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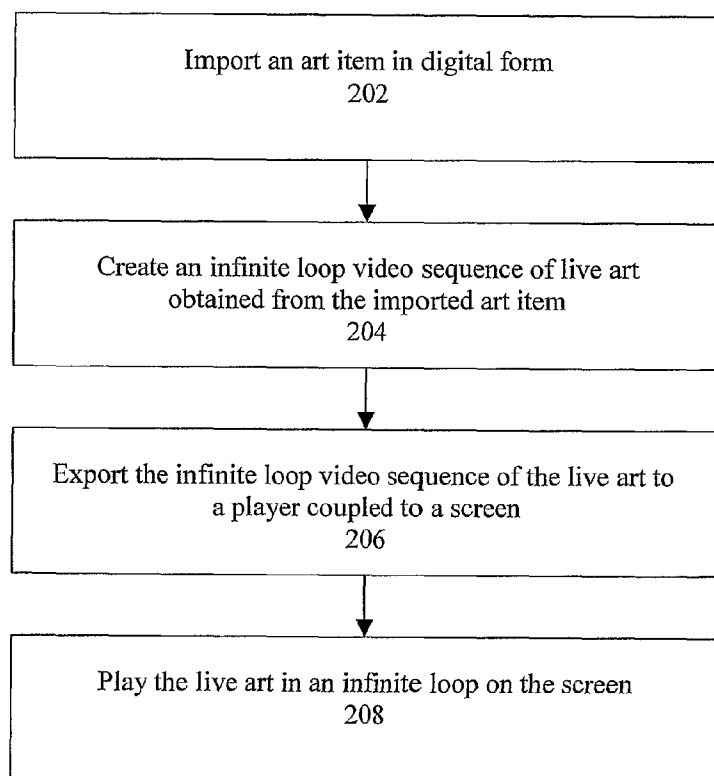
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[Continued on next page]

(54) Title: LIVE IMAGES



(57) Abstract: Methods for exhibiting a work of art as live art video sequence on a screen in an infinite loop are disclosed. In some embodiments, the work of art is a painting in digital form enlivened through animation and exhibited as a looped video sequence on the screen. In some embodiments, the work of art is a filmed video sequence arranged to form an infinite loop. In some embodiments, the work of art is encoded with a particular identification code associated with a particular screen.

FIG. 2

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## LIVE IMAGES

### FIELD OF THE INVENTION

The invention relates generally to public presentation of digital media, and in particular to the presentation of digital art brought to life on an electronic screen in an infinite loop.

### BACKGROUND OF THE INVENTION

Digital art exists and is being created in enormous volumes, yet the digital art market is very limited. Some key reasons for this situation include the ease of digital media duplication, which leads to widespread copyright violation, and a lack of a convenient way to store and present quality digital art (especially video) outside of a computer.

The display of digital art images on a TV display (or "screen") is known in the art. Hereinafter, "screen" is used to represent any type of display capable of displaying a still image or a video sequence. Encoding and decoding of digital art aimed at copyright protection is also known.

None of the known techniques allows presentation of original digital art, including still art converted into "live" video images, in a continuous, infinite loop on a TV screen. Therefore, there is a need for and it would be advantageous to have ways to display digital art on a screen in a way that would turn the screen into a live work of art (also referred to as "live image").

### SUMMARY OF THE INVENTION

The invention discloses methods for exhibiting live images of digital art on a screen in an infinite loop video sequence. In some embodiments, the digital art is a still image (such as a painting) imported into a computer, "brought to life" as a video sequence and exhibited on the screen in an infinite loop. In some embodiments, the live art is a filmed video sequence arranged to form an infinite loop and exhibited on the screen in the infinite loop. The infinite loop is characterized by the fact that the

beginning and end of the sequence merge seamlessly, without a cut. In some embodiments, the infinite loop may be achieved by animation added to the still image or to the filmed video sequence.

In some embodiments, the digital art is encoded prior to its download, then  
5 decoded for presentation and played as a video stream in an infinite loop on the screen. If the digital art originates from a still image, the video stream includes a series of frames representing live images based on the original still image. The processes for turning of a still image into a live digital art image and its presentation on the TV screen in an infinite loop are described in more detail below. In some  
10 embodiments, a player operatively coupled to the screen can receive, decode and play in any conventional format live art to be exhibited only on a specific screen. In some embodiments, the player is incorporated in the screen. In some embodiments, the screen and/or player include a memory and a mechanism to access the memory. In some embodiments, the player may have an optional mode of playing automatically  
15 when the screen is turned off.

In some embodiments, there is provided a method of exhibiting art on a screen, including the steps of creating an infinite loop video sequence of the art and exhibiting the infinite loop video sequence on the screen. In some embodiments, the screen is a flat TV screen. In some embodiments, the step of creating an infinite loop  
20 video sequence includes filming a video sequence having a beginning and an end, digitizing the video sequence, and editing and optionally animating the video sequence to obtain the effect of the infinite loop. In some embodiments, the editing includes choosing a shot, duplicating the shot and merging the chosen and duplicated shots to form the infinite loop.

In some embodiments, there is provided a method of exhibiting live art on a screen, including the steps of obtaining an art item in digital form, creating an infinite loop video sequence of live art from the art item in digital form and exhibiting the infinite loop video sequence as live art on a screen in an infinite loop. In some  
25 embodiments, the step of exhibiting the infinite loop video sequence as live art on a screen in an infinite loop includes exhibiting the live art as a unique work of art by  
30 allowing the live art to be exhibited only on a particular screen.

In some embodiments, there is provided a system for exhibiting live art on a screen in an infinite loop including a screen and a player operatively coupled to the screen, the player configured to play a video sequence of live art for exhibition in an infinite loop on the screen.

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## BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

FIG. 1 shows a flow chart of one method embodiment;

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FIG. 2 shows a flow chart of another method embodiment;

FIG. 3 shows a flow chart of yet another method embodiment;

FIG. 4 shows a schematic embodiment of a process for creating a seamless transformation between two identical shots in an infinite video sequence;

FIG. 5 shows the process of filming a video sequence for an infinite loop.

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FIGS. 6A-G show an example of an art item processed for exhibition as a live art item in an infinite loop on a screen, in various frames of a video sequence.

FIG. 7 shows an embodiment of a system that can be used in the preparation and presentation of the live art images or filmed video sequences in an infinite loop.

## 20 DETAILED DESCRIPTION OF THE INVENTION

As mentioned, the invention provides methods for converting any screen, in particular a flat TV screen that may be hanged on a wall, into a "work of art", by exhibiting live digital art on the screen in one of the particular ways described below.

