(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 045 315 A1

(12) EUROPEAN PATENT APPLICATION
published in accordance with Art. 153(4) EPC

(43) Date of publication:
20.07.2016 Bulletin 2016/29

(21) Application number: **13893176.1**

(22) Date of filing: **08.11.2013**

(51) Int Cl.:
B41J 2/165 *(2006.01)* ***B41J 29/38*** *(2006.01)*

(86) International application number:
PCT/CN2013/086748

(87) International publication number:
WO 2015/032128 (12.03.2015 Gazette 2015/10)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **09.09.2013 CN 201310406475**

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(54) FLASHING INKJET PRINTING CONTROL METHOD AND DEVICE

(57) The present invention relates to a flashing inkjet printing control method and device. The method comprises: determining whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects with a spacing therebetween, the flashing inkjet printing referring to instantaneous inkjet printing (step 101); and when flashing inkjet printing is determined to be conducted, using nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to preset flashing inkjet printing parameters (step 102). The device comprises: a determining module (31) configured to determine whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects with a spacing therebetween, the flashing inkjet printing referring to instantaneous inkjet printing; and a flashing inkjet printing module (32) configured to, when flashing inkjet printing is determined to be conducted by the determining module, use nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to preset flashing inkjet printing parameters. By adopting the method and device, the unused nozzles can effectively be kept wet to achieve the purpose of protecting the printhead.

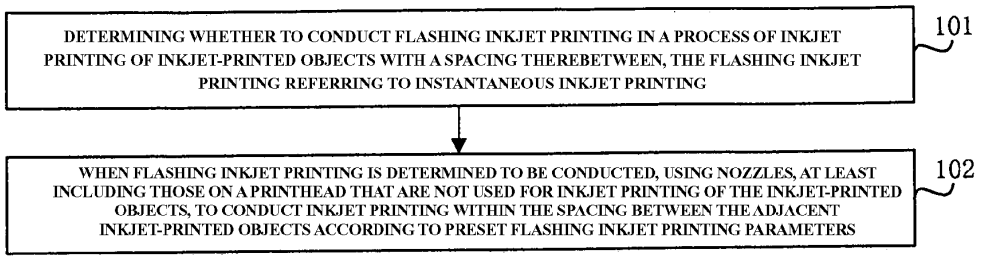

FIGURE 1

EP 3 045 315 A1

Description

Field of the Invention

[0001] The present invention relates to digital printing technology, in particular relates to a flashing inkjet printing control method and device.

Description of the Related Art

[0002] Digital inkjet printing technology, which is a non-contact type printing technique that has been developed rapidly in recent years, directly processes, conveys and inkjet prints image data. Compared to the traditional printing manners, digital inkjet printing technology which presents a short printing cycle and a high efficiency by omitting processes such as plate-making has more simple and effective advantages in particular for a printing task of variable data including variable images with a high printing complexity. Moreover, in recent years, thanks to the advantages of digital inkjet printing technology, an inkjet printing medium begins to not only be limited to a paper category and a film category, but also gradually transit to a ceramic category. Digital inkjet printing technology enters the ceramic industry with a high flexibility in real-time variable images and rapid practice in production, raises the production efficiency, reduces the cost, and diversifies the inkjet printed tile images, thereby attaining favors of most users.

[0003] However, as the ceramic inkjet printing is subjected to an environment of dry air and a large quantity of dust, it is quite severe for a printhead, while the printhead itself also pertains to an expensive member. For each batch of production of ceramic, the dimension is generally fixed, and the production cycle is very long, so that if certain nozzles of a printhead are unused for a long time, the nozzles are possibly blocked and not easily repaired, thereby resulting in the loss of the printhead.

[0004] The descriptions for any prior art in the present specification should not be considered to admit or imply that the content therein is commonly known or concerns common knowledge in the art before the filing date or the priority date of any claim.

SUMMARY OF THE INVENTION

[0005] The present invention provides a flashing inkjet printing control method and device, for effectively keeping unused nozzles wet to achieve the purpose of protecting the printhead.

[0006] In a first aspect, a flashing inkjet printing control method is provided, comprising:

determining whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects with a spacing therebetween, the flashing inkjet printing referring to instantaneous inkjet printing; and when flashing inkjet printing is determined to be conducted, using nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to preset flashing inkjet printing parameters.

[0007] In a second aspect, a flashing inkjet printing control device is provided, comprising:

a determining module configured to determine whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects with a spacing therebetween, the flashing inkjet printing referring to instantaneous inkjet printing; and
a flashing inkjet printing module configured to, when flashing inkjet printing is determined to be conducted by the determining module, use nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to preset flashing inkjet printing parameters.

