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(54) METHOD FOR CONVERTING A TONER CARTRIDGE PRINTER TO A SUBLIMATION TONER PRINTER

VERFAHREN ZUR UMWANDLUNG EINES TONERKASSETTENDRUCKERS IN EINEN
SUBLIMATIONSTONERDRUCKER

PROCÉDÉ DE CONVERSION D'UNE IMPRIMANTE À CARTOUCHES DE TONER EN IMPRIMANTE
À TONER PAR SUBLIMATION

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Description**FIELD OF THE INVENTION**

[0001] The present disclosure relates generally to printer cartridge replacement. More specifically, this disclosure relates to methods and systems of converting a standard toner cartridge printer to a printer that prints with sublimation toner.

BACKGROUND

[0002] Traditional Cyan (C), Magenta (M), Yellow (Y), and Black (K) (or CMYK) laser or Light Emitting Diode (LED) type printers come standard with Cyan, Magenta, Yellow, and Black toner and/or drum cartridges. However, traditional black toner printers and CMYK toner printers are generally used in surface printing of materials, including direct-to-fabric printing, but do not become part of the fabric like dye sublimation printings does.

[0003] Dye sublimation printing works by heating a special type of solid ink. This is different from traditional printing techniques, such as traditional inkjet, CMYK laser, or LED type printers, which spray liquid ink onto a page or surface, staining it (as in the case of inkjet) or transferring a dry ink (toner) to a page or surface and heat pressing the toner into the page or surface. Instead, dye sublimation printing heats up the solid ink, causing it to turn into gas vapors. These vapors make their way into the target surface, where they then turn back into solid form. The target surface may be transfer paper, which is coupled to a piece of polyester or another synthetic fabric, and then fed through heated rollers that combine heat with pressure to expand the cells of the fabric and convert the dye to a gaseous state. The dye is sublimated into the open pores of the polymeric synthetic materials, and as it cools again, traps the sublimated dye within the cells of the fabric. Because the dye became gaseous, it does not create a dot pattern during the sublimation process like traditional printing techniques, rather it creates a continuous tone print that creates brighter and smoother color variations and transitions, and a superior overall look.

[0004] Thus, there is a need for a method for converting or retrofitting a standard CMYK (four cartridge) or CMYKW (five cartridge) toner printer to print using sublimation toner.

[0005] Prior art document US 9383684B1 discloses a method and system for converting a toner cartridge to a white toner printer.

[0006] Prior art document US 2017/023885A1 discloses a method of converting a CMYK printer to print with a non-standard toner.

[0007] Prior art document US9488932B1 discloses a method and system for converting a toner printer to a white, clear or fluorescent toner printer.

[0008] Prior art document US 2013/004742A1 discloses a method of transfer printing onto articles, particularly

dark articles.

SUMMARY

[0009] To minimize the limitations in the cited references, and to minimize other limitations that will become apparent upon reading and understanding the present specification, the toner cartridge printer methods disclosed herein preferably allow a user to convert a standard printer into one that prints using sublimation toner.

[0010] In various embodiments, the methods may be used to convert a traditional toner cartridge(s) and/or drum(s) printing machine to a printing machine that prints sublimation toner from one or more of the toner cartridge(s).

[0011] In an aspect the invention relates to a method of converting a standard color toner printer to a sublimation color toner printer, comprising the steps described in appended claim 1.

[0012] In an aspect the invention relates to a method of sublimation printing, comprising the steps described in appended claim 7.

[0013] Additional embodiments of the invention will be understood from the detailed description of the illustrative embodiments.

DRAWINGS

[0014] The drawings are of illustrative embodiments. They do not illustrate all embodiments. Other embodiments may be used in addition or instead. Details which may be apparent or unnecessary may be omitted to save space or for more effective illustration. When the same numeral appears in different drawings, it refers to the same or like components or steps. Among the embodiments described in the following, only the embodiments according to fig. 3 and according to fig. 4, with the non-standard toner being a white toner, are embodiments according to the present invention. All other embodiments represent example configurations/ methods useful for understanding concepts of the present invention.

FIG. 1 is a flow block diagram of one embodiment of a method of converting a standard CMYK color toner printer to a CMYK sublimation color toner printer.

FIG. 2 is a flow block diagram of one embodiment of a method of converting a standard CMYK color toner printer to a CMYW sublimation color toner printer.

FIG. 3 is a flow block diagram of one embodiment of a method of converting a standard CMYK color toner printer to a CMYX sublimation color toner printer.

FIG. 4 is a flow block diagram of one embodiment of a method of converting a standard CMYKW color toner printer to a CMYKW sublimation color toner printer.

FIG. 5 is a flow block diagram of one embodiment of a method of converting a standard CMYKX color toner printer to a CMYKX sublimation color toner printer.

FIG. 6 is a flow block diagram of another embodiment of a method of converting a standard CMYKW color toner printer to a CMYKW sublimation color toner printer.

DETAILED DESCRIPTION

[0015] In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of various aspects of one or more embodiments. In other instances, well-known methods, procedures, and/or components have not been described in detail so as not to unnecessarily obscure aspects of embodiments.

[0016] While multiple embodiments are disclosed, still other embodiments will become apparent to those skilled in the art from the following detailed description. As will be realized, these embodiments are capable of modifications in various obvious aspects, as long as they do not depart from the scope of the appended claims. Accordingly, the screen shots, figures, and the detailed descriptions thereof, are to be regarded as illustrative in nature and not restrictive. Also, the reference or non-reference to a particular embodiment shall not be interpreted to limit the scope of protection.

[0017] In the following description, certain terminology is used to describe certain features of one or more embodiments. For purposes of the specification, unless otherwise specified, the term "substantially" refers to the complete or nearly complete extent or degree of an action, characteristic, property, state, structure, item, or result. For example, in one embodiment, an object that is "substantially" located within a housing would mean that the object is either completely within a housing or nearly completely within a housing. The exact allowable degree of deviation from absolute completeness may in some cases depend on the specific context. However, generally speaking, the nearness of completion will be so as to have the same overall result as if absolute and total completion were obtained. The use of "substantially" is also equally applicable when used in a negative connotation to refer to the complete or near complete lack of an action, characteristic, property, state, structure, item, or result.

[0018] As used herein, the terms "approximately" and "about" generally refer to a deviance of within 15% of the indicated number or range of numbers. In one embodiment, the term "approximately" and "about", refer to a deviance of between 0.0001-40% from the indicated number or range of numbers.

[0019] The present specification discloses methods for converting a toner cartridge printer to a sublimation toner printer. The methods for converting a toner cartridge printer to a sublimation toner printer preferably require

no special or dedicated printer drivers.

[0020] In the following description, certain terminology is used to describe certain features of one or more embodiments. For purposes of the specification, unless otherwise specified, the term "printing cartridge(s)" generally refers to a toner cartridge, a laser toner cartridge, a LED toner cartridge, a drum cartridge, and/or a combined toner and drum cartridge.

[0021] As used herein, the term "toner" generally refers to a powder, particulate, or dry ink that is used in laser printers, printers, and printing machines to form the printed text and images on the medium being printed. Generally, toner particles are melted by the heat of a fuser, and bound to the media.

[0022] Regarding a CMYK printer, the letter "K" preferably stands for black.

[0023] Regarding a CMYKW printer, the letter "W" preferably stands for white, but may also refer to a non-standard toner or toner color, such as white, clear, clear fluorescent, and/or metallic.

[0024] Regarding a CMYKX printer, the letter "X" refers to a non-standard toner or toner color, such as white, metallic, fluorescent, light, clear, clear fluorescent, ceramic, and/or sublimation.

[0025] The term transfer material may typically refer to a polyurethane media that accepts the toner print job and then allows the print job to be transferred to a final print surface via heat transfer. The transfer material may also be constructed from any suitable material, such as a specially coated paper or even just plain paper. The final print surface is preferably plastic or polymer, such as, for example, a polyester shirt or product.

[0026] **FIG. 1** is a flow block diagram of one embodiment of a method of converting a standard CMYK color toner printer to a CMYK sublimation color toner printer. As shown in **FIG. 1**, the method 100 of converting a standard CMYK color toner printer to a CMYK sublimation color toner printer, may comprise providing a standard CMYK color toner printer with four toner printing cartridges: a cyan toner printing cartridge, a magenta toner printing cartridge, a yellow toner printing cartridge, and a black toner printing cartridge **105**. Preferably, the CMYK printer is a LED printer.