FIG. 1 shows a flow chart of one method embodiment. In this embodiment, an  
25 infinite loop (or "looped") video sequence is formed, by ways described in detail below, in step **102**. The infinite loop video sequence is exported to a player capable of playing the looped video sequence in step **104**, and the sequence is played in an infinite loop on the screen in step **106**. The exported video sequence may be in any type of format suitable to be played, for example AVI, MPEG, Quicktime or Flash  
30 file. An exemplary player that may play a looped video sequence in an infinite loop is the Windows Media Player of Microsoft Corporation

FIG. 2 shows a flow chart of another method embodiment. In this embodiment, a digital art item is brought-to-life and exhibited on a screen as a looped video sequence. The art item may be any work of art that can be converted into digital form, including (but not limited to) a photograph, an etching, a sculpture, a manuscript, etc. The art item is imported in a digital form in step 202. An infinite loop video sequence showing the digital art item as "live art or "live images" is formed from the digital art item in step 204. The infinite loop video sequence of the live images is exported to a player coupled to a screen in step 206, and the live art is shown on the screen in an infinite loop in step 208.

FIG. 3 shows a flow chart of yet another method embodiment. In this embodiment, a live art item is imported in digital form in step 302 and encoded with a unique identifier (ID) in step 304, in order to have it exhibited as a "one-of-a-kind" work of art on a particular screen. The unique ID may be a unique code of player (uniquely associated with a particular screen) or the screen on which the art item is to be exhibited as a one-of-a-kind art item. Exemplarily, each flat TV screen is known to have such a unique code. The encoded live art item is exported to a player associated with a particular screen in step 306. The player decodes the encoded live art item and exhibits it on the particular screen in step 308. Encoding and decoding to achieve the stated goals may be done in different ways, known in the art

In any embodiment, the live art may be stored in a live art "source" such as a storage device, on a server, on a network or on any other means from which it can be transferred to the player/screen. Exemplarily, the storage device may be a memory device such as a Sansa Take-tv device (manufactured by SanDisk Corporation), either external to, or integrated in the screen. The live art item may be protected or unprotected. If protected (as in the embodiment of FIG. 3), the appropriate unique ID, as described above, may be provided to the source. Alternatively, in some embodiments, the server or the player may detect the unique ID automatically.

**Creating a looped video sequence based on video filming**

A video sequence has a beginning and an end. An infinite loop is formed when the sequence is repeated in a way that there is a seamless transfer between repeated consecutive sequences such that no "cut" is felt. This contrasts with known repeated showings of a video sequence on a screen, where a cut between the end and a next beginning of the same sequence is always present and clearly felt. The definition of "cut" and the reason why in known art such a cut is always present is explained next.

A looped video sequence may be obtained by filming a scene ("shot"). An infinite loop in this case may be created by creating an "endless shot" i.e. a shot that one will never really know when it begins and ends, thus creating a feeling of an endless reality that exists beyond the screen. To create a regular loop, the filmed shot is duplicated and the resulting two (identical) shots are joined such that the end of the first shot is followed by the beginning of the duplicated shot. A regular loop thus formed will always have a visible "cut" between the two shots. The cut can appear for a number of reasons, mainly because between the beginning and end of the shot there may be: a) differences in the object filmed; b) differences in lighting; c) a jump in the movement; d) differences in colors, or e) differences in resolution. An endless shot requires that the end of the first shot and the beginning of the duplicate shot undergo a reciprocal transformation without feeling the "cut". This can be accomplished by either adding a video "dissolve" effect between the beginning and end of the shot or by adding an object in animation that will cover the transformation between the beginning and end of the shot. A specific example of obtaining an effect of endless shot is given with reference to FIG. 4.

FIG. 4 shows schematically a first frame (A) and a last frame (B) of a shot of children 402a-d playing. Note that there may be many other frames (not shown) between these two frames. The normal filming of the shot cannot provide a perfect match (needed for the endless shot illusion) between the beginning of the shot and its end. When the shot is duplicated, the first frame of the duplicated shot is different from the last frame of the first (filmed) shot. Therefore, the match needs to be achieved by extra measures. For example, the match may be achieved by adding a

transformation effect such as a "wipe" effect between the two shots. FIG. 4C shows a combined frame with children **402a, b** positioned as in the first frame and children **402 c, d** positioned as in the last frame. A wipe effect is illustrated by a thick black line **404** moving from the right of the frame to the left of the frame, as indicated by arrows. Line **404** need not be black. In order to hide it, an object **406**, filmed on a blue screen and entering the combined frame from the right and exiting it on the left (as also indicated by arrows) can be added as a layer above the layer of the wipe, as shown in FIG. 4D. Object **406** and wipe **404** move simultaneously. In the editing room, the blue background of object **406** can be replaced with the shot of the children. Therefore, by overlaying the wipe effect with object **406** one can hide the transition (i.e. wipe) effect (as indicated by the segmented line **404'**), hence achieving an endless shot when the sequence is played again and again. In some embodiments, animation may be added to further enhance the transition effect. Exemplarily, the animation may be carried out on a computer using animation software ("animation computer"). The wipe effect and object **406** may perform half of the transition at the end of the edited sequence and the other half at the beginning of the edited sequence. To clarify, in order that the sequence will not "jump" when played by the player, the effect that includes the wipe and the moving object will start at the end of the sequence and finish at the beginning of the sequence.

In some embodiments, the filming of the video sequence may be done using either a static camera or a moving (dynamic) camera and/or a fixed frame size. A filmed object can enter and exit a frame, or can move in a manner that will allow creation of a loop by additional animation. Exemplarily, assume the camera, frame size, background and lighting of the shot are all fixed. The shot includes a plurality of frames. The first frame filmed is a frame without the object. If an object enters the frame from left and exits from right, then enters the frame from right and exits from left, leaving an empty frame again, then the beginning of the shot and the end of the shot will be identical. When playing this shot in a loop, it will seem that the object is in a never-ending movement, entering and exiting the frame.

When both the camera and the frame size are dynamic, a smooth transformation between the beginning of the shot and its end may be achieved as



follows: 1) by providing a quick camera movement - e.g. a quick zoom, pan or tilt between the beginning and end of the shot, or 2) by adding animation between the beginning and end of the shot, as explained with reference to FIG. 4.

The process of creation of a looped video sequence based on video filming is summarized in FIG. 5. A video sequence is filmed in step 502. The filmed video is digitized to a computer in step 504. The digitized video is then edited and/or optionally animated in step 506. The editing may include choosing the desired shot and duplicating the chosen shot. Optionally, in some embodiments, the editing may also include adding a video effect such as a "dissolve" between the two shots or animation. The editing may further include fixing colors of the original shot by adjusting the contrast of the shot and adding or taking out specific colors and or adjusting the hue and/or luminance of the shot. The edited and/or optionally animated video sequence is then exported to the player (same as step 104 above) and played on the screen in an infinite loop in step 508.

