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(71) Applicant and

(72) Inventor: **BEAK, Gy Young** [KR/KR]; 5-302, Hungjin Villa, 121-42, Birae-dong, Daedeok-gu, Daejeon 306-030 (KR).

(74) Agents: **JUNG, Yong-Joo** et al.; 504, Joeeun-Leaderstel, 921, Doosan-dong, Seo-gu, Daejeon 302-828 (KR).

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(54) Title: PUZZLE TYPED KEYCODE WITH IMAGE, AND SECURITY SYSTEM AND METHOD USING IT

(57) Abstract: Disclosed is an image puzzle-type keycode, and a system and a method for securing information. In the system and method for securing an image using the image puzzle-type keycode, an original image 10 including a photograph, a picture, a character, a number, a fingerprint, or an iris image is divided into image pieces and the divided image pieces are re-arranged so as to generate a keycode image 20, and the original image 10 is restored from the keycode image 20 as necessary. Therefore, the system and method can efficiently prevent information from being leaked using the keycode image 20, thereby performing the identity identification and authentication process while maintaining the security not to disclose personal information or personal physical information such as a fingerprint, the iris of eyes.



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Description

PUZZLE TYPED KEYCODE WITH IMAGE, AND SECURITY SYSTEM AND METHOD USING IT

Technical Field

- [1] The present invention relates to an image puzzle-type keycode, and a system and a method for securing an image using the image puzzle-type keycode, and more particularly to a system and a method for securing an image using an image puzzle-type keycode in which an original image 10 including a photograph, a picture, a character, a number, a fingerprint, or an iris image is divided into image pieces and the divided image pieces are re-arranged so as to generate a keycode image 20, and then the original image 10 is restored from the keycode image 20 as necessary.

[2]

Background Art

- [3] In general, a person should present a resident registration card, a driver's license, a passport, an employee ID card, or the like in order to pass a specific place or identify the person in question. Further, the person should input one's name, address, resident registration number, authentication key, security key, or the like, or input one's physical information, such as a fingerprint, in order to use various services.
- [4] However, when the person presents an identification card or input the physical information, the personal information comes to be disclosed to the concerned parties, so that the problems occur in that another person obtains the personal information and maliciously uses the information, or uses the information in various crimes. Specifically, the once disclosed personal information is rapidly propagated online due to the development of the internet communication network, so that damage returning to the person in charge is dramatically increased.
- [5] In general, as a means for preventing copying or the forgery of the identification card (the resident registration card, a driver license, a passport, an employee ID card, or the like) or securities, a fine printing technology, such as a foil stripe insertion, a minute character, florescent ink, a pattern formation, intaglio printing, non-florescent paper, watermark, hologram, barcode, or the like, has been used. However, certain information indicated in the prints includes information that should not be disclosed in public. Therefore, the said information being disclosed to non-interested parties frequently occurs, even though the copying, or the forgery is simply prevented.
- [6] Recently, many countries intend to introduce an electronic passport in which an electronic chip including not only the face information, but also fingerprint information, is mounted. However, there is a problem in that a code of the electronic

chip is decoded so that the fingerprint information can be read. In this respect, there have been many efforts to devise an additional security means for the electronic passport. For example, there is suggested a method in which the security information is stored in a separate server and the security information is read through accessing the server based on an encryption code of the security card. However, this method has been a problem that the security information can be obtained regardless of the truth or false of the security card capable of being forged.

[7]

Disclosure of Invention

Technical Problem

[8] Therefore, an object of the present invention is to provide a system and a method for securing information using an image puzzle-type keycode which prevents another person from recognizing the security information, even though an identification card or a security card including the security information is exposed to another person.

[9] Another object of the present invention is to provide a system and a method for securing information using an image puzzle-type keycode in which the security information can be obtained only in the original identification card or security card so that the security information cannot be obtained only with an encryption code.

[10]

Technical Solution

[11] In accordance with an aspect of the present invention, there is provided a method for securing information using an image puzzle-type keycode in which an original image 10 is divided into a plurality of image pieces so as to generate a keycode image 20 with a combination of the image pieces, the method including the steps of: (P100) generating a keycode; and (P200) restoring the original image 10, the step of (P100) generating a keycode comprising the steps of: (P110) obtaining the original image 10; (P120) obtaining the plurality of image pieces divided from the original image 10 in a predetermined size; (P130) designating a keycode value and a keycode image generation pattern; and (P140) arranging the obtained image pieces along the keycode image generation pattern and generating the keycode image 20 to represent the keycode value; and the step of (P200) restoring the original image 10 including the steps of: (P210) obtaining the keycode image 20; (P220) reading the keycode image 20 and obtaining the keycode value; (P230) designating the keycode image generation pattern of step (P130) corresponding to the obtained keycode value; (P240) obtaining the plurality of image pieces divided from the keycode image 20; and (P250) re-arranging the obtained image pieces along the keycode image generation pattern so as to generate the original image 10.

- [12] The step (P100) includes the steps of: (P110) obtaining the plurality of original images 10; (P120) obtaining the image pieces for each original image 10; (P130) designating the keycode image generation pattern for every original image 10 on a single keycode value; and (P140) representing the single keycode value with the image pieces obtained from the plurality of original images 10.
- [13] In accordance with another aspect of the present invention, there is provided a system for securing information using a keycode image 20 generated with a combination of a plurality of image pieces divided from an original image 10, the system comprising an original image restoring device 600, the original image restoring device 600 including: a keycode image obtaining unit 220 for obtaining the keycode image 20 as a digital data; a keycode reading unit 230 for obtaining a keycode value from the data of the photographed keycode image 20; a keycode image puzzling unit 240 for dividing the keycode image 20 and generating image pieces; a pattern storing unit 520 for storing a keycode image generation pattern, in which the used keycode value is divided into a plurality of classification groups and the keycode image generation pattern is designated for each classification group; an image restoring unit 270 for restoring the original image 10 from the generated image pieces according to the keycode image generation pattern; an original image output unit 280 for outputting the restored original image 10; and an original image restoration controlling unit 610 for controlling operations of the said elements, reading the keycode value from the keycode image 20 through the keycode image obtaining unit 220 so as to read the corresponding keycode image generation pattern from the pattern storing unit 520, puzzling the keycode image 20 into the image pieces, restoring the original image 10 according to the read keycode image generation pattern, and outputting the restored original image 10 through the original image output unit 280.
- [14] In accordance with another aspect of the present invention, there is provided a system for securing information using an image puzzle-type keycode in which a keycode registration terminal 100, an image restoring terminal 200, and a keycode assembling server 300 communicate through a communication network 320 and the keycode assembling server 300 is connected to a keycode database 310, the system including: the keycode registration terminal 100 for dividing an original image 10 in a pre-determined size so as to generate a plurality of image pieces, arranging the plurality of image pieces according to a designated keycode image generation pattern to represent the keycode value so as to generate the keycode image 20, outputting the generated keycode image 20 to be used by a user, and receiving the keycode image generation pattern from the keycode assembling server 300 through the communication network 320; the image restoring terminal 200 for obtaining the keycode value from the data of a photographed keycode image 20, transmitting the obtained keycode value to the