[0027] The CMYK printer provided may have the following configurations:

Configuration 1:

Black - First
Yellow - Second
Magenta - Third
Cyan - Fourth

Configuration 2:

Cyan - First
Magenta - Second
Yellow - Third

Black - Fourth

In this configuration, the toner is transferred to the transfer belt first and then to the media.

Configuration 3:

Yellow - First

Magenta - Second

Cyan - Third

Black - Fourth

[0028] In various embodiments, any one of the cartridges may be in any of the four cartridge slots.

[0029] In various embodiments, the black toner printing cartridge may be in the fourth toner cartridge slot or the first toner cartridge slot. The cartridges and slots may also be referred to by their position: a first toner cartridge, a second toner cartridge, a third toner cartridge, and a fourth toner cartridge; and a first toner cartridge slot, a second toner cartridge slot, a third toner cartridge slot, and a fourth toner cartridge slot.

[0030] The method 100 may further comprise removing the four toner printing cartridges, such that four empty toner cartridge slots are created: a cyan toner cartridge slot, a magenta toner cartridge slot, a yellow toner cartridge slot, and a black toner cartridge slot 110.

[0031] Four sublimation toner printing cartridges may be provided. Preferably, the four sublimation toner printing cartridges comprise: a cyan sublimation toner printing cartridge, a magenta sublimation toner printing cartridge, a yellow sublimation toner printing cartridge, and a black sublimation toner printing cartridge 115. The cyan sublimation toner printing cartridge may be installed into the cyan toner cartridge slot, the magenta sublimation toner printing cartridge may be installed into the magenta toner cartridge slot, the yellow sublimation toner printing cartridge may be installed into the yellow toner cartridge slot, and the black sublimation toner printing cartridge may be installed into the black toner cartridge slot 120. The method 100 may further comprise printing a print job onto a transfer material 125. The transfer material may comprise a polyurethane media that accepts the toner print job and then allows the print job to be transferred to a final print surface via heat transfer 130. The final print surface is preferably plastic or polymer, such as, for example, a polyester shirt or product. In some embodiments, the print job may be directly printed onto the final print surface without the need for an intermediate transfer material.

[0032] In some embodiments, the steps of providing the four sublimation toner printing cartridges may further comprise: disassembling the four removed toner printing cartridges; emptying and cleaning the four removed toner printing cartridges, such that four empty printing cartridges may be created. The four empty printing cartridges may be filled with four sublimation color toners. Preferably, the four sublimation toners may comprise: a cyan sublimation toner, a magenta sublimation toner, a yellow

sublimation toner, and a black sublimation toner 135.

[0033] The modified printer may be converted back to a traditional CMYK printer by removing the sublimation toner printing cartridges and/or drum cartridges from the four slots in the CMYK printer and re-installing the regular cyan, yellow, magenta, and black toner printing cartridges and/or drum cartridge into their original positions.

[0034] FIG. 2 is a flow block diagram of one embodiment of a method of converting a standard CMYK color toner printer to a CMYW sublimation color toner printer. As shown in FIG. 2, the method 200 of converting a standard CMYK color toner printer to a CMYW sublimation color toner printer, may comprise providing a standard CMYK color toner printer with four toner printing cartridges: a cyan toner printing cartridge, a magenta toner printing cartridge, a yellow toner printing cartridge, and a black toner printing cartridge 205. In some embodiments, the CMYK printer may be a LED printer.

[0035] The CMYK printer provided may have the following configurations:

Configuration 1:

Black - First

Yellow - Second

Magenta - Third

Cyan - Fourth

Configuration 2:

Cyan - First

Magenta - Section

Yellow - Third

Black - Fourth

In this configuration, the toner is transferred to the transfer belt first and then to the media.

Configuration 3:

Yellow - First

Magenta - Second

Cyan - Third

Black - Fourth

[0036] In various embodiments, the black toner printing cartridge may be in the fourth toner cartridge slot or the first toner cartridge slot. The cartridges and slots may also be referred to by their position: a first toner cartridge, a second toner cartridge, a third toner cartridge, and a fourth toner cartridge; and a first toner cartridge slot, a second toner cartridge slot, a third toner cartridge slot, and a fourth toner cartridge slot.

[0037] The method 200 may further comprise removing the four toner printing cartridges, such that four empty toner cartridge slots are created: a cyan toner cartridge slot, a magenta toner cartridge slot, a yellow toner cartridge slot, and a black toner cartridge slot 210. In one embodiment, the black toner printing cartridge may be in

the fourth toner cartridge slot or the first toner cartridge slot. Three or four sublimation toner printing cartridges may be provided. Preferably, three of the sublimation toner printing cartridges comprise: a cyan sublimation toner printing cartridge, a magenta sublimation toner printing cartridge, and a yellow sublimation toner printing cartridge; the fourth toner printing cartridge may be a white replacement toner printing cartridge **215**. In some embodiments, the white replacement toner printing cartridge is regular, non-sublimation specific toner. In other embodiments, the white replacement toner printing cartridge is white sublimation toner.

[0038] The cyan sublimation toner printing cartridge may be installed into the cyan toner cartridge slot, the magenta sublimation toner printing cartridge may be installed into the magenta toner cartridge slot, the yellow sublimation toner printing cartridge may be installed into the yellow toner cartridge slot, and the white replacement toner printing cartridge may be installed into the first or fourth toner cartridge slot **220** (depending on the configuration of the printer being converted). The method **200** may further comprise providing raster image processor (RIP) software for printing cartridge remapping **222** and printing a print job onto a transfer material **225**. The transfer material may comprise a polyurethane media that accepts the toner print job and then allows the print job to be transferred to a final print surface via heat transfer **230**. In some embodiments, the print job may be directly printed/sublimated onto the final print surface without the need for an intermediate transfer material.

[0039] In some embodiments, the steps of providing the four sublimation toner printing cartridges may comprise: disassembling the four removed toner printing cartridges; emptying and cleaning the four removed toner printing cartridges, such that four empty printing cartridges may be created. The four empty printing cartridges may be filled with four sublimation toners. The four sublimation toners may comprise: a cyan sublimation toner, a magenta sublimation toner, a yellow sublimation toner, and a white sublimation toner **235**.

[0040] Alternatively, and preferably, three sublimation toners and one regular toner may be put into the four empty cartridge slots: a cyan sublimation toner, a magenta sublimation toner, a yellow sublimation toner, and a white non-sublimation toner

[0041] Regarding the RIP software, the RIP software utilizes printing cartridge mapping to enable the ability to move, change or swap printing cartridge locations in the printer. This allows white under printing or over printing in a single pass. The RIP software may also add a customizable separate layer of white either on top or underneath the image depending on the cartridge configuration and printing needs. This fully customizable feature in the software (RIP) allows you to completely reconfigure the printer to get almost any desired effect. However, in a preferred embodiment, a white toner foreground layer may be printed when the white toner is placed in the last printing cartridge position.

[0042] The RIP software may also be configured to allow the user to print in full color, CMY black, and white, such that the white prints with the other colors at the same time in a single layer. Preferably, the single layer is put down in a single pass. Black may be printed by combining all three of the color print colors.

[0043] FIG. 3 is a flow block diagram of one embodiment of a method of converting a standard CMYK color toner printer to a CMYX sublimation color toner printer. As shown in FIG. 3, the method **300** of converting a standard CMYK color toner printer to a CMYX sublimation color toner printer, may comprise providing a standard CMYK color toner printer with four toner printing cartridges: a cyan toner printing cartridge, a magenta toner printing cartridge, a yellow toner printing cartridge, and a black toner printing cartridge **305**. In one embodiment, the CMYK printer may be a LED printer. The method **300** may further comprise removing the four toner printing cartridges, such that four empty toner cartridge slots are created: a cyan toner cartridge slot, a magenta toner cartridge slot, a yellow toner cartridge slot, and a black toner cartridge slot **310**. In one embodiment, the black toner printing cartridge may be in the fourth toner cartridge slot. At least three sublimation toner printing cartridges may be provided. Preferably, the three sublimation toner printing cartridges comprise: a cyan sublimation toner printing cartridge, a magenta sublimation toner printing cartridge, and a yellow sublimation toner printing cartridge **315**. A non-standard toner printing cartridge may also be provided. The cyan sublimation toner printing cartridge may be installed into the cyan toner cartridge slot, the magenta sublimation toner printing cartridge may be installed into the magenta toner cartridge slot, the yellow sublimation toner printing cartridge may be installed into the yellow toner cartridge slot, and the non-standard toner printing cartridge may be installed into the fourth toner cartridge slot **320**.