[0008] The flashing inkjet printing control method and device provided by the present invention, determines whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects with a spacing therebetween; and when flashing inkjet printing is determined to be conducted, uses nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to preset flashing inkjet printing parameters. On one hand, the flashing inkjet printing which is conducted within a spacing between the inkjet-printed objects does not affect a normal inkjet printing flow and a printing quality for the inkjet-printed objects. On the other hand, by using nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the inkjet-printed objects, the unused nozzles can effectively be kept wet to achieve the purpose of protecting the printhead.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

Figure 1 is a flow chart of a flashing inkjet printing control method provided by the embodiments of the present invention;
Figure 2 is a schematic view of various parameters in a ceramic tile inkjet printing process provided by the embodiments of the present invention;
Figure 3 is a structural schematic view of a flashing inkjet printing control device provided by the embodiments of the present invention; and

Figure 4 is a structural schematic view of another flashing inkjet printing control device provided by the embodiments of the present invention.

DESCRIPTION OF THE EMBODIMENTS

[0010] Various exemplary embodiments of the present invention will now be described in detail with reference to the drawings. It should be noted that the relative arrangement of the components and steps, the numerical expressions, and numerical values set forth in these embodiments do not limit the scope of the present invention unless it is specifically stated otherwise.

[0011] Meanwhile, it should be appreciated that, for the convenience of description, various parts shown in those drawings are not necessarily drawn on scale.

[0012] The following description of at least one exemplary embodiment is merely illustrative in nature and is in no way intended to limit the invention, its application, or uses.

[0013] Techniques, methods and apparatus as known by one of ordinary skill in the relevant art may not be discussed in detail but are intended to be part of the allowed specification where appropriate.

[0014] In all of the examples illustrated and discussed herein, any specific values should be interpreted to be illustrative only and non-limiting. Thus, other examples of the exemplary embodiments could have different values.

[0015] Figure 1 is a flow chart of a flashing inkjet printing control method provided by the embodiments of the present invention. The method is executed by a flashing inkjet printing control device, which may be a hardware or a software, integrated in a usual digital inkjet printing device to control an inkjet printing process. As shown in Figure 1, the method comprises:

[0016] 101. Determining whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects with a spacing therebetween, the flashing inkjet printing referring to instantaneous inkjet printing.

[0017] 102. When flashing inkjet printing is determined to be conducted, using nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to preset flashing inkjet printing parameters.

[0018] The method provided by the present embodiment is particularly adapted to a scenario in which inkjet-printed objects with a spacing therebetween are inkjet printed, and only part of the nozzles provided on the printhead are used for conducting inkjet printing of the inkjet-printed objects, for example an inkjet printing process of ceramic. In the present embodiment, as images and texts are required to be inkjet printed on the inkjet-printed objects, the objects on which images and texts are required to be inkjet printed are called inkjet-printed objects. Alternatively, the inkjet-printed objects of the present embodiment may be ceramic blanks (called as ceramic for short in the following), but not limited thereto.

[0019] Specifically, considering that if nozzles do not perform inkjet printing in a dry environment for a long time, the nozzles are possibly blocked and not easily repaired, thereby resulting in the problem of loss of the printhead. The present embodiment sets forth that nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects are used to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects, to ensure that the unused nozzles are wet so as to achieve the purpose of protecting the printhead.

[0020] Among them, how to determine whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects. In this aspect, it may be determined appropriately to conduct flashing inkjet printing according to an actual production environment and production cycle as well as a dimension and type of the inkjet-printed objects. Take an example for explanation, in order to make the unused nozzles wet better, an operator may set in a way such that one shot of flashing inkjet printing is conducted at every interval of designated number of inkjet-printed objects. The specific value of the designated number is not limited, for instance, it may be 5, 7, 10, etc.

[0021] Based on the aforementioned, one alternative embodiment of the step 101 comprises: determining whether there is already an interval of designated number of inkjet-printed objects currently from a previous flashing inkjet printing operation; and if so, determining to conduct the flashing inkjet printing; and if not, determining not to conduct the flashing inkjet printing.

[0022] In addition, the flashing inkjet printing control method provided by the present embodiment is conducted within a spacing between adjacent inkjet-printed objects, and thus does not affect a normal inkjet printing flow and may not affect an inkjet printing quality of the inkjet-printed objects. However, in order to ensure that the flashing inkjet printing may be conducted within the spacing between adjacent inkjet-printed objects, proper inkjet printing parameters are required to be set in advance. The flashing inkjet printing parameters refer to parameters required to be used so as to ensure that the flashing inkjet printing is conducted within the spacing between adjacent inkjet-printed objects.

[0023] Specifically, it is possible to set and store the flashing inkjet printing parameters before inkjet printing is actuated, and to use the stored flashing inkjet printing parameters to conduct flashing inkjet printing at a proper moment after the inkjet printing is actuated. For instance, an operator may specifically set flashing inkjet printing parameters as well as their values according to an actual production environment and production cycle as well as a dimension and a type of the inkjet-printed objects, but the present embodiment does not make a limitation on this aspect.