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#### **Creating a looped video sequence from a static picture**

As mentioned in the embodiment of FIG. 2, the video sequence for presentation in the infinite loop on the TV screen may also be obtained from a frame of an art item in digital form (e.g. a painting). The enlivening of the painting and the creation of a looped video sequence of the enlivened painting may be accomplished exemplarily as follows. The frame is transferred to a computer and animated by animation software. Exemplarily, the animation may be done by isolating segments of the static frame and endowing the isolated segments with two dimensional or three dimensional movement, as well known in the art. In order to create the infinite loop effect, the animation may be performed in a manner such that the transformation between beginning and end of the sequence is seamless, as explained above for the filmed video sequence. The video sequence is then exported to the server and from there to the player, to a hard disk, or to an Internet site for downloading to the player.

FIG. 6 illustrates in detail this process, using a painting by Vincent Van Gogh as example. Exemplarily, the painting in digital form is transformed into a video sequence of 150 frames, only six of which are shown. The "original" painting appears

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in the first frame, FIG. 6A and in the last frame, FIG. 6G. All other frames are "brought to life" frames of the original painting, showing movement of different objects such as flowers, leaves and branches. In the original painting, FIGS. 6A and 6G, objects **602**, **603** and **604** are flowers in full bloom (full size) attached to  
5 respective branches. FIG. 6B shows frame 25, in which flowers **602** and **604** are shown falling off their respective branches, while flower **603** is still in its original place. A new bud, **604b**, has appeared on the respective branch instead of flower **604**. FIG. 6C shows frame 50, in which flowers **602** and **604** are falling further, flower **603** is still in its original place, and bud **604b** starts to grow. In FIG. 6D, frame 80, flower  
10 **602** has disappeared, a new bud **602b** has appeared on the respective branch instead of **602**, flower **603** starts falling off its respective branch, flower **604** is still falling, and bud **604b** is growing. In FIG. 6E, frame 100, flowers **603** and **604** have disappeared too, a new bud **603b** has appeared on the respective branch instead of **603**, while buds **602b** and **604b** develop into flowers. In FIG. 6F, frame 125, all three  
15 new buds (flowers) **602b**, **603b** and **604b** continue to grow, until in FIG. 6G, frame 150 (which is identical with frame 1), they return exactly to the shape and size of original flowers **602**, **603** and **604**. Consequently, when the video sequence is repeated again and again, the visual effect created is of the painting being "brought-to-life" in an endless loop. Note that in some cases, there is no need to have two  
20 identical first and last frames, but only a need that the one frame before last (149 in this example) lead naturally back to the last frame such that the transformation (merging) between sequences is smooth, with no cut.

FIG. 7 shows an embodiment of a system **700** that can be used in the preparation and presentation of the live art images or filmed video sequences in an  
25 infinite loop. System **700** includes a TV screen **702** for exhibiting the live art. Included in screen **702** is a player **704** (called here a "Live Images Device" or LID) that performs actions described above and in particular is configured for playing an infinite loop. The integration or coupling between the player and the screen may be done in various ways well known in the art. Optionally, system **700** may include a  
30 memory device **706** for storing the digital artwork or live images. Memory device **706** may be detachable or integral to screen **702**.

In use, internal LID 704 may already include at least one internal "live image" sequence. In case a user wishes to add or replace "live images" on LID 704, he/she can obtain such images from memory device 706 or from another source such as an Internet site 720 to which LID 704 is operationally connected. Memory device 706  
5 may already store numeric "live images" or be connectable to a computer 730 through which it can download the live images from the Internet.

In case a user wishes to download from the Internet a digital art work that is protected (for a "one-of-a kind" exhibit on the screen), this may be done in two ways:

- a) Using memory device 706. Device 706 is connected to computer 730. Internet  
10 site 720 will request an ID of LID 704 or serial number of screen 702 and then export to the memory device decoded art media suitable for playing only on the specific LID 704. Alternatively, the Internet site will request an ID or serial number of screen 702 and export encoded media to LID 704, which will then decode the encoded art media.
- b) Using a connection between LID 704 and the Internet site directly or through  
15 computer 730. The internet site will request an ID of LID 704 or serial number of screen 702 and then export to LID 704 decoded art media. Alternatively, the Internet site will request an ID or serial number of screen 702 and export encoded art media to the LID 704, which will then decode the encoded art media.

While the invention has been described with respect to a limited number of  
20 embodiments, it will be appreciated that many variations, modifications and other applications of the invention may be made. What has been described above is merely illustrative of the application of the principles of the present invention. Those skilled in the art can implement other arrangements and methods without departing from the spirit and scope of the present invention. In addition, citation or identification of any  
25 reference in this application shall not be construed as an admission that such reference is available as prior art to the present invention.

## WHAT IS CLAIMED IS

1. A method of exhibiting art on a screen, comprising the steps of:
  - a) creating an infinite loop video sequence of the art; and
  - b) exhibiting the infinite loop video sequence on the screen.
2. The method of claim 1, wherein the screen includes a flat TV screen.
3. The method of claim 1, wherein the step of creating an infinite loop video sequence includes:
  - i. filming a video sequence having a beginning and an end,
  - ii. digitizing the video sequence, and
  - iii. editing and optionally animating the video sequence to obtain the effect of the infinite loop.
4. The method of claim 3, wherein the editing includes choosing a shot, duplicating the shot and merging the chosen and duplicated shots to form the infinite loop.
5. The method of claim 3, wherein the filming includes using a static camera with a fixed frame size and wherein the editing and optionally animating the video sequence to obtain the effect of the infinite loop includes adding a transition effect such as a masked wipe effect.
6. The method of claim 3, wherein the filming includes using a dynamic camera with a dynamic frame size and wherein the editing the video sequence to obtain the effect of the infinite loop includes obtaining a smooth transformation between the beginning and end of the sequence by using a quick camera movement.
7. The method of claim 1, wherein the step of creating an infinite loop video sequence includes creating an infinite loop video sequence from a digital art item which is brought-to-life.