[0044] The method **300** may further comprise providing raster image processor (RIP) software for printing cartridge remapping **322** and printing a print job onto a transfer material **325**. The transfer material may comprise a polyurethane media that accepts the toner print job and then allows the print job to be transferred to a final print surface via heat transfer **330**. In some embodiments, the print job may be directly printed/sublimated onto the final print surface without the need for an intermediate transfer material.

[0045] In some embodiments, the steps of providing the three sublimation toner printing cartridges **335** may comprise: disassembling the three removed toner printing cartridges; emptying and cleaning the three removed toner printing cartridges, such that three empty printing cartridges may be created. The three empty printing cartridges may be filled with three sublimation toners. Preferably, the three sublimation toners may comprise: a cyan sublimation toner, a magenta sublimation toner, and a yellow sublimation toner. The steps of providing the non-standard toner printing cartridge **335** may comprise:

disassembling the removed black toner printing cartridges; emptying and cleaning the removed black toner printing cartridges, such that an empty printing cartridge may be created. The empty printing cartridge may be filled with a non-standard toner. Preferably, the non-standard toner may comprise a non-sublimation toner, such as a white toner, a metallic toner, a fluorescent toner, a light toner, a clear toner, a clear fluorescent toner, or a ceramic toner. In one embodiment, the original black toner cartridge that was removed may be put back in along with the three new sublimation toner cartridges.

[0046] In some embodiments, the CMYK toner printer provided may be a CMYX toner printer, wherein the X is a non-standard cartridge (as original manufactured, or as previously modified), and X can be white, fluorescent, clear, metallic, ceramic, or a different sublimation. The present disclosure covers taking any existing four or five printer toner cartridges (standard and/or non-standard) and converting it to use other types of printing cartridges (standard and/or non-standard).

[0047] FIG. 4 is a flow block diagram of one embodiment of a method of converting a standard CMYKW color toner printer to a CMYKW sublimation color toner printer. As shown in FIG. 4, the method **400** of converting a standard CMYKW color toner printer to a CMYKW sublimation color toner printer, may comprise providing a standard CMYKW color toner printer with five toner printing cartridges: a cyan toner printing cartridge, a magenta toner printing cartridge, a yellow toner printing cartridge, a black toner printing cartridge, and a white toner printing cartridge **405**. In one embodiment, the CMYKW printer may be a LED printer. The method **400** may further comprise removing five toner printing cartridges, such that five empty toner cartridge slots are created: a cyan toner cartridge slot, a magenta toner cartridge slot, a yellow toner cartridge slot, a black toner cartridge slot, and a white toner cartridge slot **410**. In one embodiment, the black toner printing cartridge may be in the fourth toner cartridge slot. Five sublimation toner printing cartridges may be provided. Preferably, the five sublimation toner printing cartridges comprise: a cyan sublimation toner printing cartridge, a magenta sublimation toner printing cartridge, a yellow sublimation toner printing cartridge, a black sublimation toner printing cartridge, and a white sublimation toner printer cartridge **415**. The cyan sublimation toner printing cartridge may be installed into the cyan toner cartridge slot, the magenta sublimation toner printing cartridge may be installed into the magenta toner cartridge slot, the yellow sublimation toner printing cartridge may be installed into the yellow toner cartridge slot, the black sublimation toner printing cartridge may be installed into the black toner cartridge slot, and the white sublimation toner printing cartridge may be installed into the white toner cartridge slot **420**. The method **400** may further comprise providing raster image processor (RIP) software for printing cartridge remapping **422** (which may be used for over (or even under) printing with white in a single pass). The method **400** may further comprise print-

ing a print job onto a transfer material **425**. The transfer material may comprise a polyurethane media that accepts the toner print job and then allows the print job to be transferred to a final print surface via heat transfer **430**. In some embodiments, the print job may be directly printed/sublimated onto the final print surface without the need for an intermediate transfer material.

[0048] In some embodiments, the steps of providing the five sublimation toner printing cartridges may comprise: disassembling the five removed toner printing cartridges; emptying and cleaning the five removed toner printing cartridges, such that five empty printing cartridges may be created. The five empty printing cartridges may be filled with five sublimation toners. Preferably, the five sublimation toners may comprise: a cyan sublimation toner, a magenta sublimation toner, a yellow sublimation toner, a black sublimation toner, and a white sublimation toner **435**.

[0049] Another embodiment may be a CMYKW printer that underprints in a single pass, or overprints in a single pass, and/or does both and can be switched back and forth. Overprint printers are useful in providing a clear or white background to an image that is heat transferred to a final surface from a transfer material. Underprint printers are useful in providing a clear or white background to an image that is printed on a non-standard or dark material/surface. The overprint of clear or white may then be the background layer after the image is transferred/sublimated to the final media.

[0050] FIG. 5 is a flow block diagram of one embodiment of a method of converting a standard CMYKX color toner printer to a CMYKX sublimation color toner printer. As shown in FIG. 5, the method **500** of converting a standard CMYKX color toner printer to a CMYKX sublimation color toner printer, may comprise providing a standard CMYKX color toner printer with five toner printing cartridges: a cyan toner printing cartridge, a magenta toner printing cartridge, a yellow toner printing cartridge, a black toner printing cartridge, and a non-standard toner printing cartridge **505**. In one embodiment, the CMYKX printer may be a LED printer. The method **500** may further comprise removing five toner printing cartridges, such that five empty toner cartridge slots are created: a cyan toner cartridge slot, a magenta toner cartridge slot, a yellow toner cartridge slot, a black toner cartridge slot, and a non-standard toner cartridge slot **510**. In one embodiment, the black toner printing cartridge may be in the fourth toner cartridge slot. At least four sublimation toner printing cartridges may be provided. Preferably, the four sublimation toner printing cartridges comprise: a cyan sublimation toner printing cartridge, a magenta sublimation toner printing cartridge, a yellow sublimation toner printing cartridge, and a black sublimation toner printing cartridge **515**. A non-standard toner printing cartridge may also be provided to go in the fifth toner cartridge slot. The cyan sublimation toner printing cartridge may be installed into the cyan toner cartridge slot, the magenta sublimation toner printing cartridge may be installed into

the magenta toner cartridge slot, the yellow sublimation toner printing cartridge may be installed into the yellow toner cartridge slot, the black sublimation toner printing cartridge may be installed into the black toner cartridge slot, and the non-standard, but non-sublimation, toner printing cartridge may be installed into the non-standard toner cartridge slot **520**. The method **500** may further comprise providing raster image processor (RIP) software for printing cartridge remapping **522** (which may be used for over (or even under) printing with white in a single pass). The method **500** may also comprise printing a print job onto a transfer material **525**. The transfer material may comprise a polyurethane media that accepts the toner print job and then allows the print job to be transferred to a final print surface via heat transfer **530**. In some embodiments, the print job may be directly printed/sublimated onto the final print surface without the need for an intermediate transfer material.

[0051] In some embodiments, the steps of providing the four sublimation toner printing cartridges **535** may comprise: disassembling the four removed toner printing cartridges; emptying and cleaning the four removed toner printing cartridges, such that four empty printing cartridges may be created. The four empty printing cartridges may be filled with four sublimation color toners. Preferably, the four sublimation toners may comprise: a cyan sublimation toner, a magenta sublimation toner, a yellow sublimation toner, and a black sublimation toner. The steps of providing a non-standard toner printing cartridge **535** may comprise: disassembling the removed non-standard toner printing cartridge; emptying and cleaning the removed non-standard toner printing cartridge, such that an empty non-standard printing cartridge may be created. The empty non-standard printing cartridge may be filled with a non-standard toner color. Preferably, the non-standard toner color may comprise: a white toner, a metallic toner, a fluorescent toner, a light toner, a clear toner, a clear fluorescent toner, a sublimation non-standard toner, and/or a ceramic toner. In one embodiment, the original white toner printing cartridge may be put back into place in the fifth toner cartridge slot.

