



(51) International Patent Classification:
G06F 3/12 (2006.01)

(21) International Application Number:
PCT/EP2009/055979

(22) International Filing Date:
18 May 2009 (18.05.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/056,705 28 May 2008 (28.05.2008) US

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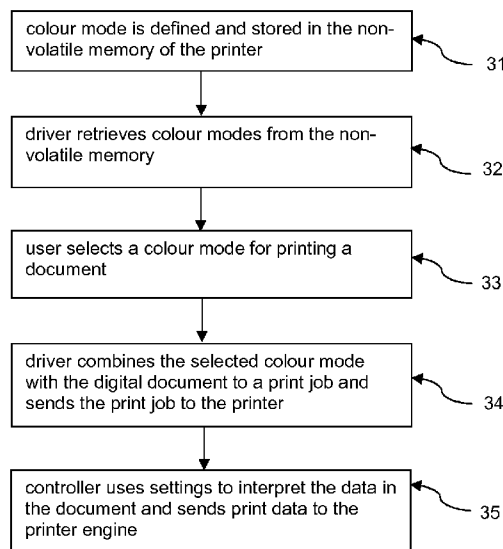
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: METHOD AND SYSTEM FOR SELECTING COLOUR SETTINGS



(57) Abstract: A method of printing documents in a system comprising a colour printer and a workstation using colour modes to communicate printer settings values. In the workstation a printer driver is used for ordering a digital document to be printed. The flexibility for the reproduction of colour that is offered by a large number of job properties that relate to the use of colour is accompanied by confusion for inexperienced users how to select the right combination of settings for a specific digital document. Colour modes comprising a number of settings for the interpretation of the colour information in the digital document are defined in the system and are communicated to the printer driver. Colour modes are edited centrally with a settings editor.

FIG. 3

METHOD AND SYSTEM FOR SELECTING COLOUR SETTINGS

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The invention relates to a method for selecting settings for colour print job properties when printing documents in a system of at least one colour printer and at least one user workstation. The invention further relates to a colour printing system.

- 10 In the present state of the art a digital document that is created using a pre-press application on a user workstation is printed by sending a print job to a printer after either invoking a printer driver or establishing direct communication between the pre-press application and the printer. The printer comprises a print engine for marking the paper and a controller for processing the print jobs. A print job is created by combining the
- 15 digital document with print job settings that indicate how the document is to be processed and printed. These settings define print job properties, comprising e.g. the plexity (with the settings simplex, duplex), the number of copies to be printed, an indication how the document is to be finished (no finishing, staple, punch holes) and what media to use for the document. These print job properties are easily conceivable
- 20 by a user of the printer.

In the case of colour printing a large number of settings need to be included that indicate the various manners in which the colours of the document must be interpreted and rendered. In contrast to other print job properties, these settings refer to properties

25 that are puzzling to the non-experienced user. Colour in documents may be defined in many ways, e.g. using RGB or CMYK co-ordinates, or by indicating the colour as a spot colour. The controller interprets these colours with a Colour Management Module that is programmed to translate the document colours into print process colours. The Colour Management Module is a part of the Raster Image Processing program. This takes

30 instructions in the digital document to make up the document in pixels, which are coloured pixels in the case of colour printing.

The translation of colours can be done in various ways, depending on the character of the document. If the document contains photographs a different rendering is expected

35 than when the document contains business graphics. In the last case mostly saturated

colours are used that are rendered well when the colours of the document are translated into pure process colours. The rendering of photographs depends on personal preferences that are different in various countries, especially for colours that belong to the domain of so-called memory colours. The Colour Management Module uses a
5 number of parameters that control the translation of document colours into print process colours. These parameters are colour settings that are defined at the time of preparing a job. They indicate values for job properties such as input- and output-profile, rendering intent, and halftone screen. These settings are necessary to offer the full potential of the colour printer to the user and give the system a great flexibility. Some of the colour
10 settings to be selected, such as black-point compensation, are dependent on the way the calibration for the printer was performed and are therefore to be set in a prescribed way. Furthermore some of the colour properties are not independent and the settings for these properties are selected in coherence.

15 Many users seem to get lost in the wide range of colour print job properties for which they have to make a selection. Hiding these properties makes them not well accessible by users that occasionally offer their documents to the printer. A further disadvantage of hiding the properties is that a user may be unaware of a change in the colour settings by another user. As a result he gets a different output than he expects. Changing the
20 settings by users also means that it is hard to keep the settings in the system consistent, meaning that on different workstations there is no difference between the settings.

