document. The transponder and/or the optical display coupled to the transponder may be difficult to be counterfeited.

[0016] Furthermore, a gist of an exemplary method of verifying a document may comprise that a transponder sends out a verification signal to an optical display in order to change the state of the optical display. Such a method may be advantageous because a complicated technology may be coupled to evident optical information, because counterfeiting may be difficult on the one hand. The proof of the validity when using and exchanging the documents may be easy on the other hand.

[0017] In the following, further exemplary embodiments of the system for a verification of a document will be described. However, these embodiments also apply to the method of verifying a document.

[0018] According to an exemplary embodiment the transponder may be adapted to supply the optical display with activation energy for changing the state of the optical display. The transponder may be electrically driven and may be coupled to the optical display. As already mentioned, the transponder may send the verification signal to the optical display. By a wiring connection via which the verification signal is sent or a further wiring connection the transponder may be coupled with the optical display to supply the optical display with energy which may be needed to activate the change of the optical display. Thus, the transponder may supply the optical display with information, such as digital information, as well as with electrical energy to enable the optical display to change its state. This may be advantageous because no extra electrical power supply for the optical display may be required.

[0019] According to an exemplary embodiment the transponder may be adapted to generate the verification signal in response to a received interrogation signal of a reader. The reader may send an interrogation signal or request to the transponder. In response to the interrogation signal the transponder may send the verification signal to the optical display. The requirements to initialize the transponder to generate the verification signal may vary: A simple and non-encrypted signal may be sent by the reader to the transponder. In this case, the security of the verification system may be based on the difficulty of copying the transponder technology and/or the display

technology and/or the difficulty to couple the transponder technology with the display technology and/or to integrate them on or into the tangible document. In another embodiment the security of the verification system may be enhanced by sending encrypted signals. The security of the verification system may additionally be based on the type of encrypted signals exchanged by the transponder and the reader, e.g. the interrogation signal of the receiver may be encrypted according to asymmetric or symmetric encryption schemes.

[0020] According to an exemplary embodiment the system may further comprise a reader adapted to supply the transponder at least with an amount of energy which may be sufficient for changing the state of the optical display. The transponder may be a passive transponder which is supplied with energy by electromagnetic signals and electromagnetic energy from the reader. The exchange of electrical signals and electrical energy between the reader and the transponder may be contactless and the transponder may be driven by the energy supplied by the reader. To activate the optical display for changing the depiction on the optical display activation energy may be required which activation energy may be supplied by the transponder to which the optical display is coupled. The amount of energy which is induced into the transponder by the reader may at least be sufficient to supply the optical display with the amount of energy for changing the state of the optical display. In case the energy per time instant is not sufficient for supplying the optical display energy may be accumulated over a time period in the transponder. Additionally or alternatively, the distant between the reader and the transponder may be selected in such a way that the energy per time instant is sufficient.

[0021] According to an exemplary embodiment the transponder may further comprise a crypto chip which is adapted to generate the verification signal. The crypto chip may be a chip which is adapted to receive encrypted, ciphered or encoded electronic signals which are sent out by the reader, further to process the encoded signals and furthermore to give out an appropriate response in the form of a electronic signal response based upon an algorithm operated on the received signal. The algorithm performed by the crypto chip may be secret and the crypto chip may be adapted to keep the secret encryption algorithm.

[0022] According to an exemplary embodiment the crypto chip may be adapted to perform a secure or encrypted communication with a reader. The term "secure or encrypted communication" may particularly denote encipherment of digital data. In general, encryption or data encryption may be described as a process of disguising information as "ciphertext", or data unintelligible to an unauthorized person. Conversely, decryption, or decipherment, is the process of converting ciphertext back into its original format. The crypto chip may allow for a secured communication with the reader by encrypting digital data to be sent to the reader and by decrypt digital

data received from the reader.

[0023] According to an exemplary embodiment the secure or encrypted communication between the crypto chip and the reader may be based on a key encryption. The reader or a processor of the reader may encrypt data by applying an algorithm-i.e., a set of procedures or instructions for performing a specified task-to a block of data. A personal encryption key, or password, known only to the transmitter of the message and its intended receiver, is used to control the algorithm's encryption of the data, thus yielding unique ciphertext that may be decrypted only by using the key.