[0024] Alternatively, the flashing inkjet printing parameters may comprise parameters such as a flashing inkjet

printing delay, a flashing inkjet printing height, and a flashing inkjet printing gray level. Among them, the flashing inkjet printing delay is used to indicate a temporal interval from the fulfillment of inkjet printing inkjet-printed objects to the starting of flashing inkjet printing. In a general description, it is how long to start flashing inkjet printing after the normal inkjet printing of inkjet-printed objects is fulfilled. The flashing inkjet printing height is used to indicate a height of a content required to be flashing inkjet printed, namely a line number required for flashing inkjet printing. The flashing inkjet printing gray level is used to indicate an amount of ink droplets required to be inkjet printed. It is set forth here that, a sum of the flashing inkjet printing delay and the flashing inkjet printing height is required to be set to be less than or equal to a spacing between adjacent inkjet-printed objects, so as to ensure that inkjet printing is conducted within the spacing between adjacent inkjet-printed objects.

[0025] Further, the flashing inkjet printing parameters may also comprise a flashing inkjet printing frequency and a flashing inkjet printing resolution. The flashing inkjet printing frequency refers to an actual operation frequency of the printhead. The flashing inkjet printing resolution refers to an actual resolution of the printhead. As the flashing inkjet printing process is conducted in the normal inkjet printing process of inkjet-printed objects, the flashing inkjet printing frequency and the flashing inkjet printing resolution are respectively identical to the frequency and the resolution of a printhead when ink-printed objects are inkjet printed. On such basis, such two parameters may not be individually set.

[0026] Based on the aforementioned flashing inkjet printing parameters as provided, one alternative embodiment of the step 102 comprises: after the flashing inkjet printing is determined to be conducted, delaying a temporal interval indicated by said flashing inkjet printing delay, using nozzles, at least including those on the printhead that are not used for the inkjet printing of the inkjet-printed objects to start the inkjet printing at a height indicated by said inkjet printing height according to an amount of ink droplets indicated by said flashing inkjet printing gray level after the inkjet printing of currently inkjet-printed objects is fulfilled; and stopping inkjet printing, and holding on for incoming of next inkjet-printed objects after the inkjet printing at the height indicated by said inkjet printing height is fulfilled.

[0027] Further alternatively, all the nozzles on the printhead may be used to conduct inkjet printing within the spacing between adjacent inkjet-printed objects, so as to not only achieve the purpose of wetting unused nozzles, but also to more facilitate the implementation.

[0028] It can be seen from the aforementioned that, the flashing inkjet printing control method provided by the present embodiment determines whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects with a spacing therebetween; and when the flashing inkjet printing is determined to be conducted, uses nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to preset flashing inkjet printing parameters. On one hand, the flashing inkjet printing which is conducted within the spacing between the inkjet-printed objects will not affect a normal inkjet printing flow, and will not affect the inkjet printing quality of the inkjet-printed objects. On the other hand, by using nozzles, at least including those on the printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects, the unused nozzles can effectively be kept wet to achieve the purpose of protecting the printhead.

[0029] Next, take ceramic tiles as the inkjet-printed objects in the embodiments of the present invention for example, the technical solution of the present invention is further explained in detail.

[0030] Also in order to solve the problem that the nozzles are unused for a long time which causes that part of nozzles are blocked and not easily restored and further results in loss of the printhead, flashing inkjet printing parameters are required to be set in advance. As the flashing inkjet printing is conducted during the production of a production line, the flashing inkjet printing frequency, i.e. the actual operation frequency of the printhead is consistent with the frequency used in printing production; and the flashing inkjet printing resolution is also consistent with the resolution used in actual production. Thus, the parameters of the flashing inkjet printing frequency and resolution may not be individually set. Next, description of setting other flashing inkjet printing parameters will be detailed.

[0031] Specifically, a ceramic production line is to continuously convey ceramic tiles of certain dimension (i.e. length by width) below an inkjet printing system through a conveying belt in a way such that images and texts are inkjet printed onto the ceramic tiles by a ceramic inkjet printing device, and the ceramic tiles are subjected to a subsequent process for treatment on the conveying belt until being sintered into a finish. Generally speaking, a width of a ceramic inkjet printing device is a device width (DeviceWidth), and an effective image-text width (width) is less than or equal to the DeviceWidth. From the perspective of conveying tiles, there is a certain spacing m between the adjacent tiles, the value of which is not fixed as the ceramic tiles are arranged randomly. The flashing inkjet printing is required to be fulfilled within such spacing m. On such basis, a flashing inkjet printing enablement (enable) may be set for indicating whether to allow actuation of the flashing inkjet printing; a flashing inkjet printing interval n is set for indicating that one shot of flashing inkjet printing is conducted every interval of n tiles; a flashing inkjet printing delay (delay) is set for indicating a duration of a delay to conduct flashing inkjet printing after completing inkjet printing for the ceramic tiles; a flashing inkjet printing height (height) is set for indicating a height of content to be inkjet printed, i.e. a line number

required to be inkjet printed; a flashing inkjet printing gray level (level) is set for indicating an amount of ink droplets required for flashing inkjet printing. It is set forth here that, a sum of the flashing inkjet printing delay and the flashing inkjet printing height cannot exceed the spacing m between adjacent ceramic tiles, otherwise it may affect the quality of ceramic tiles in normal production.