Therefore there is a problem in how the plethora of settings for job properties that relate
25 to the use of colour in the document is offered to a user of the printing system and the way consistency is preserved for these settings.

In the prior art this problem is tackled in different ways: one is to define "virtual printers" that relate to one print engine, but use different colour settings for the different virtual
30 printers. Users select a virtual printer to their choice to obtain a printed document that responds to their preference. For example, one virtual printer is dedicated to business graphics and a second virtual printer to photographic prints. Another way to tackle the problem of selecting colour print job settings is to use "hot folders". In this case the printing process is started when a print job is placed in a specific folder or directory,
35 using different folders for one print engine, each folder having different colour settings.

The present invention solves the problem by defining colour modes in the system. These colour modes each have a name and include a plurality of predetermined colour printing settings. The printer drivers and/or pre-press applications in the user
5 workstations receive these colour modes and the settings that belong to them from a location identified by the system. This location can be a central memory or, in the case of a distributed system, any other memory location that the system is able to trace. Upon defining a print job for a digital document, a colour mode is selected by the user and these are combined with other print job settings. The print job is sent to the printer,
10 where the settings of the colour mode are used to interpret the colours in the digital document. Settings comprised in the colour mode are consistent in all of the system, because they are retrieved from one and the same location identified by the system. This location is for example a hard disk of a controller in the colour printing system. Because the user of the system only has to select a colour mode, he is not confused by
15 all the colour print job properties and he will always use a coherent combination of settings.

A further aspect of the invention is that the step of combining the digital document with the selected colour mode comprises combining the digital document with the colour
20 printing settings of the selected colour mode, together with the other selected settings for the print job. This has the advantage that the controller receives all settings in the print job and does not have to collect the settings of the colour mode before being able to start interpreting the print job.

25 Another aspect of the invention is that a colour mode comprises both a rendering intent and input profile for CMYK-defined colours in the input data and a rendering intent and input profile for RGB-defined colours in the input data. These settings will be used when colours of the indicated type are present in the input data without colour profile. Sometimes a digital document comprises an embedded colour profile. Another setting
30 indicates if this embedded profile is to be used or if the profile indicated by the colour mode settings is used, overruling the embedded profile.

Another aspect of the invention is the creation of a custom colour mode when one of the colour printing settings is changed by the user of the printer driver. The user is made
35 aware that one of the settings is not the preselected one, for example by making the

name of the colour mode disappear. Of course the user can decide to use a named colour mode once more by selecting the name of the colour mode again.

Another aspect of the invention is that the settings of a colour mode are centrally
5 changed by using a separate settings editor. In this way the colour modes will be protected from accidental changes by users. Only colour specialists, such as colour consultants, will be authorized to change the settings.

The invention also relates to a colour printing system, comprising at least one colour
10 printer for interpreting a print job and reproducing digital documents, a printer driver on a user workstation that is used in defining print jobs and that has a user interface, a settings editor for defining colour modes having a name and comprising a plurality of preselected colour printing settings, and a memory location for storing the colour modes, wherein the user interface of the printer driver has a selection means for
15 selecting the name of a colour mode.

Figure 1 schematically shows a colour printing system comprising 3 workstations and 2 printers.

20 Figure 2 shows various components of a printer in the system.

Figure 3 shows a flow diagram of the method for defining and using colour modes.

Figure 4 shows a user interface that is used in defining and editing a colour mode.
25

Figure 5 shows a user interface of a printer driver that uses colour modes to select a set of settings that relate to colour print job properties.

A specific configuration of three workstations (4) and two printers comprising a print
30 engine (1) for marking paper and a controller (2) for processing print jobs for the print engine, connected through a network (3) is shown in Figure 1. In this embodiment of the printer system, colour modes are saved in a non-volatile memory of either of the controllers of the printers. Editing the colour modes by a settings editor (5) saves a new version of the colour modes in the non-volatile memory of the printer, as will be
35 explained hereinbelow.

In Figure 2 the various components of the colour printer (20) are shown. Data are communicated to the controller (2) through the network (3). A network adapter (24) couples the data onto the databus (21) of the controller. A central processing unit (23), a non-volatile memory, such as a hard disk (22), and an interface-board (25) are also coupled to this databus. In the controller print jobs are interpreted and scheduled for execution on the print engine (1). For each process colour a binary image signal is sent. In this figure four process colours are shown, but others are also possible. The process colours black (12), cyan (13), magenta (14) and yellow (15) are consecutively developed and transferred to a central intermediate where the process colours are collected. During the printing process the central intermediate rotates in the indicated direction, bringing the composed image to a fusing nip (17), where it is transferred to a paper sheet that originates from a stack (16). The exact timing of the various processes in the print engine is controlled by a control-unit that is not shown in the figure. After passing a post-fuse nip (18) the paper is placed on a finishing tray (19).