keycode assembling server 300, receiving the keycode image generation pattern corresponding to the keycode value, and re-arranging the image pieces included in the photographed keycode image 20 according to the received keycode image generation pattern, so as to restore the original image 10; the keycode database 310 for storing the keycode value used in the keycode registration terminal 100 and the image restoring terminal 200 and information on the corresponding keycode image generation pattern; and a keycode assembling server 300 for designating the keycode image generation pattern corresponding to the keycode if a registration of the keycode is requested from the keycode registration terminal 100 so as to transmit the designated keycode image generation pattern to the keycode registration terminal 100 and to store the designated keycode image generation pattern to the keycode database 310, reading the corresponding keycode image generation pattern from the keycode database 310 if the keycode value is transmitted from the image restoring terminal 200 so as to transmit the read keycode image generation pattern to the image restoring terminal 200.

Advantageous Effects

- [15] As described above, the information of the original image including the photograph, the picture, the character, the number, the fingerprint, or the iris image is printed on the identification card or is stored in a memory-type card in the form of the keycode image incapable of being recognized by another person so that the security information can be prevented from being disclosed to another person and the person can safely use the identification card or the credit card.
- [16] Further, the image pieces of the original image are included in the keycode image, and the original image is restored using the image pieces included in the keycode image, so that the present invention is advantageous in that the original image cannot be obtained only with the keycode value.

[17]

Brief Description of the Drawings

- [18] The foregoing and other objects, features and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings in which:
- [19] FIG. 1 is a diagram illustrating a process of generating an image puzzle-type keycode according to a first exemplary embodiment of the present invention;
- [20] FIG. 2 is a diagram illustrating a process of generating an image puzzle-type keycode according to a second exemplary embodiment of the present invention;
- [21] FIG. 3 is a diagram illustrating a process of generating an image puzzle-type keycode according to a third exemplary embodiment of the present invention;
- [22] FIG. 4 is a diagram illustrating a process of generating an image puzzle-type keycode

according to a fourth exemplary embodiment of the present invention;

[23] FIG. 5 is a block diagram illustrating a system for securing information using an image puzzle-type keycode according to an exemplary embodiment of the present invention;

[24] FIGs. 6A and 6B are block diagrams illustrating a system for securing information using an image puzzle-type keycode according to another exemplary embodiment of the present invention;

[25] FIG. 7 is a flowchart illustrating a method for securing information using an image puzzle-type keycode according to an exemplary embodiment of the present invention; and

[26] FIG. 8 is a flowchart illustrating a method for securing information using an image puzzle-type keycode according to another exemplary embodiment of the present invention.

[27]

Best Mode for Carrying Out the Invention

[28] Hereinafter, exemplary embodiments of the present invention will be described with reference to the accompanying drawings.

[29]

[30] Exemplary Embodiment: image puzzle-type keycode

[31]

[32] FIG. 1 is a diagram illustrating a process of generating an image puzzle-type keycode according to a first exemplary embodiment of the present invention. An original image 10-1 including a fingerprint image is divided into a plurality of image pieces having a predetermined area. The divided image pieces are arranged to generate a keycode image 20-1 represented as a barcode according to a predetermined pattern, and the completed keycode image 20-1 includes every image piece of the fingerprint. However, the image pieces are arranged according to a value of the designated pattern in sequence and the information on the original image 10-1 can be recognized only when one knows the designated pattern value. Further, the information on the predetermined pattern corresponds to a barcode value (keycode) configured with the keycode image 20-1 so as to designate the pattern with the barcode value, so that the original image 10-1 can be restored.

[33] The completed keycode image 20-1 prohibits another person from recognizing the characteristics of the fingerprint, even though the keycode image 20-1 is printed on the prints such as an identification card. The image pieces divided from the original image 10-1 can be generated as a keycode image 20-2 having the form of a specific password number, instead of the keycode image 20-1 represented as the barcode. At this time, a

series of numbers represented as the completed keycode image 20-2 comes to be a keycode value, 8801021402019, which corresponds to the pattern representing the arranging sequence of the image pieces.

[34] FIG. 2 is a diagram illustrating a process of generating an image puzzle-type keycode according to a second exemplary embodiment of the present invention, in which an original image 10-2 including a face photograph is converted into the keycode images 20-1 and 20-2 represented as the barcode or the series of numbers. The conversion process is identical to that of FIG. 1, so its description will be omitted. The original image 10 can include any one of a photograph, a picture, a character, a number, the iris image, and a pattern, and the keycode image 20 can include a two-dimensional code or a character which are not shown in FIGs. 1 and 2,.

[35] FIG. 3 is a diagram illustrating a generation process of the image puzzle-type keycode according to a third exemplary embodiment of the present invention. Referring to FIG. 3, the keycode image 20-1 represented as the barcode includes three original images, i.e. the fingerprint 10-1, the face photograph 10-2, and the resident registration number 10-3. It is preferred that the image pieces divided for every original image 10-1, 10-2, and 10-3 are arranged in the single keycode image 20-1 according to the pattern designated for every original image 10-1, 10-2, and 10-3. The reason for designating the pattern for every original image 10-1, 10-2, and 10-3 is for selectively restoring the desiring original image from the keycode image 20-1 when restoring the original image. Further, the original image 10-3 including the number string of the resident registration number can be formed in various shapes depending on a font of the number so that the number image pieces having the font characteristic are arranged as they are in the keycode image 20-1 corresponding to the original image 10-3.

[36] FIG. 4 is a diagram illustrating a generation process of the image puzzle-type keycode according to a fourth exemplary embodiment of the present invention. Referring to FIG. 4, a keycode image 20-3 represented as the passport number includes two original images, i.e. the face photograph 10-2 and a number string representing characteristic information of the fingerprint. The characteristic information of the fingerprint generally includes the number string including a characteristic point of the fingerprint, a coordinate of the characteristic point, and an angle of the characteristic point. That is, the method for recognizing the fingerprint is implemented through contrasting the characteristic of the fingerprint located on the characteristic point in the inputted actual fingerprint image for the characteristic information. Therefore, the characteristic information of the restored fingerprint can be used through incorporating with a conventional fingerprint recognizing device.

[37]

[38] Exemplary Embodiment: System for securing information

[39]

[40] FIG. 5 is a block diagram illustrating a system for securing information using the image puzzle-type keycode according to an exemplary embodiment of the present invention. Referring to FIG. 5, the system for securing information of the present invention includes a keycode registration terminal 100 generating the keycode image 20 from the original image 10, an image restoration terminal restoring the original image 10 from the keycode image 20, a keycode database 310 storing the keycode value and keycode image generation pattern information, and a keycode assembling server 300 providing the keycode registration terminal 100 and the image restoring terminal 200 with the information through a communication network 320 according to the keycode database 310.