[0032] After the aforementioned parameters are set, the method provided by the present invention may be used to conduct flashing inkjet printing in one complete flow of printing production. Specifically, in a printing process, after each ceramic tile arrives, a ceramic inkjet printing device inkjet prints onto the tile an image having the same size as the tile, then judges whether a flashing inkjet printing enablement is set to determine whether to allow actuation of a flashing inkjet printing function. Then if the flashing inkjet printing is allowed, it is determined whether the condition of the interval of n ceramic tiles is satisfied, and when such condition is satisfied, after inkjet printing of the image is fulfilled, a time interval indicated by a flashing inkjet printing delay is delayed, the inkjet printing at a height indicated by a flashing inkjet printing height is started, in which a gray level of inkjet printing is a value of flashing inkjet printing gray level, and a width of inkjet printing is a device width (DeviceWidth), i.e. all the nozzles of the device conduct inkjet printing. After inkjet printing of content at the height indicated by the flashing inkjet printing height is fulfilled, inkjet printing is stopped and hold on for incoming of a next ceramic tile.

[0033] If the condition of the interval of n tiles is not satisfied, inkjet printing is not conducted. Likewise, if flashing inkjet printing enablement is invalid, actuation of the flashing inkjet printing function is not allowed. In an operational process of tile production, an operator may determine whether to actuate flashing inkjet printing as well as set various parameters of flashing inkjet printing according to the actual environment and the production cycle as well as the size and the type of ceramic.

[0034] Further, as the ceramic tiles are carried on the conveying belt, the conveying belt is exposed between the ceramic tiles and thus ink droplets of flashing inkjet printing are on the conveying belt between the ceramic tiles so that ink droplets on the conveying belt are required to be cleaned after flashing inkjet printing is fulfilled, i.e. ink droplets on said conveying belt formed by inkjet printing conducted within a spacing between adjacent inkjet-printed objects are eliminated, so as to ensure that the ceramic tiles in normal production are not affected.

[0035] Take a colored ceramic digital inkjet printing device with a width of the DeviceWidth of 350mm based on an XAAR1001 printhead for use in ceramic production for example, values of various parameters in the technical solution of the present invention are illustrated, the specific positions designated by the various parameters may refer to the illustration of Figure 2.

[0036] Among them, the dimension of the ceramic tiles is 600mm (length)×300mm (width), and the effective image-text length is required to be 600mm. According to the actual operation condition of the user, as the spacing m between the ceramic tiles is generally over 100mm, it is possible to set the flashing inkjet printing interval n to be 5, the flashing inkjet printing delay (delay) to be 12mm, the flashing inkjet printing height (height) to be 10mm, and the flashing inkjet printing gray level (level) to be 2.

[0037] In the production process, after scanning the incoming of ceramic tiles, the ceramic inkjet printing device first conducts an image-text inkjet printing having the length of 600mm and the width of 300mm. After the image-text inkjet printing of 600mm is fulfilled, on one hand, it is determined whether to allow flashing inkjet printing; on the other hand, a statistic of inkjet printed ceramic tiles is made so that one shot of flashing inkjet printing every interval of five tiles will be conducted, and flashing inkjet printing in the remaining circumstances will not be conducted. If the flashing inkjet printing condition is satisfied, a delay of 12mm is first conducted, and then a flashing inkjet printing of 10mm is conducted in which the flashing inkjet printing gray level is totally 2, and the flashing inkjet printing width is 350mm (i.e. the device width). The gray level inkjet printed by the nozzles depend on data sent to the printhead. After flashing inkjet printing is fulfilled, the process returns to wait for incoming of a next ceramic tile, and the ink droplets on the conveying belt by flashing inkjet printing are eliminated.

[0038] It is set forth here that, the method provided by the above embodiment of the present invention may be fulfilled by a flashing inkjet printing control device, which may be constituted by a software part and a hardware part. The software part may run on a PC for fulfilling the setting about the flashing inkjet printing parameters and controlling flashing inkjet printing. The hardware part serves as a substantial realization part of the flashing inkjet printing control method specifically for fulfilling effective image-text inkjet printing and flashing inkjet printing, comprising buffering and conveying of image-text, filling of the flashing inkjet printed content, statistic of flashing inkjet printing delay, as well as control of a printhead member, etc. Various members cooperate closely so as to effectively realize the flashing inkjet printing control method described by the present invention. Among them, the hardware part may be realized by a ceramic inkjet printing device, but not limited thereto.