The steps of the method of selecting colour printing settings can be followed as in Figure 3. First a colour mode is created and saved in the non-volatile memory of the printer (31). The colour mode has a name and a number of settings that is used by the controller to interpret the document data of a job. The colour mode comprises settings for black and white printing versus colour printing, a name of a device RGB input profile, a rendering intent for device RGB, a name of a device CMYK input profile, a rendering intent for device CMYK, a setting for blackpoint compensation, spot colour matching, spot colour overprinting and a setting for a trapping method.

At the time a driver is initialized in a workstation by selecting a printer, it reads the data of the colour modes out of the memory of the printer (32). In the user interface of the driver, the user can make a selection out of the available colour modes (33). If wanted, the user can look what settings belong to a selected colour mode, but mostly this is not necessary. Upon defining a print job, the selected colour mode, using either the name of the colour mode or the colour settings belonging to the colour mode, and other selected print job settings are combined with the digital document. This print job is sent to the printer (34). There the controller uses the colour settings to interpret the colour document data and converts the print job into print data (35). These may be stored in a queue or be transferred directly to the print engine.

Although it would be sufficient to send the name of the colour mode only along with the document data, in this embodiment the settings belonging to the colour mode are sent. It is only one of the many embodiments that one can realise using the concept of the colour modes.

Colour modes are defined and edited by using a settings editor, that is enabled to access the network (3). In Figure 4 a graphical user interface is shown that is used in the settings editor. The window has a titlebar (41) and the name of the colour mode is entered in a text entry box (42) with a description for reference purposes. The colour property (44) is set by selecting one of the options "Colour" and "Black & White" using radio buttons (43). The selection of "Black & White" results in a print in which only black toner is used.

The Device RGB property (45) uses two drop-down lists to select a source profile and a rendering intent. A source profile is used to translate colours of the digital document into colours of a so-called Profile Connection Space. It is a parameter that is necessary for a Colour Management Module to be able to interpret the colours that are used in the source data. If in the digital document colours are defined by RGB-coordinates, they are interpreted with the indicated profile that is combined with the printer specific output profile. This output profile translates the colours of the Profile Connection Space into print process colours. The rendering intent indicates how the Colour Management Module distorts the colour gamut to fit in the colours that are not within the gamut of the printer, as defined in the standard set by the International Colour Consortium. The same is done for the Device CMYK property (46).

"Black point compensation" is selected by checking the check box (48). It is used to make adjustments between the maximum black levels of digital colour data and the capabilities of reproducing black of the printer. Because the output may look nicer, but is less accurate for dark colours, in some colour modes it is turned off and in others it is turned on.

Other properties that are selectable are "spot colour matching", which makes the Colour Management Module search for spot colour definitions in the digital file, "spot colour overprint", which instructs the Raster Image Processor how to compose pixels that are

involved in several instructions in the digital document, one of them being a spot colour instruction. Finally a selection is made for the property "preserve K only black", that specifies whether only black ink or toner is to be used for gray colours or if gray colours are to be composed by cyan, magenta and yellow ink or toner. It is convenient to have
5 these properties defined by a specialist user in contrast to an ordinary user, because they go beyond the usual understanding of colour printing.

Figure 5 shows the graphical user interface that is used in a printer driver. Three tabs (51) are available. Under the "Advanced" tab information about the memory locations
10 that are addressed by the driver is placed. The "Job" tab is used to define a print job. The "Printer" tab is used for information about the status of the selected printer. Colour modes are selected under the "Job" tab. First the number of copies is set (52) by a spinner (53). The settings select box is folded out, showing the job properties "Layout", where the page orientation, left and top margins, the plexity, the binding edge
15 and other properties involving the layout of the document are selected. The job property "Paper" involves the size of the output material and its quality. "Special pages" indicates what material is to be used for front and back covers. Under "Finishing" the user can set properties like whether or not to add a staple in the document, whether or not to punch holes, the order in which the document is to be printed and other properties depending
20 on the finishing possibilities of the printer engine. "Image" combines a number of properties involving image processing operations like sharpening or blurring the image, and selection of the halftone screen. Finally the job property "Colour" (56) is folded out, showing that a "Colour Mode" is to be selected with the available drop-down list (57). Besides "European photo", that is selected to reproduce the digital document in a way
25 that corresponds to the average preference of European customers for photographic images, other possible colour modes include "Black & White", in which all colours are reproduced by gray colours only, "Business Graphics", that is convenient for pie charts and bar graphs with a limited number of saturated colours, "American style", corresponding to the average preference of American customers, etc. The specialist
30 user may add colour modes to these predefined ones, making full use of the broad range of possibilities that is available in the case of colour printing. After pressing the "OK" button the digital document is combined with the selected settings to a print job that is sent to the printer where it is executed, resulting in a coloured document according to the preference of the user.