8. The method of claim 7, wherein the digital art is brought-to-life by animation, and wherein the infinite loop is achieved by ensuring a last and a first frame of the video sequence merge seamlessly, without a cut.
9. A method of exhibiting live art on a screen, comprising the steps of:
  - a) obtaining an art item in digital form;
  - b) creating an infinite loop video sequence of live art from the art item in digital form; and
  - c) exhibiting the infinite loop video sequence as live art on a screen in an infinite loop.
10. The method of claim 9, wherein the screen includes a flat TV screen.
11. The method of claim 9, wherein the step of creating an infinite loop video sequence includes obtaining a seamless transformation between a first frame of the video sequence and a last frame of the video sequence, so that no cut appears when the video sequence is repeated starting again with the first sequence frame after the last sequence frame.
12. The method of claim 11, wherein the obtaining a seamless transformation between a first frame of the video sequence and a last frame of the video sequence includes creating identical first and last frames of the video sequence.
13. The method of claim 9, further comprising the step of exhibiting the infinite loop video sequence as live art on a screen in an infinite loop includes exhibiting the live art as a unique work of art by allowing the live art to be exhibited only on a particular screen.
14. A system for exhibiting live art on a screen in an infinite loop, comprising:
  - a) a screen; and
  - b) a player operatively coupled to the screen and configured to play a video sequence of live art for exhibition in an infinite loop on the screen.

15. The system of claim 14, wherein the player is included in the screen.
16. The system of claim 15, further comprising a storage device for storing the live art.
17. The system of claim 15, wherein the live art is obtained from a still digital image.

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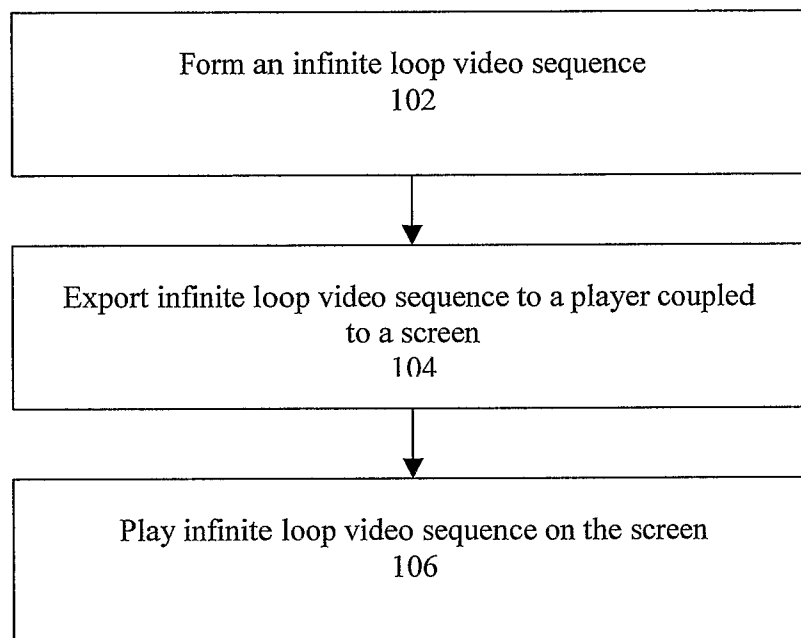


FIG. 1

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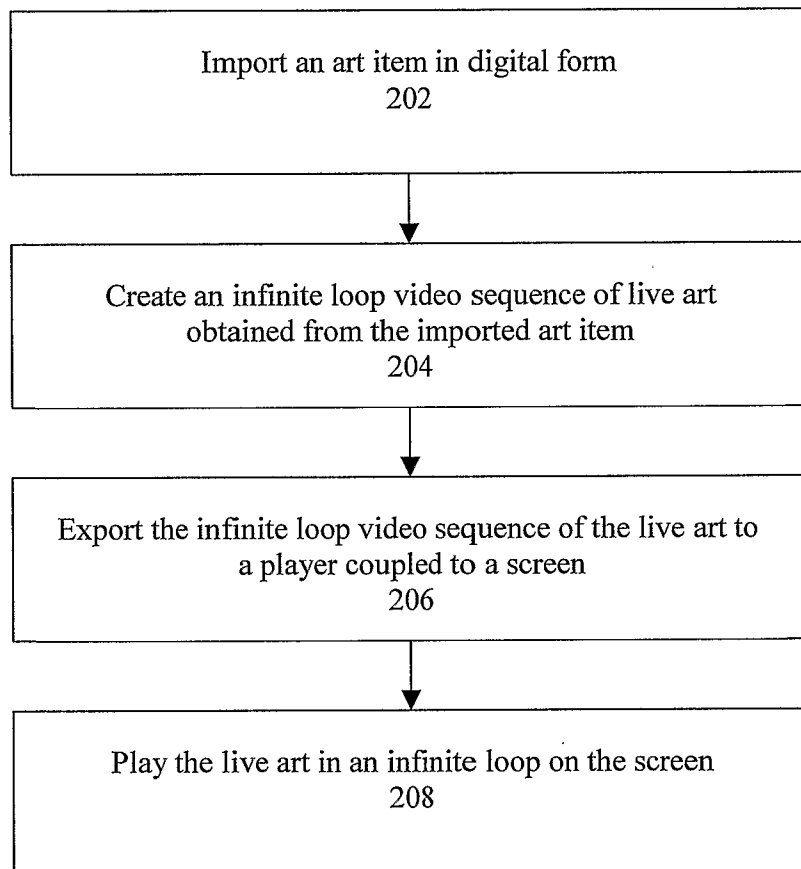


FIG. 2



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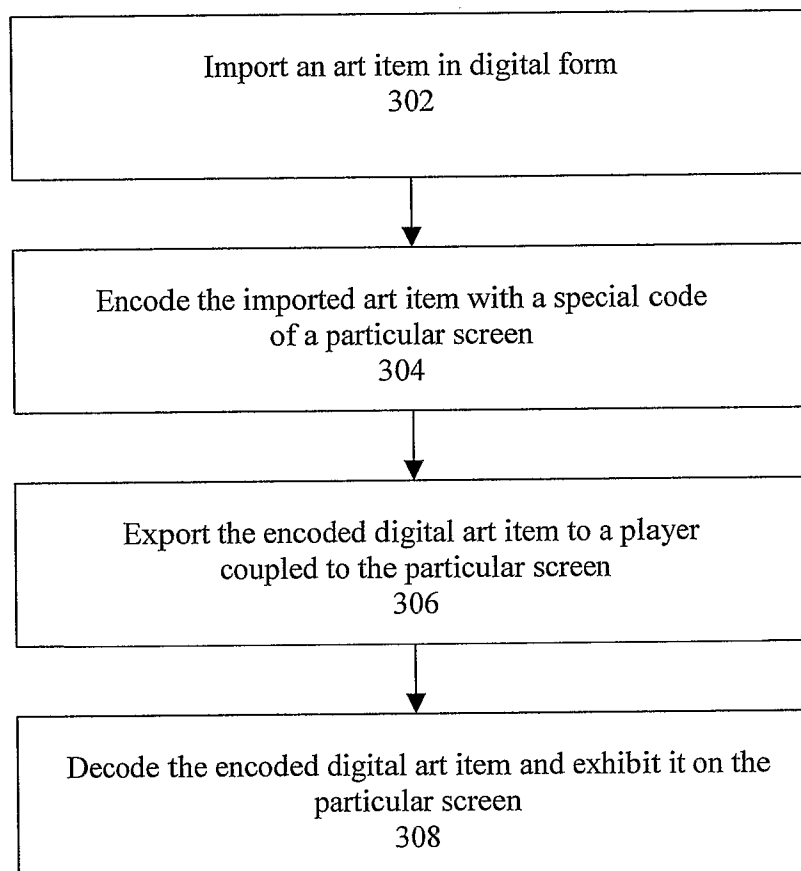