[0024] According to an exemplary embodiment the state of the optical display may indicate an enabling state or a disabling state. In particular the disabling state may indicate a state in which the verification is temporarily or permanently disabled. The disabling state may in particular be useful if a document, e.g. banknotes, are transported or are stored and may be withdrawn for a period of time. A special reader may be adapted to apply a secret key and may be used to disable the document. A special reader and a secret key may be used to change the status of the optical display to the enabling state. A first group of readers may be adapted to make a query wherein the response of the transponder may express validity for the enabling state indicated by the optical display on the document. The first group of readers may be adapted to make a query wherein the response of the transponder may express no validity for the disabling state indicated by the optical display of the document. A second group of readers may be adapted to change the state of the document from the enabling state to the disabling state and from the disabling state to the enabling state by applying a secret key, for example, only used by and accessible to banks or authorized persons and organisations. The amount of energy to change the state of the document between the enabling state and the disabling state may be of a higher value than the amount of energy to change the state of the optical display.

[0025] According to an exemplary embodiment the change of the state of the optical display may be based on a polarisation effect. A polarisation effect may change the depiction on an optical display. Polarized light may be produced by absorption, reflection, scattering or birefringence of non polarized light. An LCD-technology (liquid crystal display) may be applied, wherein the polarized light may be filtered depending on the state of liquid crystals. The state of the liquid crystals may be changed by applying an electrical potential or voltage measured in V (Volt).

[0026] According to an exemplary embodiment the change the state of the optical display may be based on a colour effect. An electro-optical effect may change the colour of the display when a change of absorption or a change of a refractive index is dependent on an applied electrical field.

[0027] According to an exemplary embodiment the change of the state of the optical display may be based

upon a change of an electrical property. Due to the coupling of the transponder to the optical display the change of the state of the optical display may be induced by the verification signal transmitted by the transponder and supported by electrical energy supplied by the transponder.

[0028] The aspects defined above and further aspects of the invention are apparent from the examples of embodiment to be described hereinafter and are explained with reference to these examples of embodiment.

[0029] The invention will be described in more detail hereinafter with reference to examples of embodiment but to which the invention is not limited.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030]

Figure 1 shows a document according to an embodiment of the invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0031] The illustration in the drawing is schematically. In different drawings, similar or identical elements are provided with the same reference signs.

[0032] Figure 1 shows a document 2 comprising a transponder 4 and an optical display 6. The transponder 4 may comprise an antenna 8 and an RFID-chip 6. Further, the transponder may comprise a crypto chip 14. The optical display 10 may be adapted to show an optical signal 12. The transponder 4 and the optical display 10 may be coupled by a wiring connection 16. A method for verification of a signal may comprise the following steps:

[0033] Receiving an interrogation signal, which may be encrypted or clear text, in a transponder, e.g. an RFID-tag, wherein the interrogation signal may be generated by a reader or reader unit, wherein the transponder is associated to a specific document.

[0034] Performing a verification procedure in the transponder, e.g. by a processor implemented in the transponder.

[0035] Transmitting a verification signal from the transponder to a display unit, wherein the verification signal is based on the result of the verification procedure, i.e. is indicative for the authenticity of the associated specific document.

[0036] Changing the state of a display of the display unit in response to receiving the verification signal. For example, a colour of the display unit may change or some predetermined indicia may be displayed.

[0037] It should be noted that the term "comprising" does not exclude other elements or steps and the "a" or "an" does not exclude a plurality. Also elements described in association with different embodiments may be combined. It should also be noted that reference signs in the claims shall not be construed as limiting the scope

of the claims. Implementation of the invention is not limited to the preferred embodiments shown in the figures and described above. Instead, a multiplicity of variants are possible which use the solutions shown and the principle according to the invention even in the case of fundamentally different embodiments.

Claims

1. System for a verification of a document, the system comprising:

a transponder positionable on the document,
an optical display positionable on the document,
wherein the transponder is adapted to generate a verification signal, and wherein
the verification signal is adapted to change a state of the optical display.