[0052] In some embodiments, the X non-standard toner may be in the first, fourth, or fifth toner printing cartridge slot and the black sublimation toner printing cartridge may be in the first, fourth, or fifth toner printing cartridge slot and whichever is not being used by the non-standard toner cartridge. In another embodiment, the X non-standard toner may be in the first, second, third, fourth, or fifth toner printing cartridge slot and the black sublimation toner printing cartridge may be in the first, second, third, fourth, or fifth toner printing cartridge slot.

[0053] Another embodiment may be a CMYKX printer that underprints in a single pass, or overprints in a single pass, and/or does both and can be switched back and forth.

[0054] Overprint printers are useful in providing a clear or white background to an image that is heat transferred to a final surface from a transfer material. Underprint

printers are useful in providing a clear or white background to an image that is printed on a non-standard or dark material/surface. The overprint of clear or white may then be the background layer after the image is transferred/sublimated to the final media.

[0055] FIG. 6 is a flow block diagram of one embodiment of a method of converting a standard CMYKW color toner printer to a CMYKW sublimation color toner printer. As shown in FIG. 6, the method **600** of converting a standard CMYKW color toner printer to a CMYKW sublimation color toner printer, may comprise providing a standard CMYKW color toner printer with five toner printing cartridges: a cyan toner printing cartridge, a magenta toner printing cartridge, a yellow toner printing cartridge, a black toner printing cartridge, and a white toner printing cartridge **605**. In one embodiment, the CMYKW printer may be a LED printer. The method **600** may further comprise removing four toner printing cartridges, such that four empty toner cartridge slots are created: a cyan toner cartridge slot, a magenta toner cartridge slot, a yellow toner cartridge slot, and a black toner cartridge slot **610**. Preferably, the white toner cartridge is not removed, unless it is remapped into another slot. In one embodiment, the black toner printing cartridge may be in the fourth toner cartridge slot. Four sublimation toner printing cartridges may be provided. Preferably, the four sublimation toner printing cartridges comprise: a cyan sublimation toner printing cartridge, a magenta sublimation toner printing cartridge, a yellow sublimation toner printing cartridge, and a black sublimation toner printing cartridge **615**. The cyan sublimation toner printing cartridge may be installed into the cyan toner cartridge slot, the magenta sublimation toner printing cartridge may be installed into the magenta toner cartridge slot, the yellow sublimation toner printing cartridge may be installed into the yellow toner cartridge slot, and the black sublimation toner printing cartridge may be installed into the black toner cartridge slot **620**. The method **600** may further comprise providing raster image processor (RIP) software for printing cartridge remapping **622** and printing a print job onto a transfer material **625**. The transfer material may comprise a polyurethane media that accepts the toner print job and then allows the print job to be transferred to a final print surface via heat transfer **630**. In some embodiments, the print job may be directly printed onto the final print surface without the need for an intermediate transfer material.

[0056] In some embodiments, the steps of providing the four sublimation toner printing cartridges **635** may comprise: disassembling the four removed toner printing cartridges; emptying and cleaning the four removed toner printing cartridges, such that four empty printing cartridges may be created. The four empty printing cartridges may be filled with four sublimation toners. Preferably, the four sublimation toners may comprise: a cyan sublimation toner, a magenta sublimation toner, a yellow sublimation toner, and a black sublimation toner.

[0057] In some embodiments, the X non-standard ton-

er may be in the first, fourth, or fifth toner printing cartridge slot and the black toner printing cartridge may be in the first, fourth, or fifth toner printing cartridge slot and which-ever is not being used by the non-standard toner cartridge.

[0058] Another embodiment may be a CMYKX printer that underprints in a single pass, or overprints in a single pass, and/or does both and can be switched back and forth.

[0059] Overprint printers are useful in providing a clear or white background to an image that is heat transferred to a final surface from a transfer material. Underprint printers are useful in providing a clear or white background to an image that is printed on a non-standard or dark material/surface. The overprint of white may then be the background layer after the image is transferred/sublimated to the final media.

[0060] Unless otherwise stated, all measurements, values, ratings, positions, magnitudes, sizes, locations, and other specifications, which set forth in this specification, including in the claims that follow, are approximate, not exact. They are intended to have a reasonable range, which is consistent with the functions to which they relate and with what is customary in the art to which they pertain.

[0061] The foregoing description of the preferred embodiment has been presented for the purposes of illustration and description. While multiple embodiments are disclosed, still other embodiments will become apparent to those skilled in the art from the above detailed description, which shows and describes the illustrative embodiments. As will be realized, these embodiments are capable of modifications as long as they fall within the scope of the appended claims.

Claims

1. A method of converting a standard color toner printer to a sublimation color toner printer (200, 300), comprising the steps:

providing a standard color toner printer comprising four toner printing cartridges (205, 305):

a cyan toner printing cartridge, a magenta toner printing cartridge, a yellow toner printing cartridge, and a black toner printing cartridge; wherein said black toner printing cartridge is in the fourth toner cartridge slot of the standard color toner printer;
removing four of said toner printing cartridges (210, 310), such that four empty toner cartridge slots are created: a cyan toner cartridge slot, a magenta toner cartridge slot, a yellow toner cartridge slot, and a black toner cartridge slot;

providing three sublimation toner printing car-

tridges (215, 315):

a cyan sublimation toner printing cartridge, a magenta sublimation toner printing cartridge, and a yellow sublimation toner printing cartridge;
providing a white replacement toner printing cartridge (215, 315);

installing said cyan sublimation toner printing cartridge into said cyan toner cartridge slot (220, 320);

installing said magenta sublimation toner printing cartridge into said magenta toner cartridge slot (220, 320);

installing said yellow sublimation toner printing cartridge into said yellow toner cartridge slot (220, 320);

installing said white replacement toner printing cartridge in said black toner cartridge slot (220, 320), i.e. the fourth toner cartridge slot of the standard toner printer; and providing raster image processor, RIP, software for printing cartridge remapping (222, 322) to obtain the sublimation color toner printer, wherein the sublimation color toner printer is configured by the RIP software to print a white toner foreground layer with said three sublimation colors at the same time in a single layer in a single pass.

2. The method of converting a standard color toner printer to a sublimation color toner printer according to claim 1 wherein said step of providing three sublimation toner printing cartridges and said step of providing a white replacement toner printing cartridge comprises the steps of:

disassembling said removed toner printing cartridges;
emptying and cleaning said removed toner printing cartridges, such that four empty printing cartridges are created; and
filling three of said empty printing cartridges with three sublimation toners: a cyan sublimation toner, a magenta sublimation toner, and a yellow sublimation toner; and
filling one of said empty printing cartridges with a white replacement toner.

3. The method of converting a standard color toner printer to a sublimation toner printer according to claim 2 wherein said white replacement toner is a white sublimation toner.

4. The method of converting a standard color toner printer to a sublimation toner printer according to claim 2 wherein said white replacement toner is a regular, non-sublimation specific white toner.

5. The method of converting a standard color toner printer to a sublimation toner printer according to claim 1 wherein said white replacement toner printing cartridge is a white sublimation toner printing cartridge. 5
6. The method of converting a standard color toner printer to a sublimation toner printer according to claim 1 wherein said white replacement toner printing cartridge is a non-sublimation specific white toner printing cartridge. 10
7. A method of sublimation printing a print job to a final print surface via heat transfer, said method comprising: 15
 - performing the method of converting a standard color toner printer to a sublimation toner printer according to any of the claims 1 to 6 to obtain a converted printer; 20
 - printing, using said converted printer, a print job onto a transfer material;
 - transferring said print job to a final print surface via a heat transfer. 25
8. The method of sublimation printing according to claim 7, further comprising: 30
 - overprinting a layer of white on said print job in a single pass such that said layer of white is under said print job when said transferring said print job from said transfer material to said final print surface via said heat transfer.