FIG. 3

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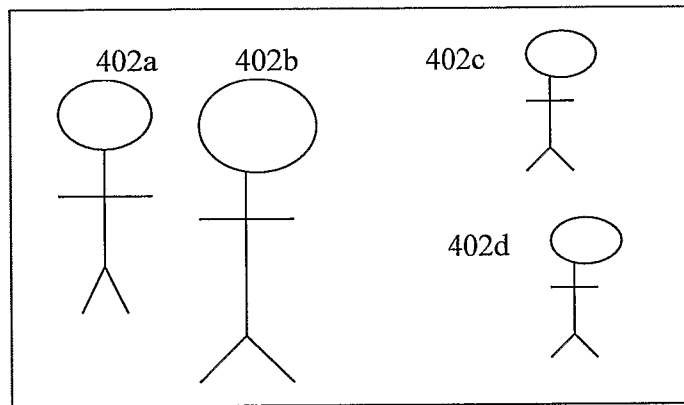


FIG. 4A

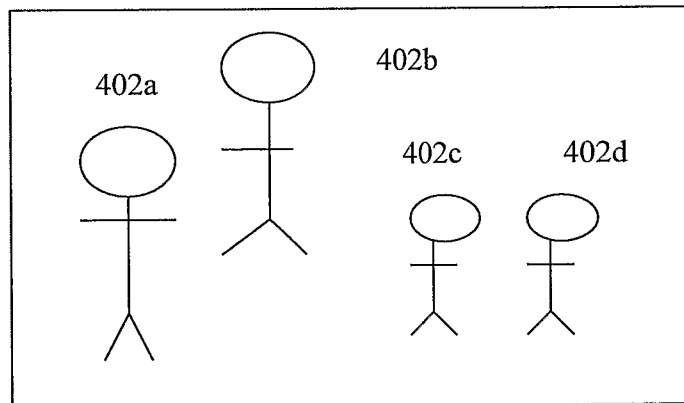


FIG. 4B

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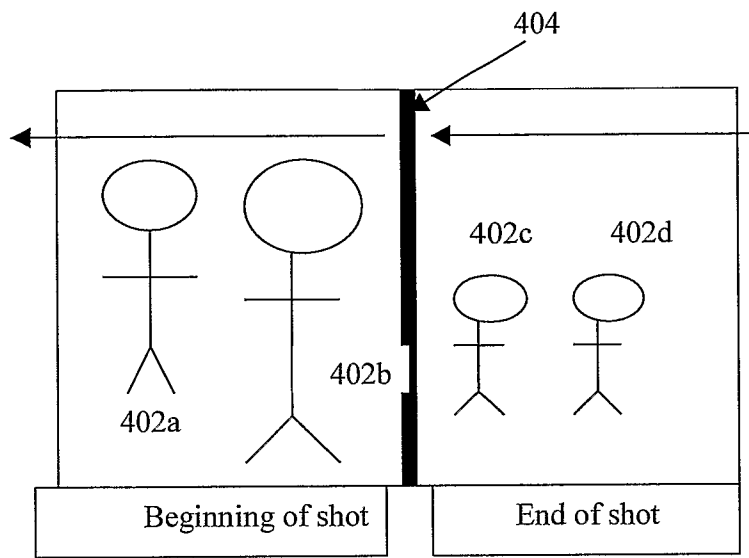