[41] The aspect of registering the keycode and restoring the original keycode from the keycode value and the keycode image 20 information by the configurations of FIG. 5 will be described.

[42] First, an original image obtaining unit 120 receives the original image 10 desired to be keycoded by in the keycode registration terminal 100, and an original image puzzling unit 130 divides the original image 10 in a predetermined size so as to generate the plurality of image pieces, in which the image pieces are assigned the value of the coordinate located on the original image 10.

[43] Then, the keycode value is inputted through a key input unit 150, and the keycode value is transmitted to the keycode assembling server 300 through the communication network 320 so as to request the keycode image generation pattern. Then, the keycode assembling server 300 receiving the request signal generates the keycode image generation pattern so as to transmit the generated keycode image generation pattern to the keycode registration terminal 100. At this time, the keycode assembling server 300 stores the received keycode value and the generated keycode image generation pattern to the keycode database 310. In a case where the plural original images 10 are inputted from the original image obtaining unit 120 so as to generate the image pieces for every original image 10, and an identifier for every original image 10 have been inputted from the key input unit 150, the keycode value and the identifiers are transmitted to the keycode assembling server 300, the keycode assembling server 300 generates and transmits the keycode image generation pattern for each identifier, and the keycode value, the identifiers, and the keycode image generation pattern are stored in the keycode database 310. At this time, the keycode image generation pattern includes information that the coordinate value of the image pieces generated in the original image puzzling unit 130 on the original image 10 one-to-one matches the coordinate value on the keycode image 20 corresponding to the keycode value.

- [44] The keycode registration terminal 100 re-arranges the image pieces generated in the original image puzzling unit 130 according to the keycode image generation pattern received from the original image puzzling unit 130 so as to generate the keycode image 20.
- [45] Further, the generated keycode image 20 is outputted to be printed on the prints or stored in the storing medium.
- [46] The keycode image 20 generated by the keycode registration terminal 100 is printed on personal things, or stored in a memory as a data. A process of authorizing the keycode image 20 included in the personal things is performed by the image restoring terminal 200.
- [47] First, the image restoring terminal 200 receives the keycode image 20 as the digital data through the keycode image obtaining unit 220, a keycode decoding unit 230 decodes the keycode image 20 so as to obtain the keycode value, and the keycode value is transmitted to the keycode assembling server 300 through the communication network 320 so as to request the corresponding keycode image generation pattern.
- [48] Then, the keycode assembling server 300 reads the keycode image generation pattern corresponding to the received keycode value from the keycode database 310 so as to transmit it to the image restoring terminal 200. If the keycode image 20 includes the plural original images so that the plural numbers of keycode image generation patterns corresponding to the keycode value are stored, the keycode assembling server 300 also reads the keycode image generation pattern and the corresponding identifier so as to transmit them to the image restoring terminal 200.
- [49] The image restoring terminal 200 receives the transmitted keycode image generation pattern, the keycode image puzzling unit 240 divides the keycode image 20 data so as to generate the image piece data, and assigns the coordinate value of the location of the image piece on the keycode image 20 for every image piece.
- [50] The image restoring unit 270 re-arranges the image pieces according to the received keycode image generation pattern so that the image pieces are restored to the data of the original image 10. If there is the plurality of received keycode image generation patterns and the corresponding identifiers are received, the user selects the identifier through a control input unit 250, and the corresponding image pieces are extracted with the corresponding keycode image generation pattern so that only the original image 10 corresponding to the selected identifier is restored.
- [51] The restored original image 10 is outputted through an original image output unit 280 to be delivered to a display unit or another authentication apparatuses.
- [52] FIGs. 6A and 6B are block diagrams illustrating the system for securing information using the image puzzle-type keycode according to another exemplary embodiment of the present invention. The system for securing information of FIG. 5 is implemented

online so that the system manages the keycode information through the server, but the system for securing information of FIGs. 6A and 6B is implemented offline. That is, the system for securing information of FIGs. 6A and 6B includes a keycode generating device 500 obtaining the original image 10 and generating the keycode image according to the designated keycode image generation pattern and an original image restoring device 600 restoring the original image 10 from the used keycode image 20 according to the designated keycode image generation pattern.

- [53] The configurations of the keycode generating device 500 and the original image restoring device 600 identical to those of FIG. 5 will be briefly described, and it will be described with emphasis on the characteristics of the configurations of the keycode generating device 500 and the original image restoring device 600.
- [54] First, a keycode generation controlling unit 510 of the keycode generating device 500 makes the original image puzzling unit 130 generate the image pieces from the original image 10 data obtained by the original image obtaining unit 120, and receives the keycode value through the key input unit 160. Then, the keycode generation controlling unit 510 of the keycode generating device 500 obtains the keycode image generation pattern corresponding to the keycode value from a pattern storing unit 520 so as to generate and output the keycode image 20.
- [55] Next, an original image restoration controlling unit 610 of the original image restoring device 600 obtains the keycode image 20 data of the user through the keycode image obtaining unit 220, obtains the keycode value through the keycode decoding unit 230, and obtains the keycode image generation pattern corresponding to the keycode value from the pattern storing unit 520. Further, the keycode image puzzling unit 240 generates the image pieces from the keycode image 20 data so that the image restoring unit 270 restores the original image 10 according to the keycode image generation pattern.
- [56] It is preferred that the pattern storing unit 520 divides the inputted keycode values to be used, in which the keycode values are divided into a plurality of classification groups so as to store the keycode image generation pattern designated for each classification group. That is, the pattern storing unit 520 of the original image restoring device 600 and the pattern storing unit 520 of the keycode generating device 500 should store the identical keycode image generation pattern corresponding to the identical keycode so that the keycode image generation pattern with respect to the keycode to be used should be designated in advance.
- [57] Further, the conversion of the plurality of original images 10 into the single keycode image 20 can be accomplished by the aspect described in FIG. 5. That is, the identifiers are inputted through the key input unit 160 and the control input unit 250 so that the keycode image generation pattern is designated for every original image 10.

[58]

[59] Exemplary Embodiment: Method for securing information

[60]

[61] FIG. 7 is a flowchart illustrating a method for generating the keycode and restoring the original image in the method for securing information using the image puzzle-type keycode according to an exemplary embodiment of the present invention. Referring to FIG. 7, the image puzzle-type keycode can be generated S100 by the keycode assembling server 300 and the keycode registration terminal 100 according to the exemplary embodiment of FIG. 5, and by the keycode generating device 500 shown in FIG. 6.

[62] First, the original image 10 is photographed or scanned so as to be image-processed, or the original image 10 data stored in the memory as the digital data is inputted, so that the original image is obtained S110.