Patentansprüche

1. Verfahren zum Umwandeln eines Standardfarbtonerdruckers in einen Sublimationsfarbtonerdrucker (200, 300), umfassend die folgenden Schritte: 35
 - Bereitstellen eines Standardfarbtonerdruckers, der vier Tonerdruckkartuschen (205, 305) umfasst, eine Cyan-Tonerdruckkartusche, eine Magenta-Tonerdruckkartusche, eine Gelb-Tonerdruckkartusche und eine Schwarz-Tonerdruckkartusche; wobei sich die Schwarz-Tonerdruckkartusche in dem vierten Tonerkartuschenschlitz des Standardfarbtonerdruckers befindet; 40
 - Entfernen von vier der Tonerdruckkartuschen (210, 310), sodass vier leere Tonerkartuschenschlitze erzeugt werden: ein Cyan-Tonerkartuschenschlitz, ein Magenta-Tonerkartuschenschlitz, ein Gelb-Tonerkartuschenschlitz und ein Schwarz-Tonerkartuschenschlitz; 45
 - Bereitstellen von drei Sublimationstonerdruckkartuschen (215, 315): eine Cyan-Sublimationstonerdruckkartusche, eine Magenta-Sublimati-

onstonerdruckkartusche und eine Gelb-Sublimationstonerdruckkartusche;
 Bereitstellen einer Weiß-Ersatztonerdruckkartusche (215, 315);
 Einsetzen der Cyan-Sublimationstonerdruckkartusche in den Cyan-Tonerkartuschenschlitz (220, 320);
 Einsetzen der Magenta-Sublimationstonerdruckkartusche in den Magenta-Tonerkartuschenschlitz (220, 320);
 Einsetzen der Gelb-Sublimationstonerdruckkartusche in den Gelb-Tonerkartuschenschlitz (220, 320);
 Einsetzen der Weiß-Ersatztonerdruckkartusche in den Schwarz-Tonerkartuschenschlitz (220, 320), d. h. den vierten Tonerkartuschenschlitz des Standardtonerdruckers; und
 Bereitstellen einer Rasterbildprozessorsoftware, RIP-Software, zum Neuordnen von Druckkartuschen (222, 322), um den Sublimationsfarbtonerdrucker zu erhalten, wobei der Sublimationsfarbtonerdrucker durch die RIP-Software konfiguriert ist, um eine Weiß-Tonervordergrundschrift mit den drei Sublimationsfarben gleichzeitig in einer einzigen Schicht in einem einzigen Durchgang zu drucken.

2. Verfahren zum Umwandeln eines Standardfarbtonerdruckers in einen Sublimationsfarbtonerdrucker nach Anspruch 1, wobei der Schritt des Bereitstellens von drei Sublimationstonerdruckkartuschen und der Schritt des Bereitstellens einer Weiß-Ersatztonerdruckkartusche die folgenden Schritte umfassen:

Zerlegen der entfernten Tonerdruckkartuschen; Leeren und Reinigen der entfernten Tonerdruckkartuschen, sodass vier leere Druckkartuschen erzeugt werden; und
 Füllen von drei der leeren Druckkartuschen mit drei Sublimationstonern: einem Cyan-Sublimationstoner, einem Magenta-Sublimationstoner und einem Gelb-Sublimationstoner; und
 Füllen von einer der leeren Druckkartuschen mit einem Weiß-Ersatztoner.

3. Verfahren zum Umwandeln eines Standardfarbtonerdruckers in einen Sublimationstonerdrucker nach Anspruch 2, wobei der Weiß-Ersatztoner ein Weiß-Sublimationstoner ist.
4. Verfahren zum Umwandeln eines Standardfarbtonerdruckers in einen Sublimationstonerdrucker nach Anspruch 2, wobei der Weiß-Ersatztoner ein regulärer, nichtsublimationsspezifischer Weiß-Toner ist.
5. Verfahren zum Umwandeln eines Standardfarb-

tonerdruckers in einen Sublimationstonerdrucker nach Anspruch 1, wobei die Weiß-Ersatztonerdruckkartusche eine Weiß-Sublimationstonerdruckkartusche ist.

6. Verfahren zum Umwandeln eines Standardfarbtonerdruckers in einen Sublimationstonerdrucker nach Anspruch 1, wobei die Weiß-Ersatztonerdruckkartusche eine nicht-sublimationsspezifische Weiß-Tonerdruckkartusche ist.

7. Verfahren zum Sublimationsdrucken eines Druckauftrags auf eine finale Druckoberfläche mittels Wärmeübertragung, wobei das Verfahren Folgendes umfasst:

Durchführen des Verfahrens zum Umwandeln eines Standardfarbtonerdruckers in einen Sublimationstonerdrucker nach einem der Ansprüche 1 bis 6, um einen umgewandelten Drucker zu erhalten;

Drucken, unter Verwendung des umgewandelten Druckers, eines Druckauftrags auf ein Übertragungsmaterial;

Übertragen des Druckauftrags auf eine finale Druckoberfläche mittels einer Wärmeübertragung.

8. Verfahren zum Sublimationsdrucken nach Anspruch 7, ferner umfassend:

Überdrucken einer weißen Schicht auf den Druckauftrag in einem einzigen Durchgang, sodass sich die weiße Schicht unter dem Druckauftrag befindet, wenn der Druckauftrag von dem Übertragungsmaterial auf die finale Druckoberfläche mittels der Wärmeübertragung übertragen wird.

Revendications

1. Procédé de conversion d'une imprimante à toner couleur standard en une imprimante à toner couleur de sublimation (200, 300), comprenant les étapes de :

fourniture à une imprimante à toner couleur standard comprenant quatre cartouches d'impression à toner (205, 305) d'une cartouche d'impression à toner cyan, d'une cartouche d'impression à toner magenta, d'une cartouche d'impression à toner jaune et d'une cartouche d'impression à toner noir ; dans lequel ladite cartouche d'impression à toner noir se situe dans le quatrième logement de cartouche de toner de l'imprimante à toner couleur standard ; retrait de quatre desdites cartouches d'impression à toner (210, 310) de telle sorte que quatre logements de cartouches de toner vides soient

créés : un logement de cartouche de toner cyan, un logement de cartouche de toner magenta, un logement de cartouche de toner jaune et un logement de cartouche de toner noir ;

fourniture de trois cartouches d'impression à toner de sublimation (215, 315): une cartouche d'impression à toner de sublimation cyan, une cartouche d'impression à toner de sublimation magenta et une cartouche d'impression à toner de sublimation jaune ;

fourniture d'une cartouche d'impression à toner de remplacement blanc (215, 315) ;

installation de ladite cartouche d'impression à toner de sublimation cyan dans ledit logement de cartouche de toner cyan (220, 320) ;

installation de ladite cartouche d'impression à toner de sublimation magenta dans ledit logement de cartouche de toner magenta (220, 320) ;

installation de ladite cartouche d'impression à toner de sublimation jaune dans ledit logement de cartouche de toner jaune (220, 320) ;

installation de ladite cartouche d'impression à toner de remplacement blanc dans ledit logement de cartouche de toner noir (220, 320),

c'est-à-dire le quatrième logement de cartouche de toner de l'imprimante à toner standard ; et

fourniture d'un logiciel de traitement d'image matricielle, RIP, pour le remappage de cartouche d'impression (222, 322) afin d'obtenir l'imprimante à toner couleur de sublimation, dans lequel l'imprimante à toner couleur de sublimation est configurée par le logiciel RIP pour imprimer une couche d'avant-plan de toner blanc avec lesdites trois couleurs de sublimation en même temps en une seule couche en un seul passage.

2. Procédé de conversion d'une imprimante à toner couleur standard en une imprimante à toner couleur de sublimation selon la revendication 1, dans lequel ladite étape de fourniture de trois cartouches d'impression à toner de sublimation et ladite étape de fourniture d'une cartouche d'impression à toner de remplacement blanc comprend les étapes de :

démontage desdites cartouches d'impression à toner retirées ;

vidage et nettoyage desdites cartouches d'impression à toner retirées, de telle sorte que quatre cartouches d'impression vides soient créées ; et

remplissage de trois desdites cartouches d'impression vides avec trois toners de sublimation : un toner de sublimation cyan, un toner de sublimation magenta et un toner de sublimation jaune ; et

remplissage de l'une desdites cartouches d'im-

pression vides avec un toner de remplacement blanc.