[0039] Figure 3 is a structural schematic view of a flashing inkjet printing control device provided by the embodiments of the present invention. As shown in Figure 3, the device comprises: a determining module 31 and a flashing inkjet printing module 32.

[0040] The determining module 31 is configured to determine whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects with a spacing therebetween, the flashing inkjet printing referring to instantaneous inkjet printing.

[0041] The flashing inkjet printing module 32 is connected to the determining module 31, and is configured to, when flashing inkjet printing is determined to be con-

ducted by the determining module 31, use nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to preset flashing inkjet printing parameters.

[0042] In one alternative embodiment, the determining module 31 is specifically configured to determine whether there is already an interval of designated number of inkjet-printed objects currently from a previous flashing inkjet printing operation; if so, determine to conduct the flashing inkjet printing; and if not, determine not to conduct the flashing inkjet printing.

[0043] Alternatively, the flashing inkjet printing parameters may comprise but not limit to: a flashing inkjet printing delay, a flashing inkjet printing height and a flashing inkjet printing gray level. Among them, the flashing inkjet printing delay is used to indicate a temporal interval from fulfillment of inkjet printing inkjet-printed objects to starting of flashing inkjet printing, the flashing inkjet printing height is used to indicate a height of a content required to be flashing inkjet printed, and the flashing inkjet printing gray level is used to indicate an amount of ink droplets required to be inkjet printed; wherein a sum of the flashing inkjet printing delay and the flashing inkjet printing height is less than or equal to a spacing between said adjacent inkjet-printed objects.

[0044] Based on the aforementioned flashing inkjet printing parameters, the flashing inkjet printing module 32 is specifically used for delaying a temporal interval indicated by said flashing inkjet printing, using nozzles, at least including those on the printhead that are not used for inkjet printing of the inkjet-printed objects, starting inkjet printing at a height indicated by said inkjet printing height according to an amount of ink droplets indicated by said flashing inkjet printing gray level after inkjet printing of currently inkjet-printed objects is fulfilled; and stopping inkjet printing, and holding on for incoming of next inkjet-printed objects after inkjet printing at the height indicated by said inkjet printing height is fulfilled.

[0045] To be further explained, the flashing inkjet printing module 32 may also use nozzles on the printhead for normal inkjet printing of inkjet-printed objects besides fulfillment of flashing inkjet printing.

[0046] Alternatively, said inkjet-printed objects may be tiles carried by the conveying belt. On such basis, as shown in Figure 4, said flashing inkjet printing control device further comprises: an eliminating module 33.

[0047] The eliminating module 33 is used for eliminating ink droplets on said conveying belt formed by inkjet printing conducted within a spacing between adjacent inkjet-printed objects by the flashing inkjet printing module 32 after the flashing inkjet printing 32 fulfills flashing inkjet printing.

[0048] In a specific realization, the eliminating module 33 may specifically be attached to a mechanical platform of the conveying belt, but not limited thereto.

[0049] Various functional modules of the flashing inkjet printing device provided by the present embodiment may be used for executing a flow of the embodiment of the method as shown in Figure 1, and its specific operational principles are no longer repeated. Please see a flow of the embodiment of the method in detail.

[0050] The flashing inkjet printing control device provided by the present embodiment determines whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects with a spacing therebetween; when flashing inkjet printing is determined to be conducted, uses nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to preset flashing inkjet printing parameters. On one hand, the flashing inkjet printing which is conducted within a spacing between the inkjet-printed objects does not affect the normal inkjet printing flow, and may not affect the printing quality for the inkjet-printed objects. On the other hand, by using nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects, the unused nozzles can effectively be kept wet to achieve the purpose of protecting the printhead.

[0051] This disclosure also provides one or more computer readable mediums having stored thereon computer-executable instructions that when executed by a computer perform a flashing inkjet printing method. The method comprises: determining whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects with a spacing therebetween, the flashing inkjet printing referring to instantaneous inkjet printing; and when flashing inkjet printing is determined to be conducted, using nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to preset flashing inkjet printing parameters.

[0052] The present disclosure further provides a computer comprising one or more computer readable mediums having stored thereon computer-executable instructions that when executed by the computer perform the aforementioned flashing inkjet printing method.

Exemplary operation environment:

[0053] The computer or computing device as described herein comprises hardware, including one or more processors or processing units, system memory and some types of computer readable media. By way of example and not limitation, computer readable media comprise computer storage media and communication media. Computer storage media comprises volatile or non-volatile, removable or non-removable media implemented in any method or technology for storage of information such as computer readable instructions, data structures, program modules or other data. Communica-

tion media typically embody computer readable instructions, data structures, program modules, or other data in a modulated data signal such as a carrier wave or other transport mechanism and include any information delivery media. Combinations of any of the above are also included within the scope of computer readable media.