[63] The obtained original image 10 is divided into the plurality of image pieces having a predetermined size, and simultaneously the coordinate value is assigned to each of the divided image pieces to be identified S120.

[64] At this time, it is preferred that the image pieces configured with a background image which does not characterize the original image 10 is not assigned the coordinate value. For example, a background except for the face image in an identification photograph is not the information characterizing the identification photograph and also only the outline of the character or the number represents the real information in the original image 10 configured with the characters or the numbers, so that it is preferred that the image pieces including the background should be excluded.

[65] Next, the keycode value to be represented as the keycode image 20 and the pattern along which the divided image pieces are arranged to complete the keycode image are designated, and the designated keycode value and pattern are stored in the database S130. The keycode value is a unique code assigned to the original image 10 so that it is preferred that the keycode value of the original image 10 is distinguishably designated from the value of another original image. Further, it is preferred that the pattern along which the divided image pieces are arranged is designated as the pattern generated through a random-number generator not to be designated in only the uniform pattern or is designated in the randomly selected patterns as necessary after generating the plurality of patterns in advance, thereby ensuring the security. At this time, the pattern includes the coordinate value designated for each image piece in step S120 and the coordinate value on the keycode image 20 corresponding to each image piece.

[66] The image pieces obtained in step S120 are arranged along the pattern selected in step S130 so as to generate the keycode image 20 to represent the keycode value S140. That is, the image pieces are arranged on the location of the keycode image 20

according to the keycode image generation pattern one to one, and the completed keycode image 20 represents the value of the selected keycode.

[67] The keycode image 20 completed in step S140 is outputted to be printed on the identification card, the securities, or the like, or stored in a magnetic card, a smart card, or an RFID tag, so that the user can use the keycode image in real life.

[68] A method S200 for restoring the original image 10 from the image puzzle-type keycode generated by the above method includes the steps of reading the keycode image 20 so as to obtain the keycode value, designating the keycode image generation pattern corresponding to the obtained keycode value, and restoring the original image 10 from the image pieces included in the keycode image 20 by an inverse process of the pattern.

[69] To explain in more detail, first, the keycode image 20 represented on the prints are obtained through photographing or scanning or the keycode image 20 data stored in the magnetic card, the smart card, or the RFID tag is obtained S210.

[70] Next, the keycode value is read from the obtained keycode image 20 S220. In general, the keycode image 20 obtained from the prints is image-processed so that the keycode value is read, and the keycode image 20 data stored in the magnetic card, the smart card, or the RFID tag are analyzed so that the keycode value is read.

[71] After performing the step of reading, the keycode image pattern of step S130 corresponding to the read keycode value is designated S230. The pattern is stored in the database to one-to-one correspond to the keycode value so that the keycode image generation pattern selected in step S130 can be recognized with the keycode value serving as a searching value.

[72] Next, the keycode image 20 is divided in the size of the image piece used in step S120 so as to obtain the plural image pieces, and at the same time, the divided image pieces are designated the coordinate value, respectively, to be distinguished S240.

[73] Finally, the obtained image pieces are re-arranged in the inverse of the pattern so as to complete the original image 10 S250. That is, the coordinates of the image piece on the original image 10 correspond to the coordinates of the image piece on the keycode image 20 so as to generate the keycode image 20 in step S140, while the coordinate of the image piece on the keycode image 20 corresponds to the coordinate of the image piece on the original image 10 so as to restore the original image 10.

[74] After performing the step S250, the user can identify the restored original image 10. In the case of the method S200 for restoring the original image 10 being applied to the fingerprint recognition of the electronic passport, the original image 10 is restored from the keycode image 20 obtained in the electronic passport by the method, the fingerprint of the possessor of the electronic passport is obtained through the fingerprint recognition device, and the obtained fingerprint or the photograph is

mutually contrasted with the original image by the electronic manner or the naked eyes so that it is possible to identify the identity of the possessor of the electronic passport.

[75] FIG. 8 is a flowchart illustrating the method for securing information using the image puzzle-type keycode according to another exemplary embodiment of the present invention. Referring to FIG.8, the method for securing the information is implemented through converting the plural original images 10 into the single keycode image 20 and selectively extracting and restoring only the desired original image 10 from the keycode image 20. The description of the steps of the method of FIG. 8 identical to those of FIG. 7 will be omitted.

[76] First, in the step S300 of generating the keycode, the plural original images are inputted, respectively, S310, a group of the plural image pieces divided in the pre-determined size is obtained S320, and the used keycode value is designated, and the identifier and the keycode image generation pattern for each original image 10 are designated S330. Then, the group of the image pieces is arranged along the keycode image generation pattern so as to generate the keycode image 20 to represent the keycode value. That is, the keycode image 20 represents the keycode value with its outline.

[77] Next, in the step S400 of restoring the original image, the data of the keycode image 20 is obtained S410 to be read so that the keycode value is obtained S420, and the keycode image generation patterns corresponding to the keycode value are called S431. Further, the keycode image generation pattern desired by the user is designated for each identifier S432, the keycode image 20 is divided into the image piece having the predetermined size so as to extract only the image piece corresponding to the keycode image generation pattern S440, and the extracted image pieces are re-arranged S450 so as to generate the original image 10.

[78] In the exemplary embodiment of FIG. 7 or FIG. 8, the data representing the information of the keycode image generation pattern can include the keycode value. The keycode value of step S130 of FIG. 7 or step S330 of FIG. 8 is designated as the data representing the keycode image generation pattern, and the keycode image generation pattern in step S230 or step S430 is designated as the keycode value read in step S220 or step S420.

[79]

[80] Although several exemplary embodiments of the present invention have been described for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

- [1] A method for securing information using an image puzzle-type keycode in which an original image 10 is divided into a plurality of image pieces so as to generate a keycode image 20 with a combination of the image pieces, the method comprising the steps of:
(P100) generating a keycode; and
(P200) restoring the original image 10,
the step of (P100) generating a keycode comprising the steps of:
(P110) obtaining the original image 10;
(P120) obtaining the plurality of image pieces divided from the original image 10 in a predetermined size;
(P130) designating a keycode value and a keycode image generation pattern; and
(P140) arranging the obtained image pieces along the keycode image generation pattern and generating the keycode image 20 to represent the keycode value; and
the step of (P200) restoring the original image 10 comprising the steps of:
(P210) obtaining the keycode image 20;
(P220) reading the keycode image 20 and obtaining the keycode value;
(P230) designating the keycode image generation pattern of step (P130) corresponding to the obtained keycode value;
(P240) obtaining the plurality of image pieces divided from the keycode image 20; and
(P250) re-arranging the obtained image pieces along the keycode image generation pattern so as to generate the original image 10.
- [2] The method as claimed in claim 1, wherein step (P100) comprises the steps of:
(P110) obtaining the plurality of original image 10s;
(P120) obtaining the image pieces for each original image 10;
(P130) designating the keycode image generation pattern for every original image 10 on a single keycode value; and
(P140) representing the single keycode value with the image pieces obtained from the plurality of original images 10.
- [3] The method as claimed in claim 1 or 2, wherein, in step (P130), the keycode image generation pattern includes location information of the image pieces divided from the original image 10 and location information of the image pieces on the keycode image 20, and is established as a database together with the designated keycode value to be stored, and in step (P230), the keycode image generation pattern corresponding to the keycode value is read from the database.
- [4] The method as claimed in claim 3, wherein the original image 10 includes one or

more of a photograph, a picture, characters, numbers, a fingerprint, and an iris image, and the keycode image 20 includes one or more of a barcode, a two-dimensional code, characters, and numbers.