3. Procédé de conversion d'une imprimante à toner couleur standard en une imprimante à toner de sublimation selon la revendication 2, dans lequel ledit toner de remplacement blanc est un toner de sublimation blanc. 5
4. Procédé de conversion d'une imprimante à toner couleur standard en une imprimante à toner de sublimation selon la revendication 2, dans lequel ledit toner de remplacement blanc est un toner blanc ordinaire, non spécifique à la sublimation. 10
5. Procédé de conversion d'une imprimante à toner couleur standard en une imprimante à toner de sublimation selon la revendication 1, dans lequel ladite cartouche d'impression à toner de remplacement blanc est une cartouche d'impression à toner de sublimation blanc. 15 20
6. Procédé de conversion d'une imprimante à toner couleur standard en une imprimante à toner de sublimation selon la revendication 1, dans lequel ladite cartouche d'impression à toner de remplacement blanc est une cartouche d'impression à toner blanc non spécifique à la sublimation. 25
7. Procédé d'impression par sublimation d'un travail d'impression sur une surface d'impression finale par transfert thermique, ledit procédé comprenant : 30
 - l'exécution du procédé de conversion d'une imprimante à toner couleur standard en une imprimante à toner de sublimation selon l'une quelconque des revendications 1 à 6 pour obtenir une imprimante convertie ; 35
 - impression, en utilisant ladite imprimante convertie, d'un travail d'impression sur un matériau de transfert ; 40
 - transfert dudit travail d'impression sur une surface d'impression finale par transfert thermique.
8. Procédé d'impression par sublimation selon la revendication 7, comprenant en outre : 45
 - la surimpression d'une couche de blanc sur ledit travail d'impression en un seul passage de telle sorte que ladite couche de blanc se trouve sous ledit travail d'impression lors dudit transfert dudit travail d'impression depuis ledit matériau de transfert vers ladite surface d'impression finale via ledit transfert thermique. 50