FIG. 4C

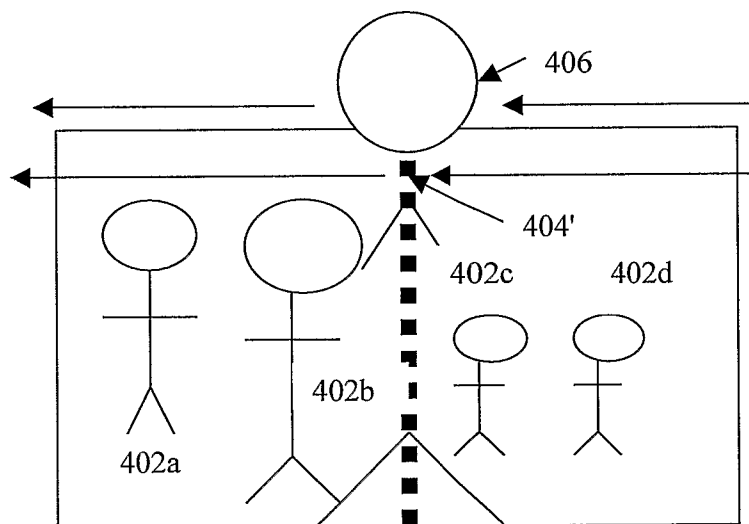


FIG. 4D

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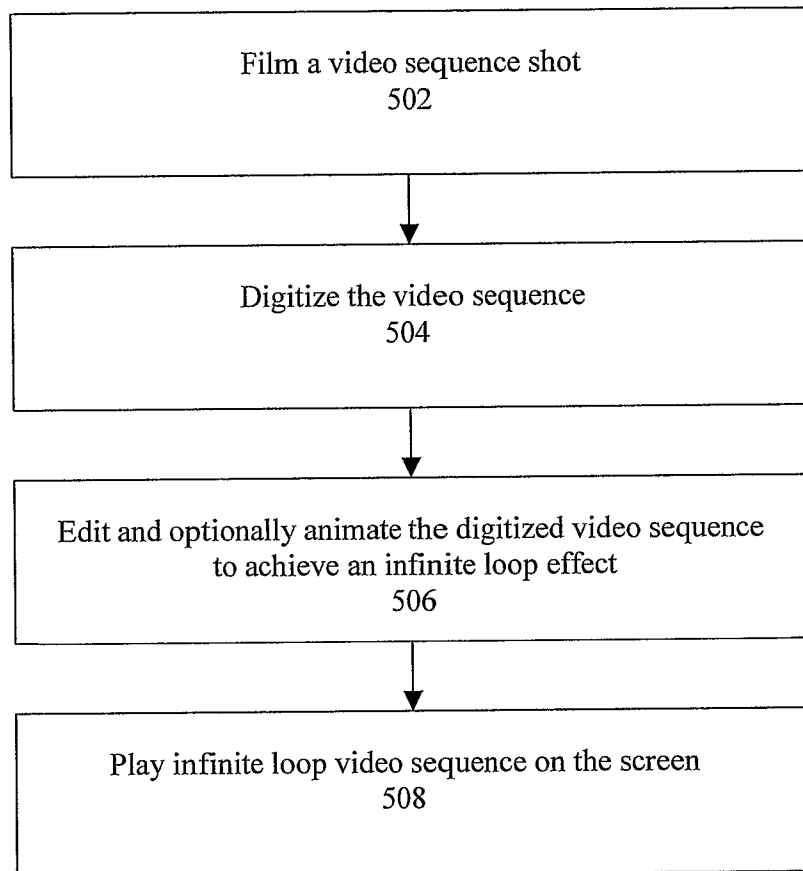


FIG. 5

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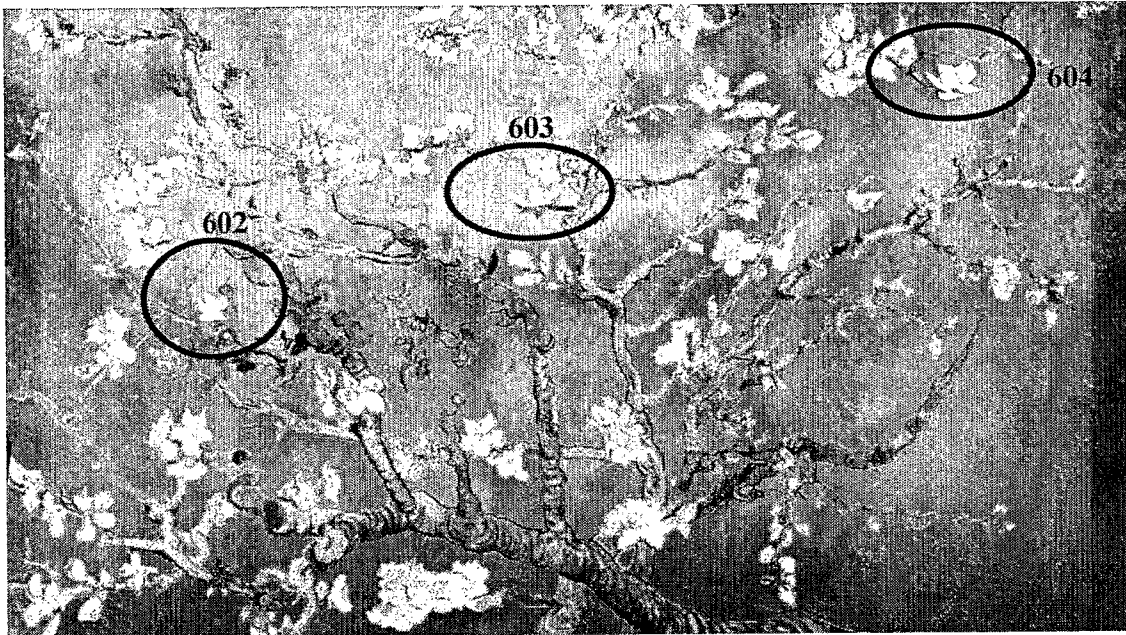