- [5] The method as claimed in claim 4, wherein, in step (P120), the image pieces are obtained excluding a background which does not represent characteristic information of the original image 10.
- [6] The method as claimed in claim 4, wherein, in step (P130), the keycode is classified according to a predetermined reference and the keycode included in an identical keycode classification group is designated the identical keycode image generation pattern.
- [7] The method as claimed in claim 4, wherein, in step (P140), the generated keycode image 20 is printed on prints or stored in a magnetic card, a smart card, or an RFID tag.
- [8] The method as claimed in claim 4, wherein, in step (P130), a data representing the keycode image generation pattern is designated as the keycode value and in step (P230), and the keycode value obtained in step (P220) is designated as the keycode image generation pattern.
- [9] A system for securing information using a keycode image 20 generated with a combination of a plurality of image pieces divided from an original image 10, the system comprising an original image restoring device 600, the original image restoring device 600 comprising:
 - a keycode image obtaining unit 220 for obtaining the keycode image 20 as a digital data;
 - a keycode reading unit 230 for obtaining a keycode value from the data of the photographed keycode image 20;
 - a keycode image puzzling unit 240 for dividing the keycode image 20 and generating image pieces;
 - a pattern storing unit 520 for storing a keycode image generation pattern, in which the used keycode value is divided into a plurality of classification groups and the keycode image generation pattern is designated for each classification group;
 - an image restoring unit 270 for restoring the original image 10 from the generated image pieces according to the keycode image generation pattern;
 - an original image output unit 280 for outputting the restored original image 10;
 - and
 - an original image restoration controlling unit 610 for controlling operations of the said elements, reading the keycode value from the keycode image 20 through the keycode image obtaining unit 220 so as to read the corresponding keycode

image generation pattern from the pattern storing unit 520, puzzling the keycode image 20 into the image pieces, restoring the original image 10 according to the read keycode image generation pattern, and outputting the restored original image 10 through the original image output unit 280.

- [10] The system as claimed in claim 9, wherein the keycode image 20 is generated by a keycode generating device 500 in which the keycode generating device comprises:
- an original image obtaining unit 120 for obtaining the original image 10 as a digital data;
 - an original image puzzling unit 130 for dividing the obtained original image 10 in a predetermined size so as to generate the plurality of image pieces;
 - a key input unit 150 for inputting the keycode value represented as the keycode image 20;
 - the pattern storing unit 520 for storing a keycode image generation pattern, in which the inputted and used keycode value is divided into the plurality of classification groups and the keycode image generation pattern is designated for each classification group;
 - a keycode image generating unit 140 for arranging the image pieces generated in the image puzzling unit along the keycode image generation pattern so as to generate the keycode image 20 to represent the keycode value;
 - a keycode image output unit 180 for outputting the generated keycode image 20 to be used by a user; and
 - a keycode generation controlling unit 510 for controlling operations of the said elements, puzzling the original image 10 obtained through the original image obtaining unit 120 into the image pieces, obtaining the keycode image generation pattern corresponding to the keycode value from the pattern storing unit 520 so as to generate the keycode image 20, and outputting the generated keycode image 20 through the keycode image output unit 180.

- [11] A system for securing information using an image puzzle-type keycode in which a keycode registration terminal 100, an image restoring terminal 200, and a keycode assembling server 300 communicate through a communication network 320 and the keycode assembling server 300 is connected to a keycode database 310, the system comprising:
- the keycode registration terminal 100 for dividing an original image 10 in a predetermined size so as to generate a plurality of image pieces, arranging the plurality of image pieces according to a designated keycode image generation pattern to represent the keycode value so as to generate the keycode image 20, outputting the generated keycode image 20 to be used by a user, and receiving

the keycode image generation pattern from the keycode assembling server 300 through the communication network 320;
 the image restoring terminal 200 for obtaining the keycode value from the data of a photographed keycode image 20, transmitting the obtained keycode value to the keycode assembling server 300, receiving the keycode image generation pattern corresponding to the keycode value, and re-arranging the image pieces included in the photographed keycode image 20 according to the received keycode image generation pattern, so as to restore the original image 10;
 the keycode database 310 for storing the keycode value used in the keycode registration terminal 100 and the image restoring terminal 200 and information on the corresponding keycode image generation pattern; and
 a keycode assembling server 300 for designating the keycode image generation pattern corresponding to the keycode if a registration of the keycode is requested from the keycode registration terminal 100 so as to transmit the designated keycode image generation pattern to the keycode registration terminal 100 and to store the designated keycode image generation pattern to the keycode database 310, reading the corresponding keycode image generation pattern from the keycode database 310 if the keycode value is transmitted from the image restoring terminal 200 so as to transmit the read keycode image generation pattern to the image restoring terminal 200.

[12] The system as claimed in claim 11, wherein the keycode registration terminal 100 comprises:

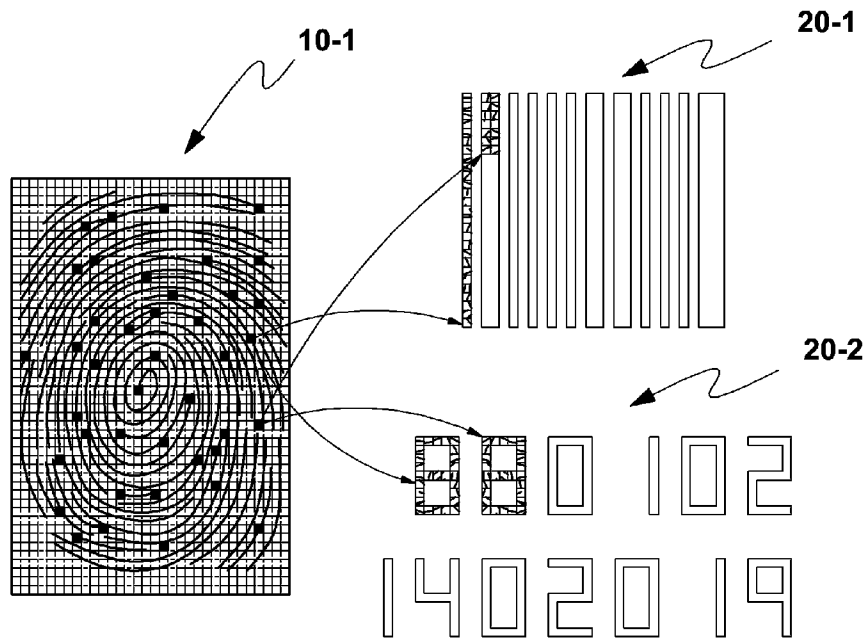
an original image obtaining unit 120 for obtaining the original image 10 as a digital data;
 an original image puzzling unit 130 for dividing the obtained original image 10 in a predetermined size so as to generate the plurality of image pieces;
 a key input unit 150 for inputting a keycode value represented as the keycode image 20;
 an interface unit 160 for transmitting the inputted keycode value to the keycode assembling server 300 through the communication network 320 and receiving the corresponding keycode image generation pattern;
 a keycode image generating unit 140 for arranging the image pieces generated in the image puzzling unit along the keycode image generation pattern so as to generate the keycode image 20 to represent the keycode value;
 a keycode image output unit 180 for outputting the generated keycode image 20 to be used by a user; and
 a registration terminal controlling unit 110 for controlling operations of the said elements, puzzling the original image 10 obtained through the original image