[0054] The computer may use one or more remote computers, such as logical connections to remote computers operated in a networked environment. Although various embodiments of the present disclosure are described in the context of the exemplary computing system environment, various embodiments of the present disclosure may be used with numerous other general purpose or application specific computing system environments or configurations. The computing system environment is not intended for limiting any aspect of the scope of use or functionality of the invention. In addition, the computer environment should not be interpreted as depending on or requiring any one or combination of components shown in the exemplary operating environment. Well-known examples of the computing systems, the environment and/or configurations suitable for all aspects of the present disclosure include, but are not limited to: personal computers, server computers, handheld or laptop devices, multiprocessor systems, microprocessor-based systems, set top boxes, programmable consumer electronics, mobile phone, network PC, minicomputers, mainframe computers, distributed computing environments including any one of the above systems or devices, and so on.

[0055] Various embodiments of the invention may be described in a general context of computer executable instructions such as program modules executed on one or more computers or other devices. The computer-executable instructions may be organized into one or more computer-executable components or modules as software. Generally, program modules include, but are not limited to, routines, programs, objects, components, and data structures that perform particular tasks or implement particular abstract data types. Aspects of the invention may be implemented with any number and organization of such components or modules. For example, aspects of the invention are not limited to the specific computer-executable instructions or the specific components or modules illustrated in the figures and described herein. Other embodiments of the invention may include different computer-executable instructions or components having more or less functionality than illustrated and described herein. Aspects of the invention may also be practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote computer storage media including memory storage devices.

[0056] A person skilled in the art may understand that: all or part of the steps for realizing the aforementioned method embodiments may be fulfilled by hardware associated with program instructions. The aforementioned programs may be stored in a computer readable storage medium. The program when executed, executes steps including the aforementioned various method embodiments, and the aforementioned storage media comprise: various media such as ROM, RAM, magnetic disks or optic disks capable of storing program codes.

[0057] Finally, it should be noted that: the above embodiment only used to illustrate the technical solution of the present invention, rather than limit it; despite reference to the aforementioned embodiments to make a detailed description for the present invention, the ordinary technical personnel in this field should understand that: they can still amend the technical solution recited in the foregoing embodiment, or make equivalent replacements to some or all of the technical features; However, the modifying or replacing, do not make the nature of the corresponding technical solutions depart from the scope of the technical solutions of the embodiments in the present invention.

Claims

1. A flashing inkjet printing control method, **characterized in that**, comprising:

   determining whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects with a spacing therebetween, the flashing inkjet printing referring to instantaneous inkjet printing; and
   when flashing inkjet printing is determined to be conducted, using nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to preset flashing inkjet printing parameters.

2. The method according to claim 1, **characterized in that**, said determining whether to conduct flashing inkjet printing comprises:

   determining whether there is already an interval of designated number of inkjet-printed objects currently from a previous flashing inkjet printing operation;
   if so, determining to conduct the flashing inkjet printing; and if not, determining not to conduct the flashing inkjet printing.

3. The method according to claim 1, **characterized in that**, said flashing inkjet printing parameters comprise: a flashing inkjet printing delay, a flashing inkjet printing height and a flashing inkjet printing gray level; wherein the flashing inkjet printing delay is used to indicate a temporal interval from fulfillment of inkjet

printing inkjet-printed objects to starting of flashing inkjet printing, the flashing inkjet printing height is used to indicate a height of a content required to be flashing inkjet printed, and the flashing inkjet printing gray level is used to indicate an amount of ink droplets required to be inkjet printed; wherein a sum of the flashing inkjet printing delay and the flashing inkjet printing height is less than or equal to a spacing between said adjacent inkjet-printed objects.

4. The method according to claim 3, **characterized in that**, said using nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to the preset flashing inkjet printing parameters, comprises:

after finishing inkjet printing of a current inkjet-printed object, delaying a temporal interval indicated by said flashing inkjet printing delay, using nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects to start the inkjet printing at a height indicated by said inkjet printing height according to an amount of ink droplets indicated by said flashing inkjet printing gray level; and stopping inkjet printing, and holding on for incoming of a next inkjet-printed object after the inkjet printing at the height indicated by said inkjet printing height is fulfilled.

5. The method according to any one of claims 1-4, **characterized in that**, said inkjet-printed objects are tiles carried by a conveying belt.

6. The method according to claim 5, **characterized in that**, said using nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to the preset flashing inkjet printing parameters, further comprises:

eliminating ink droplets on said conveying belt formed by inkjet printing conducted within a spacing between adjacent inkjet-printed objects.

7. A flashing inkjet printing control device, **characterized in that**, comprising:

a determining module configured to determine whether to conduct flashing inkjet printing in a process of inkjet printing of inkjet-printed objects with a spacing therebetween, the flashing inkjet printing referring to instantaneous inkjet printing; and

a flashing inkjet printing module configured to, when flashing inkjet printing is determined to be conducted by the determining module, use nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects, to conduct inkjet printing within the spacing between the adjacent inkjet-printed objects according to preset flashing inkjet printing parameters.

