Claims:

1. A graphical watermark, comprising:

a plurality of graphical markers, the plurality of graphical markers carrying position and pose information and further carrying identity information of the graphical watermark; and

a watermark pattern provided between a pair of graphical markers;

wherein each graphical marker does not have a rotation symmetry.

2. The graphical watermark according to claim 1, wherein a sub-region bounded by the pair of graphical markers has a flat surface when the graphical watermark is applied onto a non-flat surface.

3. The graphical watermark according to claim 1, further comprising:

a QR code, wherein the identity information of the graphical watermark is encoded in the QR code.

4. The graphical watermark according to claim 1, wherein the identity information is split into a plurality of portions and each portion is embedded into one graphical marker.

5. The graphical watermark according to claim 1, wherein the position information is configured to indicate a relative position of the graphical marker in the graphical watermark, the pose information is configured to indicate an orientation of the graphical marker in the graphical watermark, and the identity information is configured to construct the graphical watermark.

6. A method for generating a graphical watermark, comprising:

generating a plurality of graphical markers, the plurality of graphical markers carrying position and pose information and further carrying identity information of the graphical watermark, a pair of graphical markers bound a sub-region having a flat surface;

generating a watermark pattern and providing the watermark pattern between the pair of graphical markers to form the graphical watermark;

wherein each graphical marker does not have a rotation symmetry.

7. The method according to claim 6, further comprising:

generating a QR code carrying identity information of the graphical watermark.

8. The method according to claim 7, wherein the generating the watermark pattern and providing the watermark pattern between the pair of graphical markers to form the graphical watermark comprises:
generating a secret key;
computing a hash function of the QR code or the identity information in the QR code by means of the secret key;
obtaining a random number generator by a digest from the hash function;
generating the graphical watermark by the random number generator.

9. The method according to claim 8, further comprising:
encrypting the secret key by a storage key; and
storing the encrypted secret key into a database.

10. The method according to claim 6, further comprising:
encrypting the graphical watermark by using a public key of a recipient;
transmitting the encrypted graphical watermark to the recipient for printing.

11. The method according to claim 6, further comprising:
storing the generated graphical watermark in a server as a watermark reference, after generating the watermark pattern and providing the watermark pattern between the pair of graphical markers to form the graphical watermark.

12. The method according to claim 6, wherein the generating a plurality of graphical markers carrying position and pose information and identity information of the graphical watermark further comprises:
acquiring the identity information of the graphical watermark from a server;
splitting the identity information into a plurality of portions;
adding an additional bit of data to each portion such that each portion has a data sequence with a preset number of bits;
converting each portion into a corresponding graphical marker.

13. The method according to claim 12, wherein a data sequence of one of the plurality of portions comprises header information which is configured to indicate a type of the graphical watermark, a total number of the portions.

14. The method according to claim 13, wherein the type of the graphical watermark comprises an arrangement of the plurality of graphical markers.

15. A method for authenticating a graphical watermark, comprising:
acquiring identity information of a graphical watermark by scanning the graphical watermark;
constructing a watermark reference according to the identity information;
detecting a plurality of graphical markers of the graphical watermark, acquiring position and pose information of each graphical marker, wherein the plurality of graphical markers carry the position and pose information and further carry the identity information of the graphical watermark;
pairing up the detected graphical markers according to the position and pose information of each graphical marker, and computing a similarity or correlation score of a watermark pattern bounded by a pair of graphical markers according to the watermark reference; and
determining whether the graphical watermark is authentic according to the similarity or correlation score;
wherein each graphical marker does not have a rotation symmetry.

16. The method according to claim 15, wherein the acquiring identity information of a graphical watermark by scanning the graphical watermark comprises: acquiring and combining identity information split and encoded in the plurality of graphical markers of the graphical watermark.

17. The method according to claim 15, wherein the graphical watermark comprises a QR code, and the acquiring identity information of a graphical watermark by scanning the graphical watermark comprises: acquiring the identity information from a server by scanning the QR code of the graphical watermark.

18. The method according to claim 15, wherein the acquiring position and pose information of each graphical marker comprises:
acquiring parameters from the server according to the identity information, wherein the parameters comprise an amount of zoom, and position and pose information of the graphical markers.

19. The method according to claim 15, wherein the computing a similarity or correlation score of a watermark pattern bounded by a pair of graphical markers according to the watermark reference comprises:
computing a perspective transformation matrix according to coordinates of two corners of a first graphical marker which are adjacent to a second graphical marker and coordinates of two corners of the second graphical marker which are adjacent to the first graphical marker, wherein the first graphical marker and the second graphical marker form the pair of graphical markers;
correcting a perspective distortion of a sub-region in the graphical watermark bounded by the pair of graphical markers by using the perspective transformation matrix;
acquiring a corresponding sub-region in the watermark reference according to the position and pose information of the pair of graphical markers;
computing the similarity or correlation score between the sub-region in the graphical watermark in which the perspective distortion is corrected and the corresponding sub-region in the watermark reference.

20. The method according to claim 15, wherein the similarity or correlation score is a percentage of values which are the same between the watermark reference and the graphical watermark in which the perspective distortion is corrected.

21. The method according to claim 15, wherein the determining whether the graphical watermark is authentic according to the similarity or correlation score comprises:
comparing the similarity or correlation score to a preset threshold, and determining the graphical watermark is authentic if the similarity or correlation score is greater than the preset threshold.

22. An apparatus for generating a graphical watermark, comprising:

a generation module configured to: generate a plurality of graphical markers, the plurality of graphical markers carrying position and pose information and further carrying identity information of the graphical watermark; generate a watermark pattern, and provide the watermark pattern between the pair of graphical markers to form the graphical watermark;
wherein each graphical marker does not have a rotation symmetry.

23. An apparatus for authenticating a graphical watermark, comprising:
an acquisition module configured to acquire identity information of a graphical watermark by scanning the graphical watermark;
a construction module configured to construct a watermark reference according to the identity information;
a detection module configured to detect a plurality of graphical markers of the graphical watermark and acquire position and pose information of each graphical marker, wherein the plurality of graphical markers carry the position and pose information and further carry the identity information of the graphical watermark;
a computation module configured to pair up the detected graphical markers according to the position and pose information of each graphical marker, and compute a similarity or correlation score of a watermark pattern bounded by a pair of graphical markers according to the watermark reference; and
a determination module configured to determine whether the graphical watermark is authentic according to the similarity or correlation score;
wherein each graphical marker does not have a rotation symmetry.