obtaining unit 120 into the image pieces, receiving the keycode value, making the interface unit 160 request and receive the keycode image generation pattern corresponding to the keycode value and to generate the keycode image 20, and outputting the generated keycode image 20 through the keycode image output unit 180.

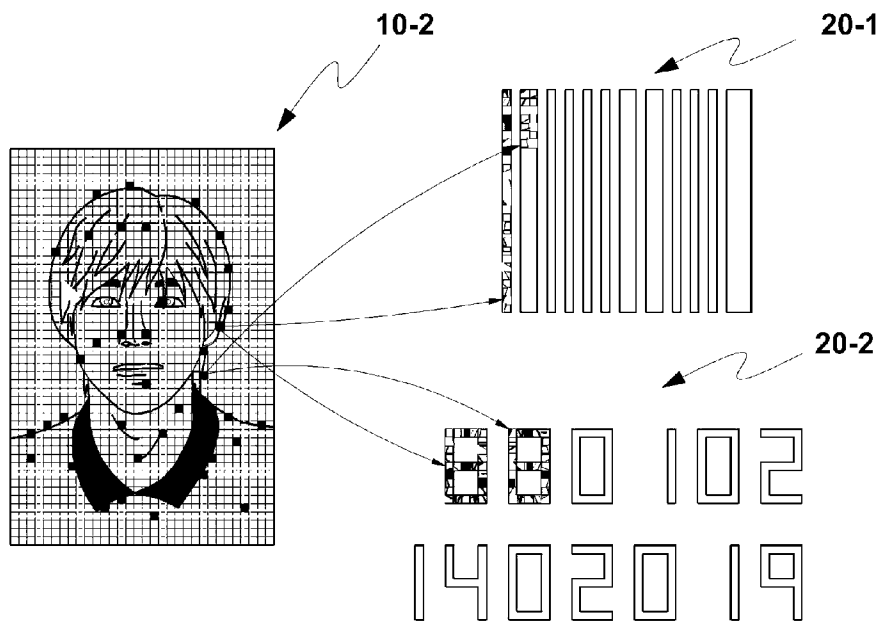
- [13] The system as claimed in claim 11, wherein the image restoring terminal 200 comprises:
a keycode image obtaining unit 220 for obtaining the keycode image 20 as a digital data;
a keycode reading unit 230 for obtaining the keycode value from the data of the photographed keycode image 20;
an interface unit 260 for requesting and receiving the keycode image generation pattern for the keycode value from the keycode assembling server 300 through the communication network 320;
a keycode image puzzling unit 240 for dividing the keycode image 20 and generating image pieces;
an image restoring unit 270 for restoring the original image 10 from the generated image pieces according to the keycode image generation pattern;
an original image output unit 280 for outputting the restored original image 10;
and
a controller 210 for controlling operations of the said elements, reading the keycode value from the keycode image 20 obtained through the keycode image obtaining unit 220, making the interface unit 260 request and receive the keycode image generation pattern corresponding to the read keycode, puzzling the keycode image 20 into the image pieces, restoring the original image 10 according to the keycode image generation pattern, and outputting the restored original image 10 through the original image output unit 280.
- [14] The system as claimed in one of claim 9 to 13, wherein the original image 10 includes one or more of a photograph, a picture, characters, numbers, a fingerprint, and an iris image, and the keycode image 20 includes one or more of a barcode, a two-dimensional code, characters, and numbers.
- [15] The system as claimed in claim 14, wherein, in the keycode registration terminal 100 or the keycode generating device 500, if the plurality of original images 10 is obtained from the original image obtaining unit 120 and an identifier for each original image 10 is received from the key input unit 150, the keycode image generation pattern is generated for each identifier.
- [16] The system as claimed in claim 15, wherein the image restoring terminal 200 or the original image restoring device 600 further comprises a control input unit 250

for selecting the identifier corresponding to the original image 10 desired to be restored in the keycode image 20 including the plurality of original images 10, in which the identifier for the original image 10 desired to be restored is selected by the control input unit 250 and the original image 10 is extracted from the keycode image 20 with the corresponding keycode image generation pattern so as to restore the original image 10.

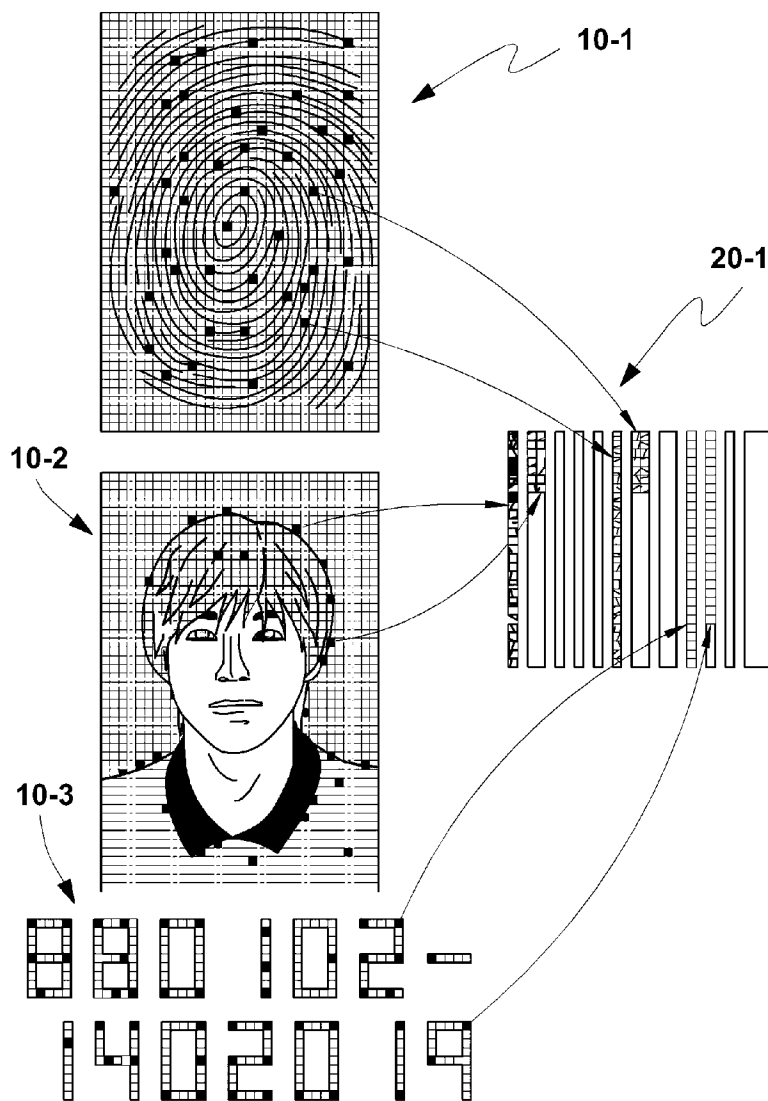
[Fig. 1]