FIG. 6A

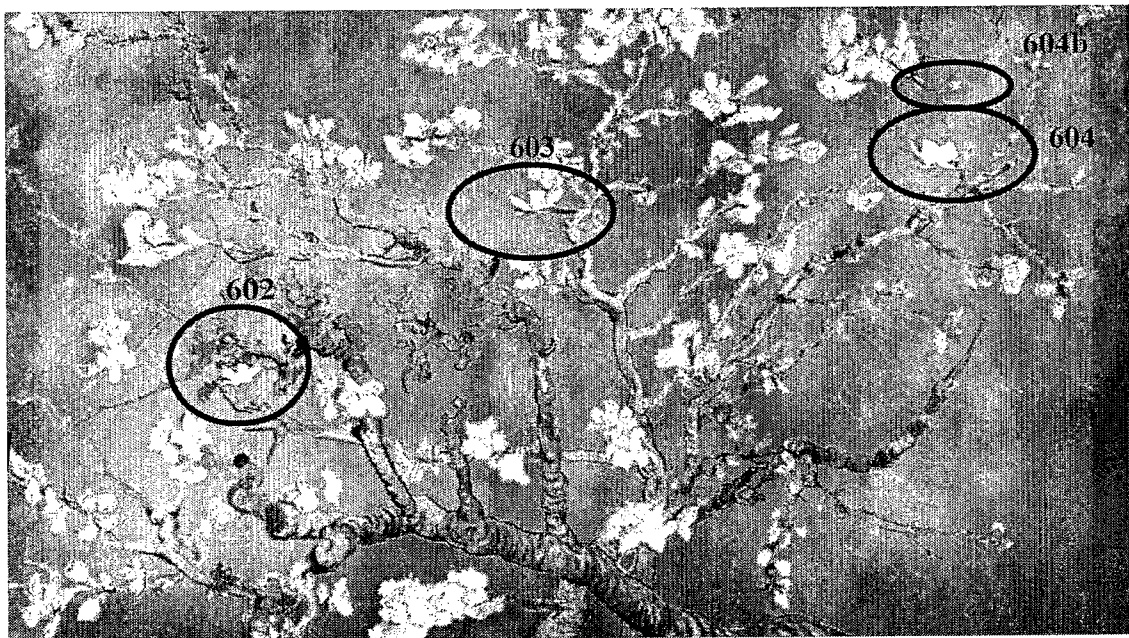


FIG. 6B

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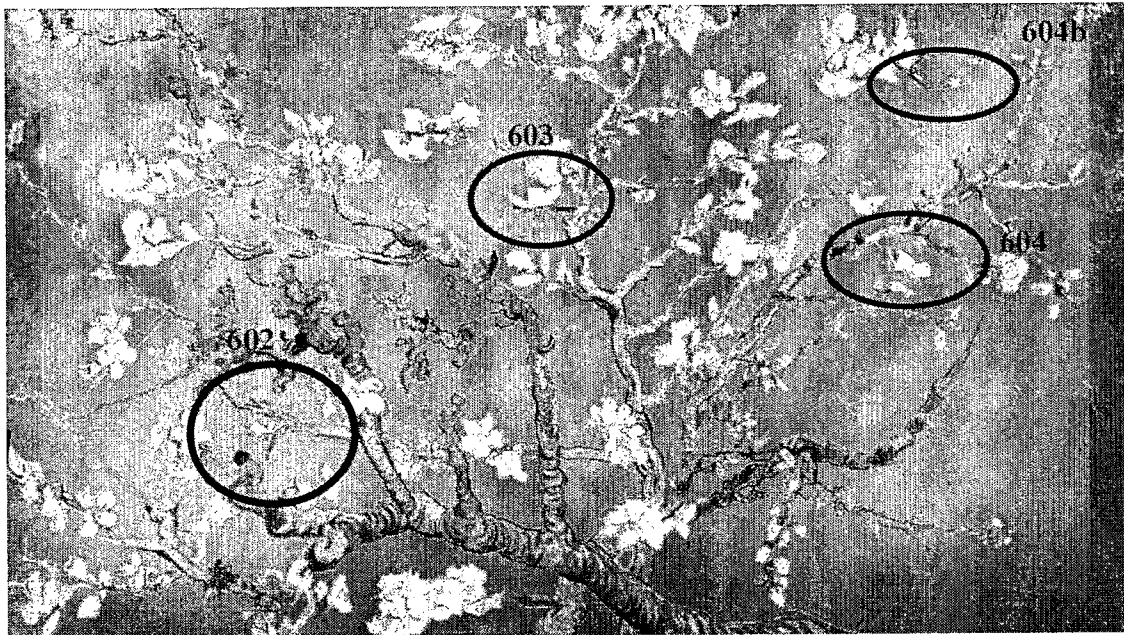


FIG. 6C

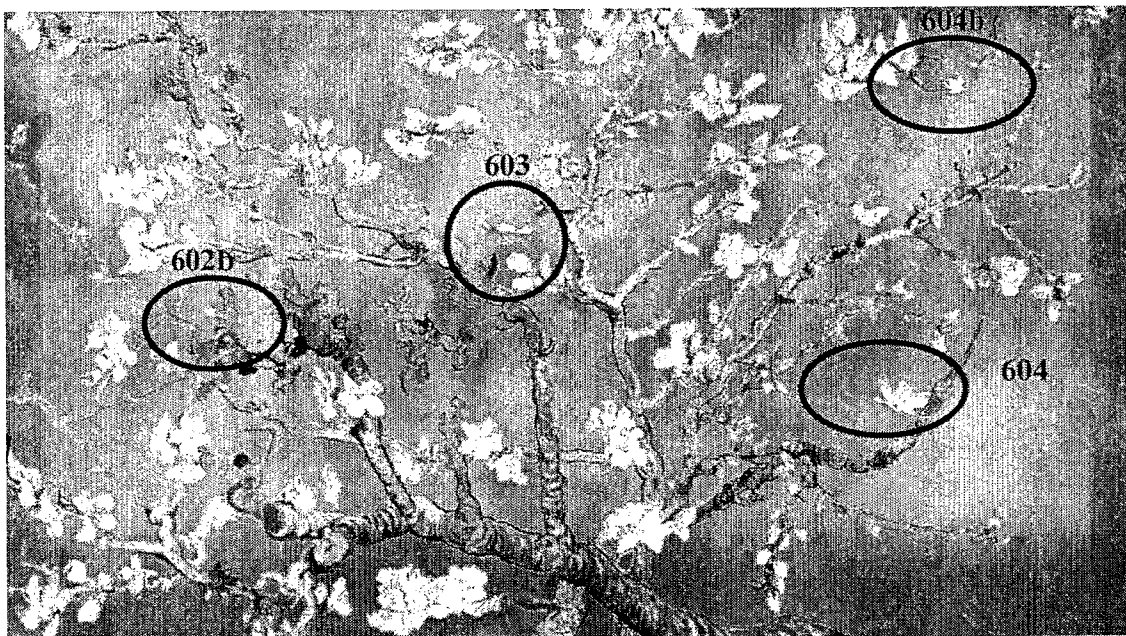


FIG. 6D

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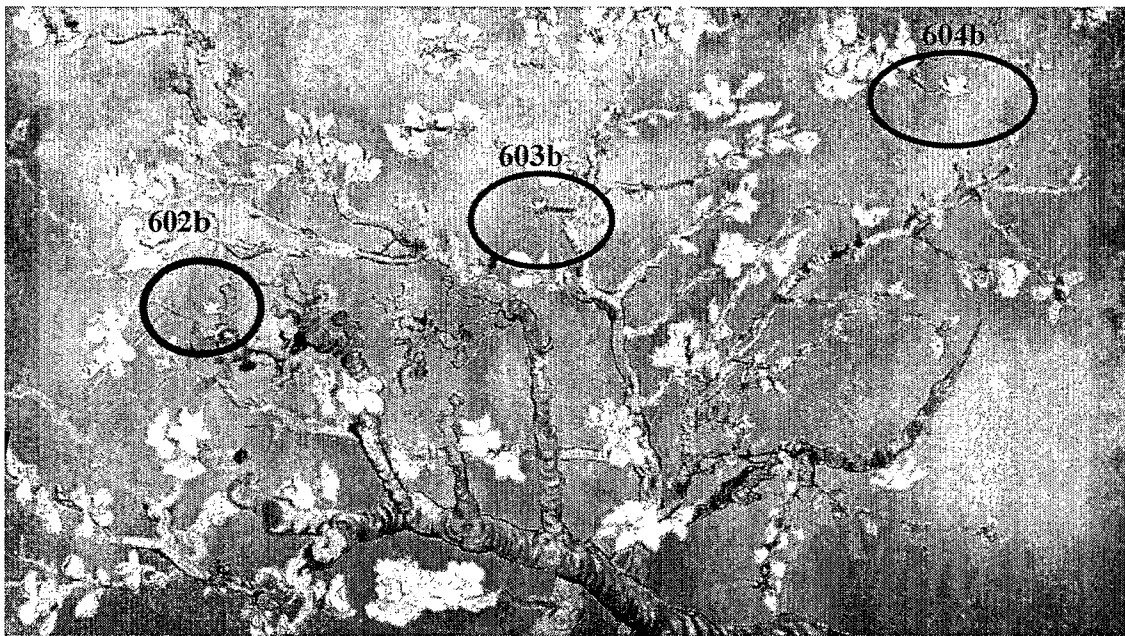