8. The device according to claim 7, **characterized in that**, said determining module is specifically configured to determine whether there is already an interval of designated number of inkjet-printed objects currently from a previous flashing inkjet printing operation; if so, determine to conduct the flashing inkjet printing; and if not, determine not to conduct the flashing inkjet printing.

9. The device according to claim 7, **characterized in that**, said flashing inkjet printing parameters comprise:

a flashing inkjet printing delay, a flashing inkjet printing height and a flashing inkjet printing gray level; wherein the flashing inkjet printing delay is used to indicate a temporal interval from fulfillment of inkjet printing inkjet-printed objects to starting of flashing inkjet printing, the flashing inkjet printing height is used to indicate a height of a content required to be flashing inkjet printed, and the flashing inkjet printing gray level is used to indicate an amount of ink droplets required to be inkjet printed; wherein a sum of the flashing inkjet printing delay and the flashing inkjet printing height is less than or equal to a spacing between said adjacent inkjet-printed objects.

10. The device according to claim 9, **characterized in that**, said flashing inkjet printing module is specifically configured to: after finishing inkjet printing of a current inkjet-printed object, delay a temporal interval indicated by said flashing inkjet printing delay, use nozzles, at least including those on a printhead that are not used for inkjet printing of the inkjet-printed objects to start the inkjet printing at a height indicated by said inkjet printing height according to an amount of ink droplets indicated by said flashing inkjet printing gray level; and stop inkjet printing, and hold on for incoming of a next inkjet-printed object after the inkjet printing at the height indicated by said inkjet printing height is fulfilled.

11. The device according to any one of claims 7-10, **characterized in that**, said inkjet-printed objects are tiles carried by a conveying belt.

12. The device according to claim 11, **characterized in**

further comprising:

an eliminating module for eliminating ink droplets on said conveying belt formed by inkjet printing conducted within a spacing between adjacent inkjet-printed objects by said flashing inkjet printing module.