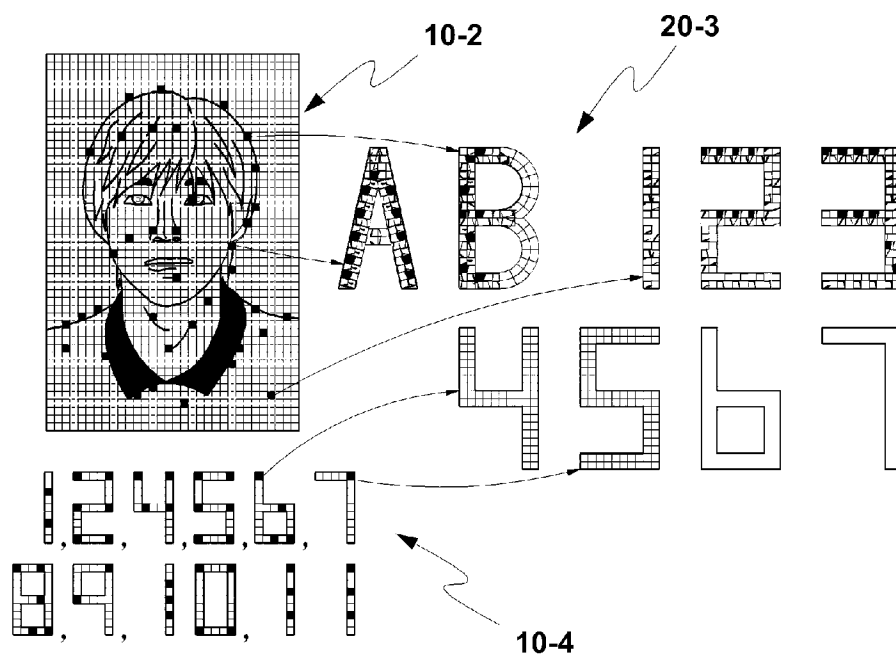
[Fig. 2]



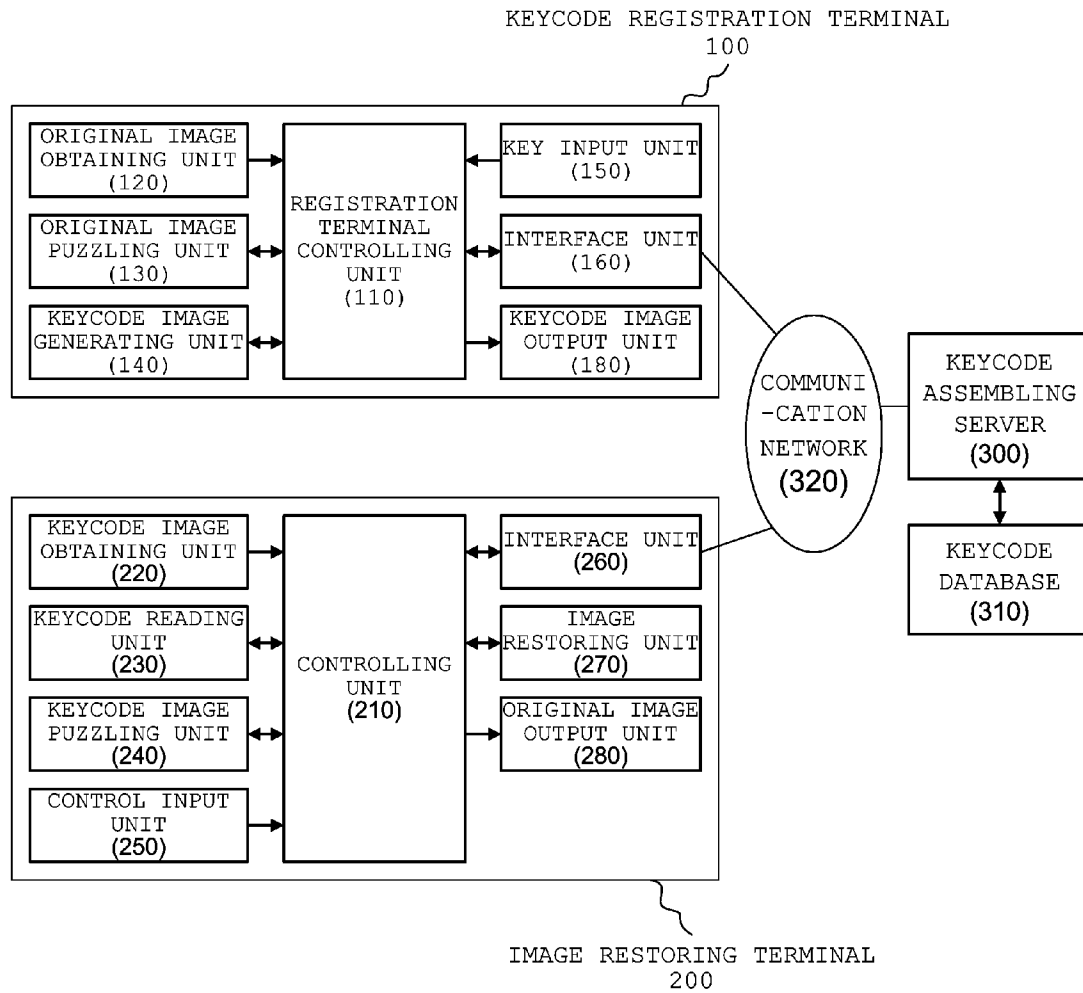
[Fig. 3]