FIG. 6E

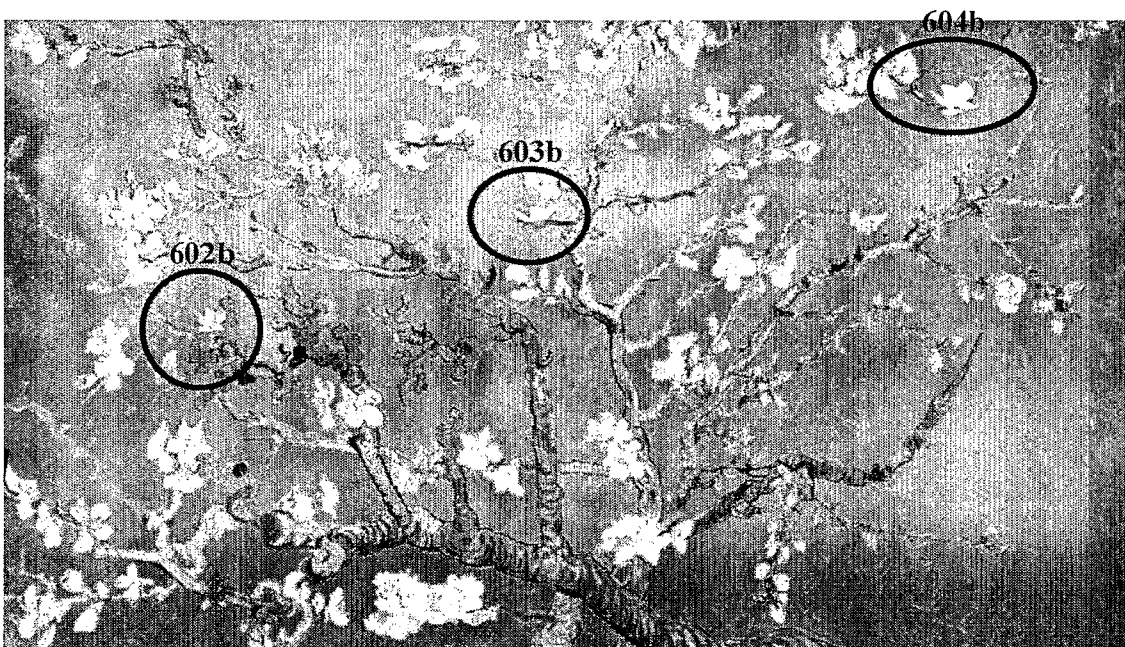


FIG. 6F



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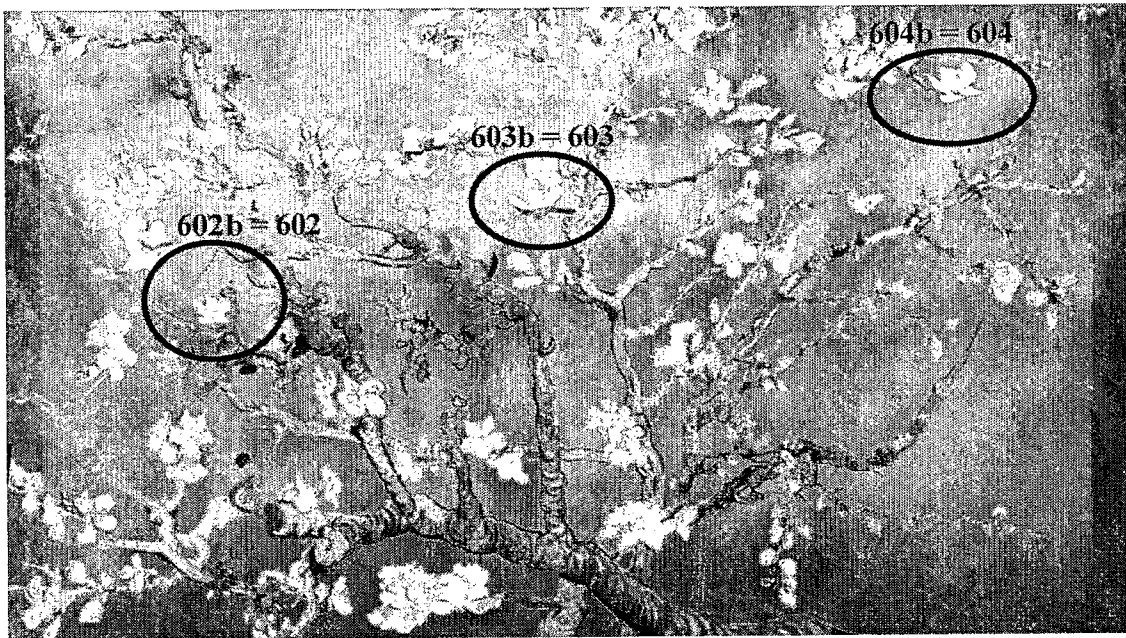


FIG. 6G



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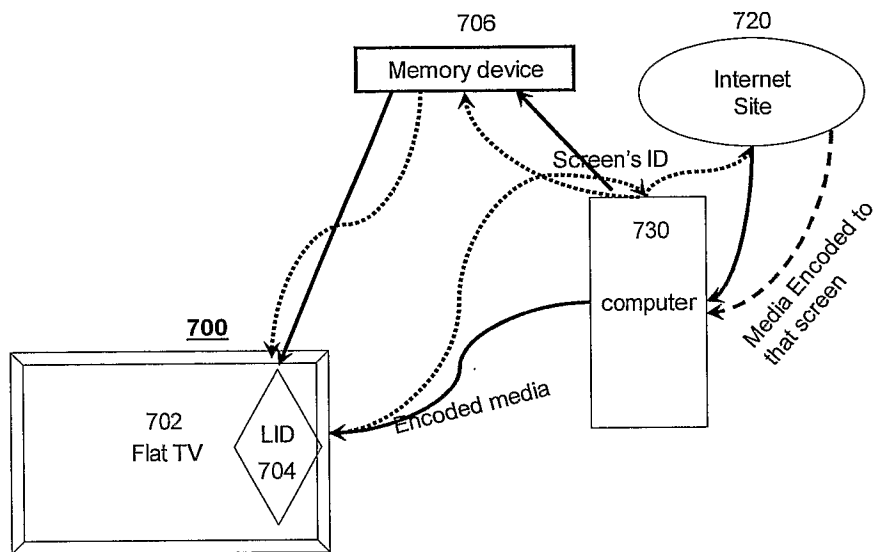


FIG. 7