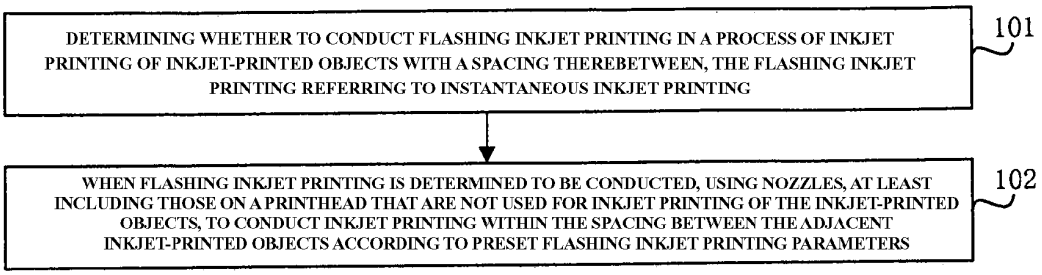

FIGURE 1

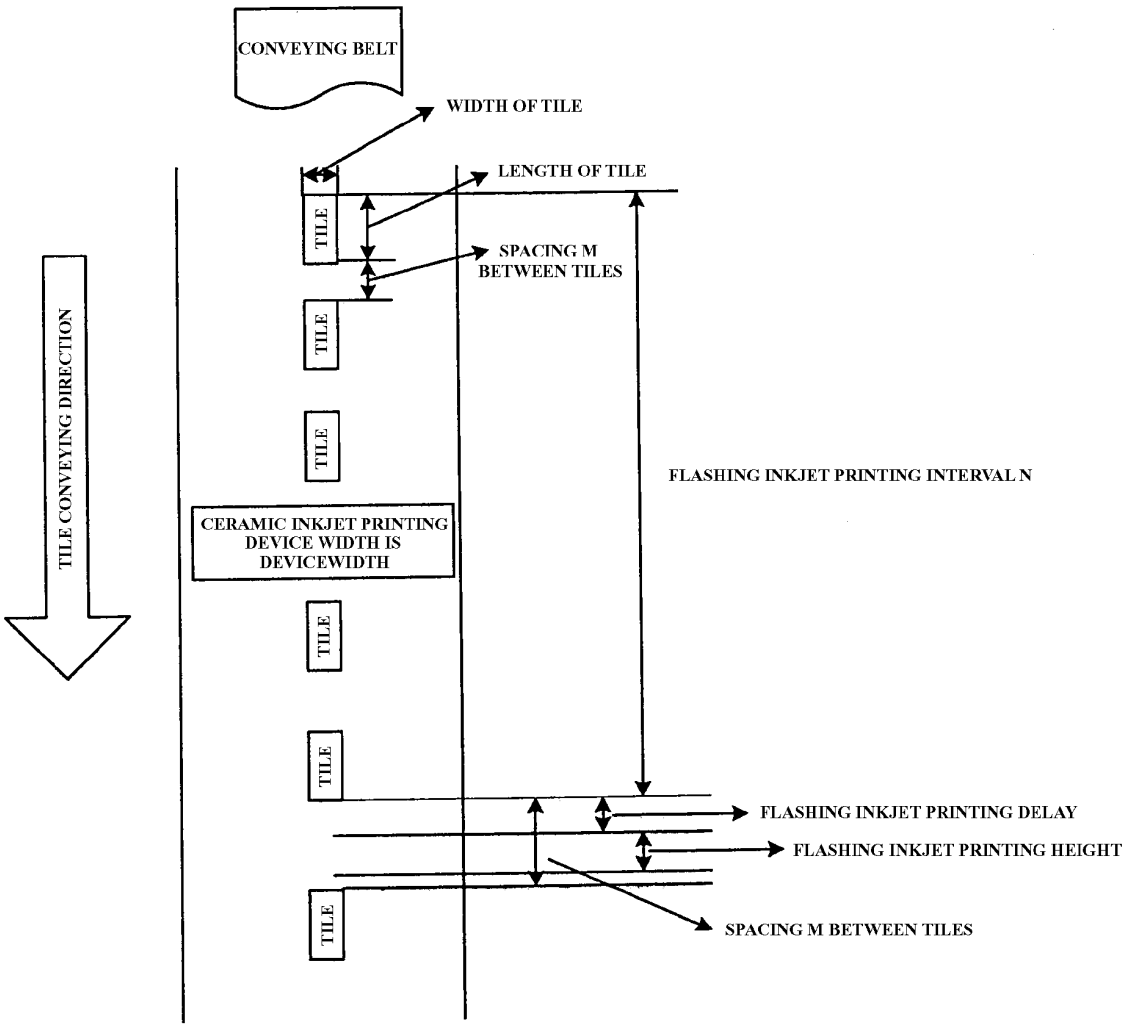

FIGURE 2

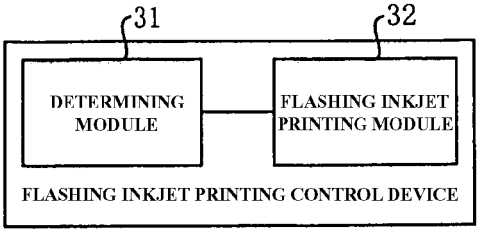

FIGURE 3

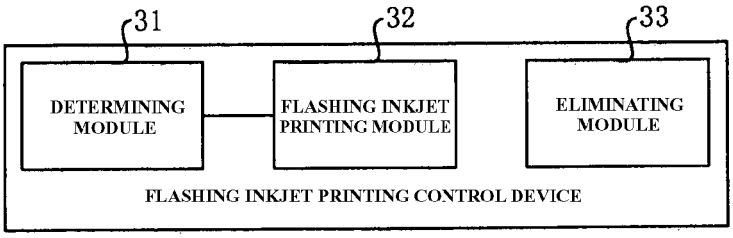

FIGURE 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/086748

A. CLASSIFICATION OF SUBJECT MATTER

B41J 2/165 (2006.01) i; B41J 29/38 (2006.01) i
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B41J 2/01; B41J 29/38; B41J 3/407

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

VEN, CNABS: inkjet+, flush+, flash+, clean+, nozzle?, clog+, blockage+, dry+, ceramic, tile, non-contact

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 102844193 A (DIEFFENBACHER SYSTEM AUTOMATION GMBH) 26 December 2012 (26.12.2012) description, paragraphs [0069] and [0070] and figures 7-9	1-12
A	CN 202368064 U (LU, Yongtian) 08 August 2012 (08.08.2012) the whole document	1-12
A	CN 101151159 A (DURST PHOTOTECHNIK AG) 26 March 2008 (26.03.2008) the whole document	1-12
A	CN 101337474 A (JIN, Rong) 07 January 2009 (07.01.2009) the whole document	1-12
A	CN 101374669 A (PHOENIX CONTACT GMBH & CO) 25 February 2009 (25.02.2009) the whole document	1-12
A	EP 0968826 A2 (BROTHER IND LTD) 05 January 2000 (05.01.2000) the whole document	1-12

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&"document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 June 2014	20 June 2014
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer HUANG, Jun Telephone No. (86-10) 62085073

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/086748

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 102013002254 A1 (BAUMER INSPECTION GMBH) 14 August 2013 (14.08.2013) the whole document	1-12
A	EP 2085225 A2 (INGEGNERIA CERAMICA S R L) 05 August 2009 (05.08.2009) the whole document	1-12

Form PCT/ISA /210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2013/086748

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CN 101374669 A	25 February 2009	EP 1973744 A1	01 October 2008
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EP 0968826 A2	05 January 2000	US 6276778 B1	21 August 2001
		JP 2000015843 A	18 January 2000

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2013/086748

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
DE 102013002254 A1	14 August 2013	EP 2626209 A1	14 August 2013
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Form PCT/ISA /210 (patent family annex) (July 2009)