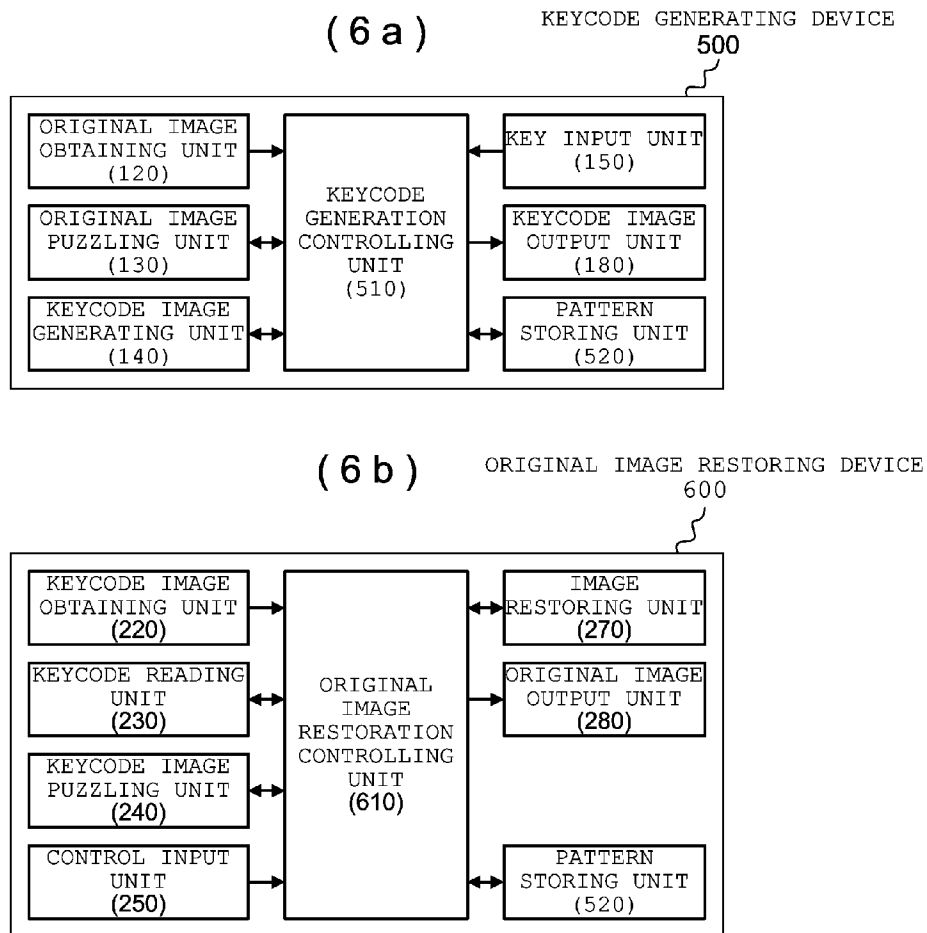
[Fig. 4]



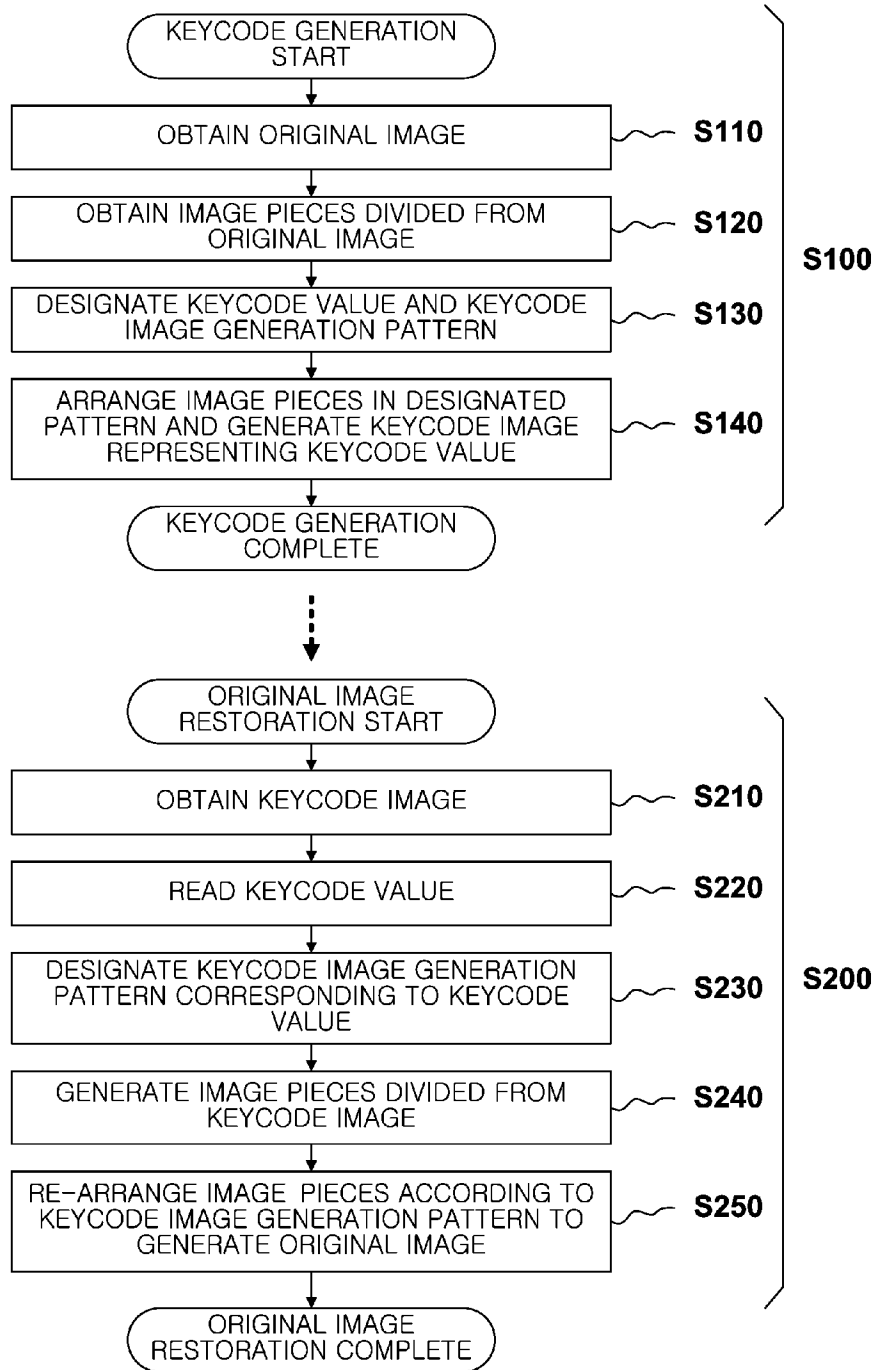
[Fig. 5]



[Fig. 6]



[Fig. 7]



[Fig. 8]