55

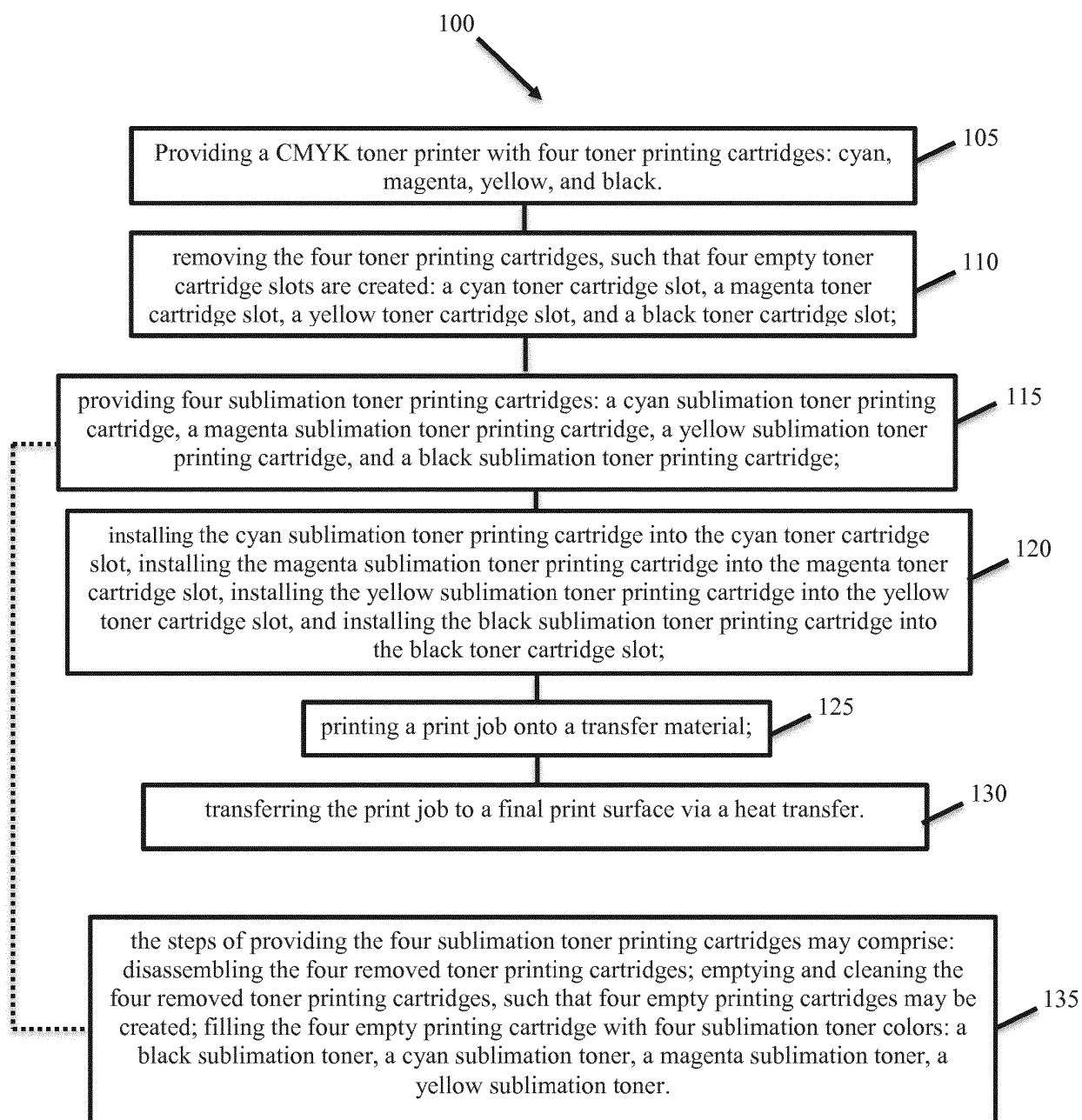


FIG. 1

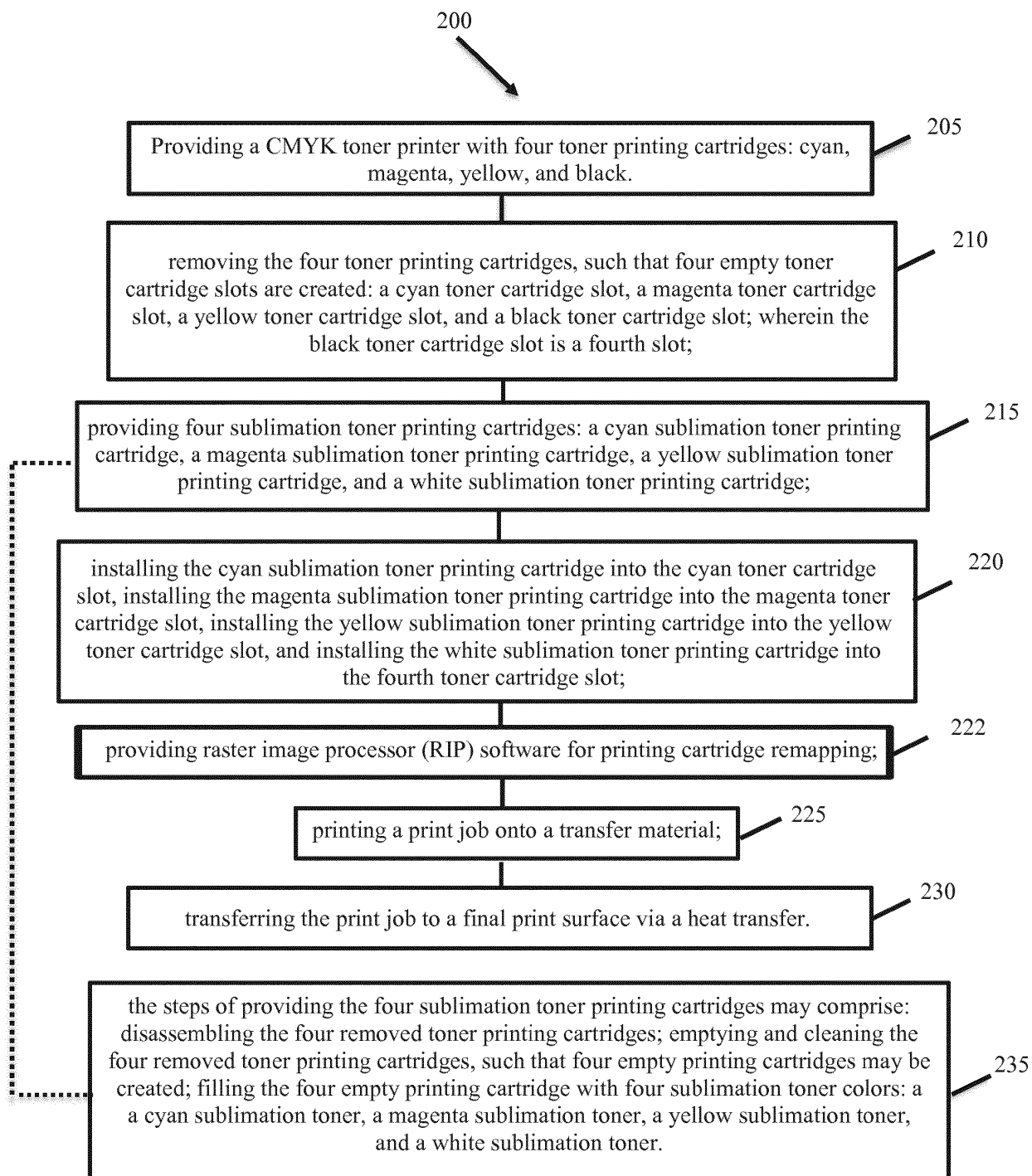


FIG. 2

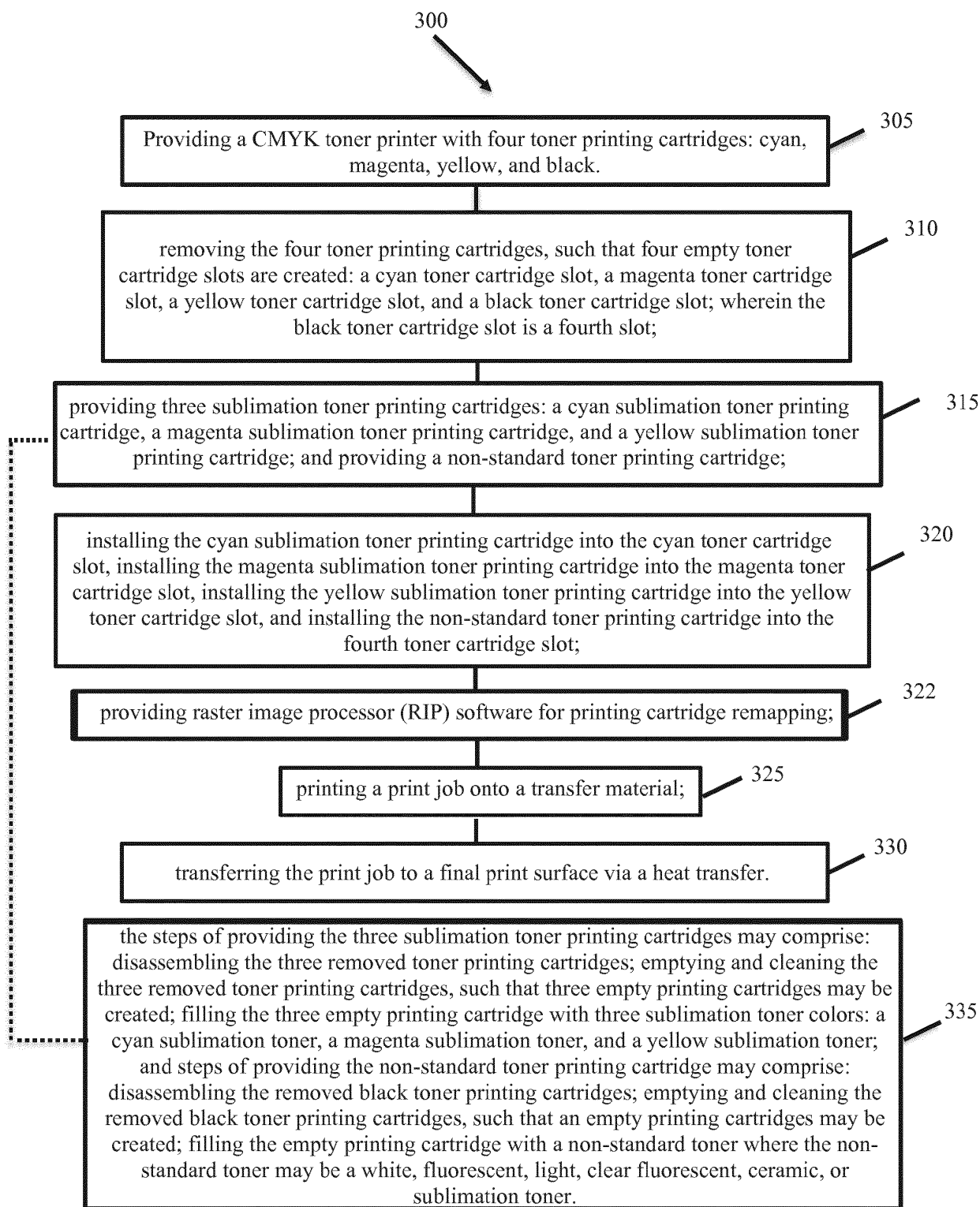


FIG. 3

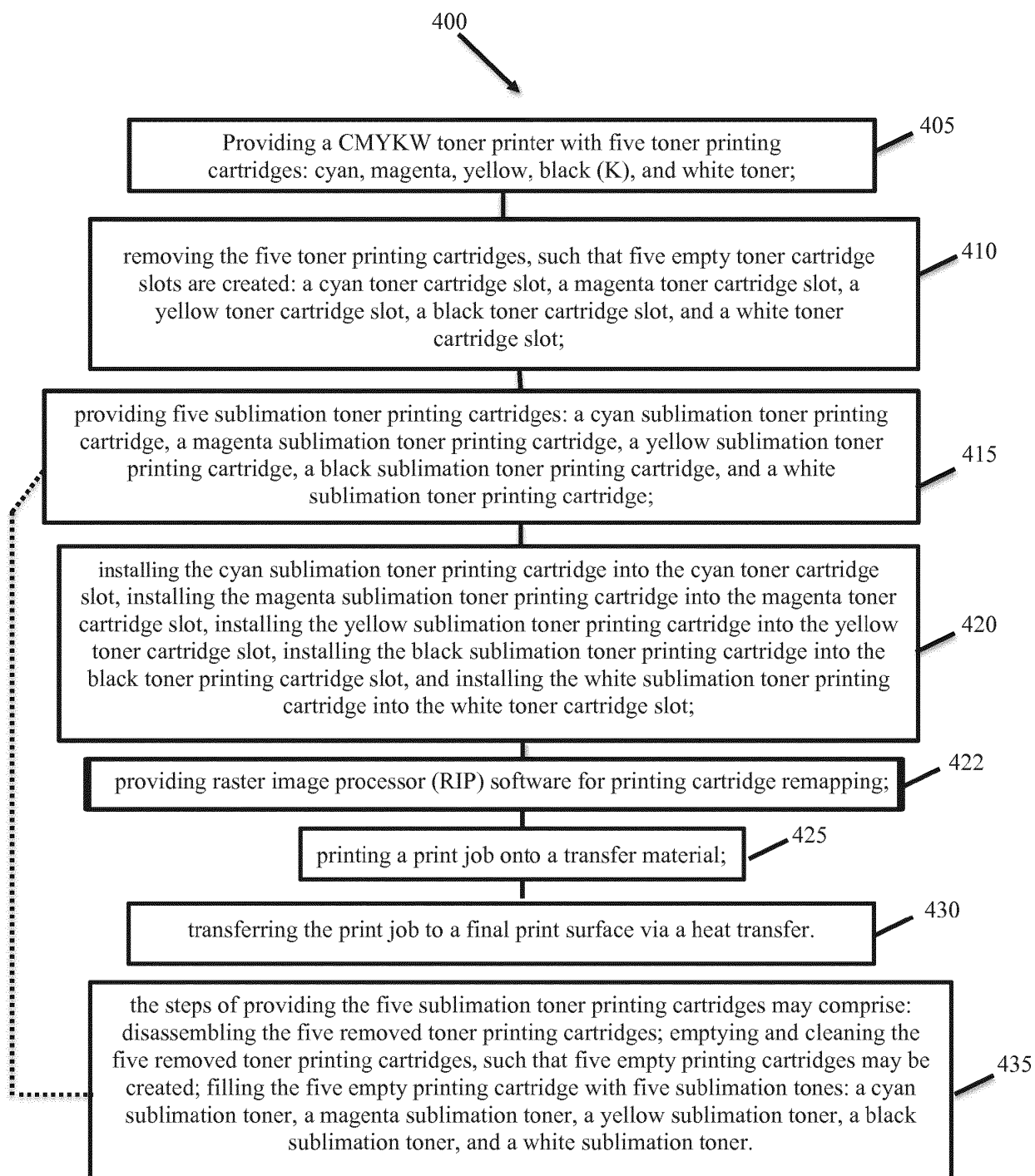