2. The system according to claim 1,
wherein the transponder is adapted to supply the optical display with activation energy for changing the state of the optical display.

3. The system according to claim 1,
wherein the transponder is adapted to generate the verification signal in response to a received interrogation signal of a reader.

4. The system according to claim 1, wherein the system further comprises
a reader adapted to supply the transponder at least with an amount of energy which is sufficient for changing the state of the optical display.

5. The system according to claim 1, wherein the transponder comprises
a crypto chip which is adapted to generate the verification signal.

6. The system according to claim 5,
wherein the crypto chip is adapted to perform a secure or encrypted communication with a reader.

7. The system according to claim 6,
wherein the secure or encrypted communication between the crypto chip and the reader is based on a key encryption.

8. The system according to claim 1,
wherein the state of the optical display indicates an enabling state or a disabling state.

9. The system according to claim 1,
wherein the change of the state of the optical display is based on a polarisation effect.

10. The system according to claim 1,
wherein the change the state of the optical display is based on a colour effect.

11. The system according to claim 1,
wherein the change of the state of the optical display is based upon a change of an electrical property.

12. Method of verifying a document, the method comprising:

providing a system according to claim 1,
generating a verification signal by the transponder, wherein
changing a state of the optical display in response to the verification signal.

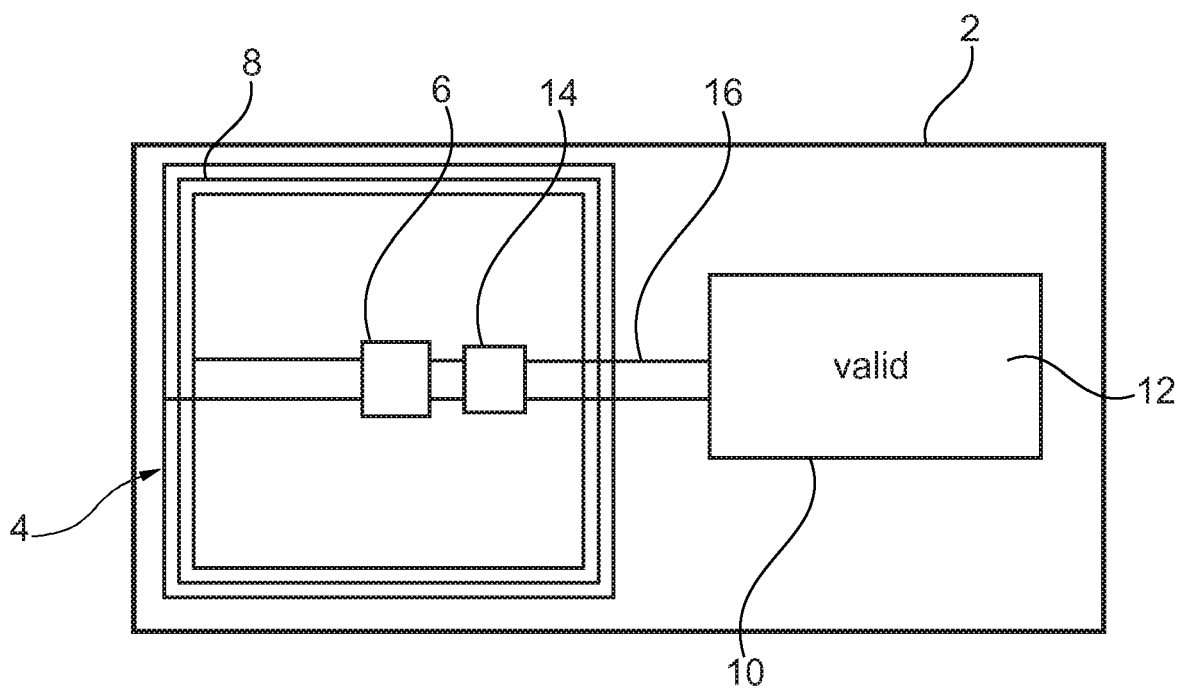


Fig. 1



EUROPEAN SEARCH REPORT

Application Number
EP 09 16 9671

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 January 2010	Examiner Espuela, Vicente
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 16 9671

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