FIG. 4

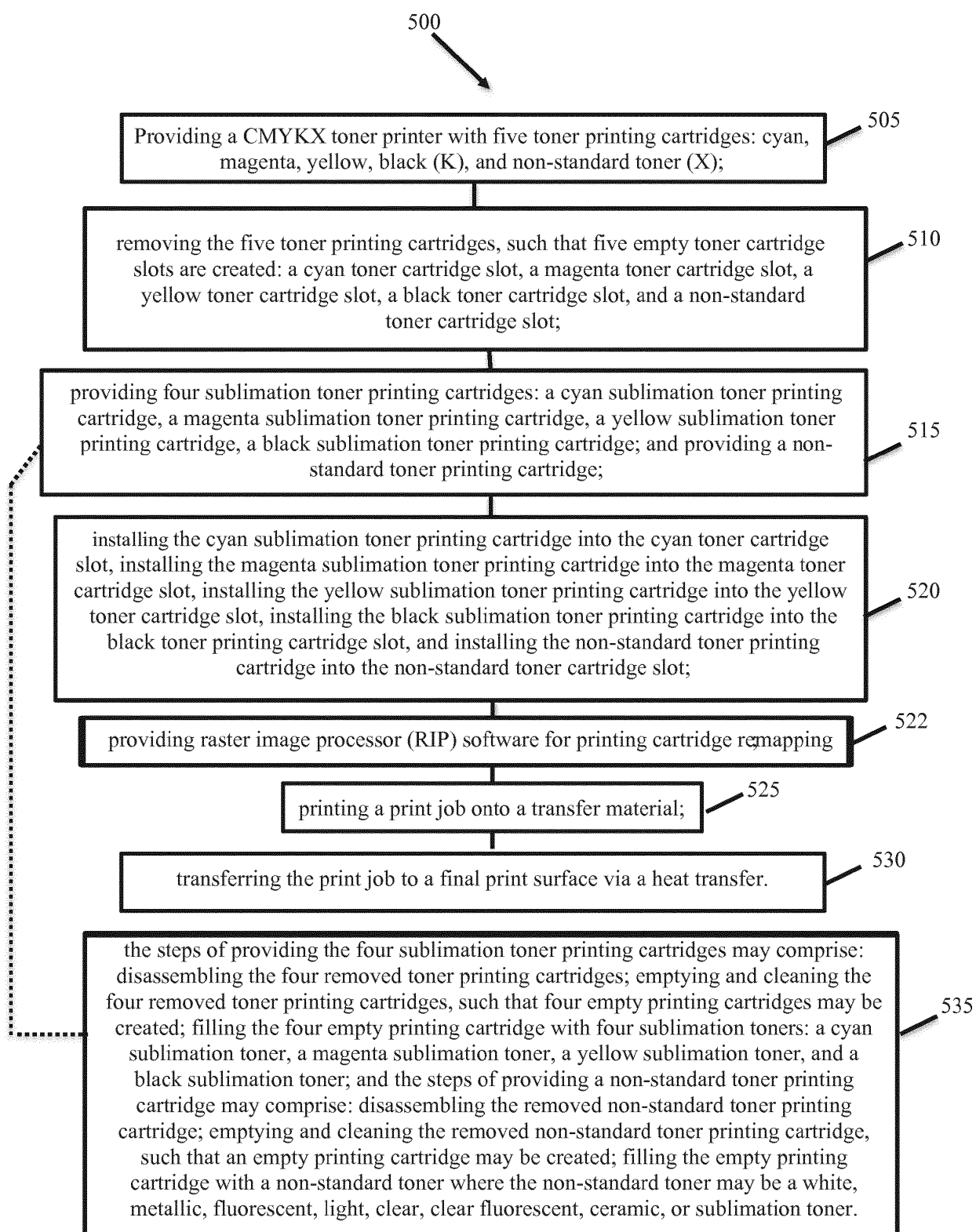


FIG. 5

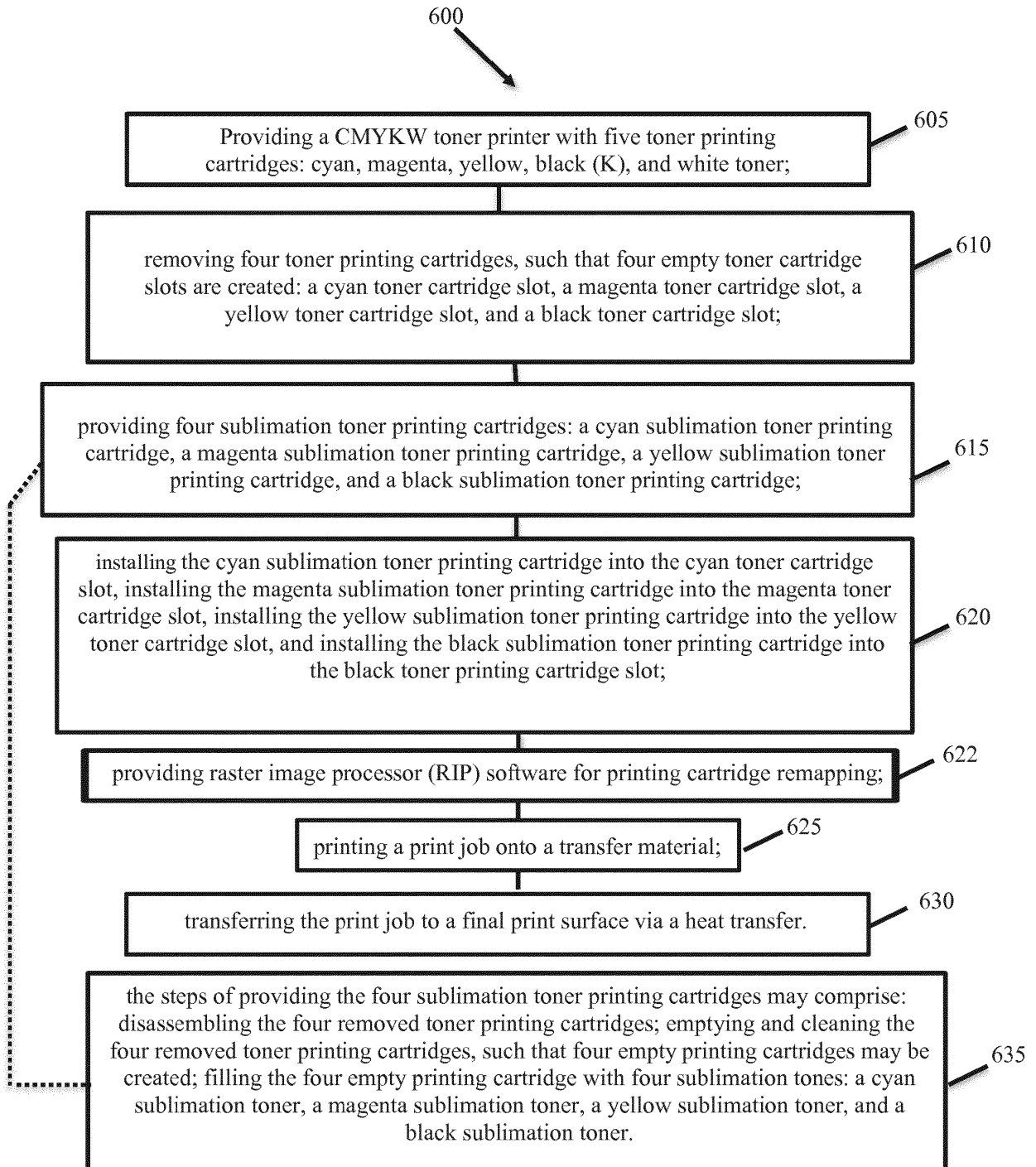


FIG. 6

REFERENCES CITED IN THE DESCRIPTION

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