The skilled person will recognise that other embodiments are possible within the scope of the appended claims.

CLAIMS

1. A method of selecting colour printing settings for colour print job properties when printing documents in a system of at least one colour printer and at least one user workstation, comprising the steps of:
- defining one or more colour modes in the system, each colour mode having a name and comprising a plurality of preselected colour printing settings;
 - making the colour modes available and selectable by name in all of the system;
 - upon defining a print job for a digital document on a workstation, selecting one of the colour modes that is available in the system;
 - combining the digital document with the selected colour mode and other print job settings to form a print job; and
 - sending the print job to the colour printer.
2. The method of claim 1, wherein the step of combining the digital document with the selected colour mode and other print job settings comprises combining the digital document with the colour printing settings of the selected colour mode and other print job settings.
3. The method of claim 1, wherein a colour mode includes colour printing settings for colour rendering intents and input profiles for CMYK-defined colours and for RGB-defined colours in the input data.
4. The method of claim 1, comprising a step of creating a custom colour mode upon changing one of the colour printing settings of a named colour mode.
5. The method of claim 1, wherein the preselected colour printing settings of a colour mode are centrally defined using a settings editor.
6. Colour printing system, comprising at least one colour printer for interpreting print jobs and reproducing digital document data, a printer driver on a user workstation, the printer driver having a user interface, a settings editor for defining colour modes having a name and comprising a plurality of preselected colour printing settings and a memory location for storing the colour modes, wherein the user interface of the printer driver has a selection means for selecting the name of a colour mode.

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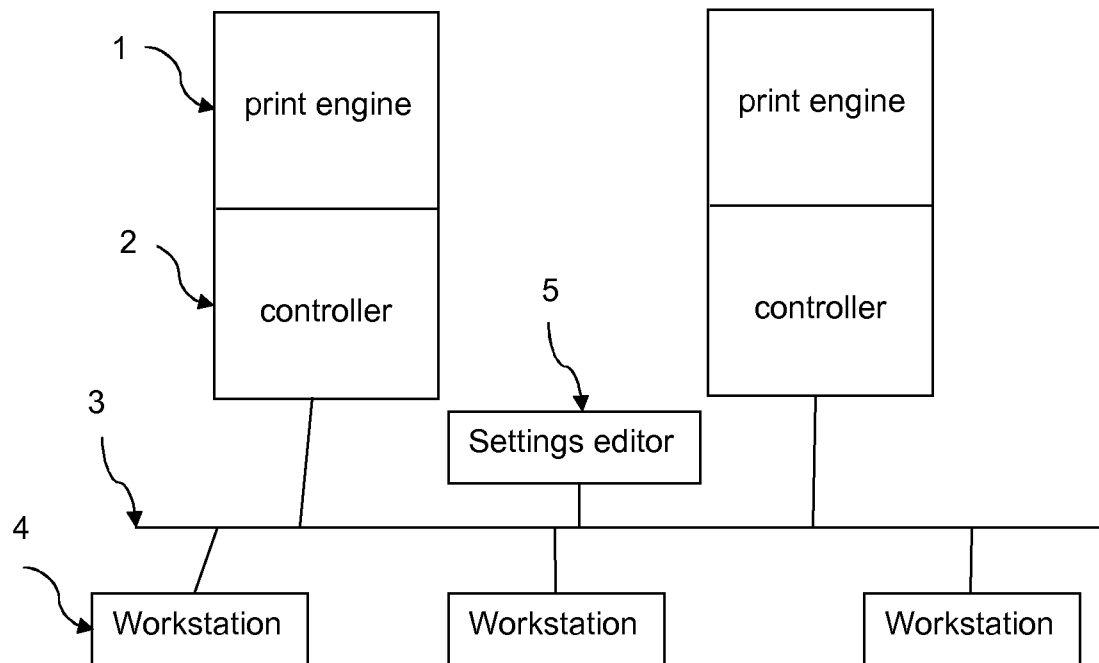


FIG. 1

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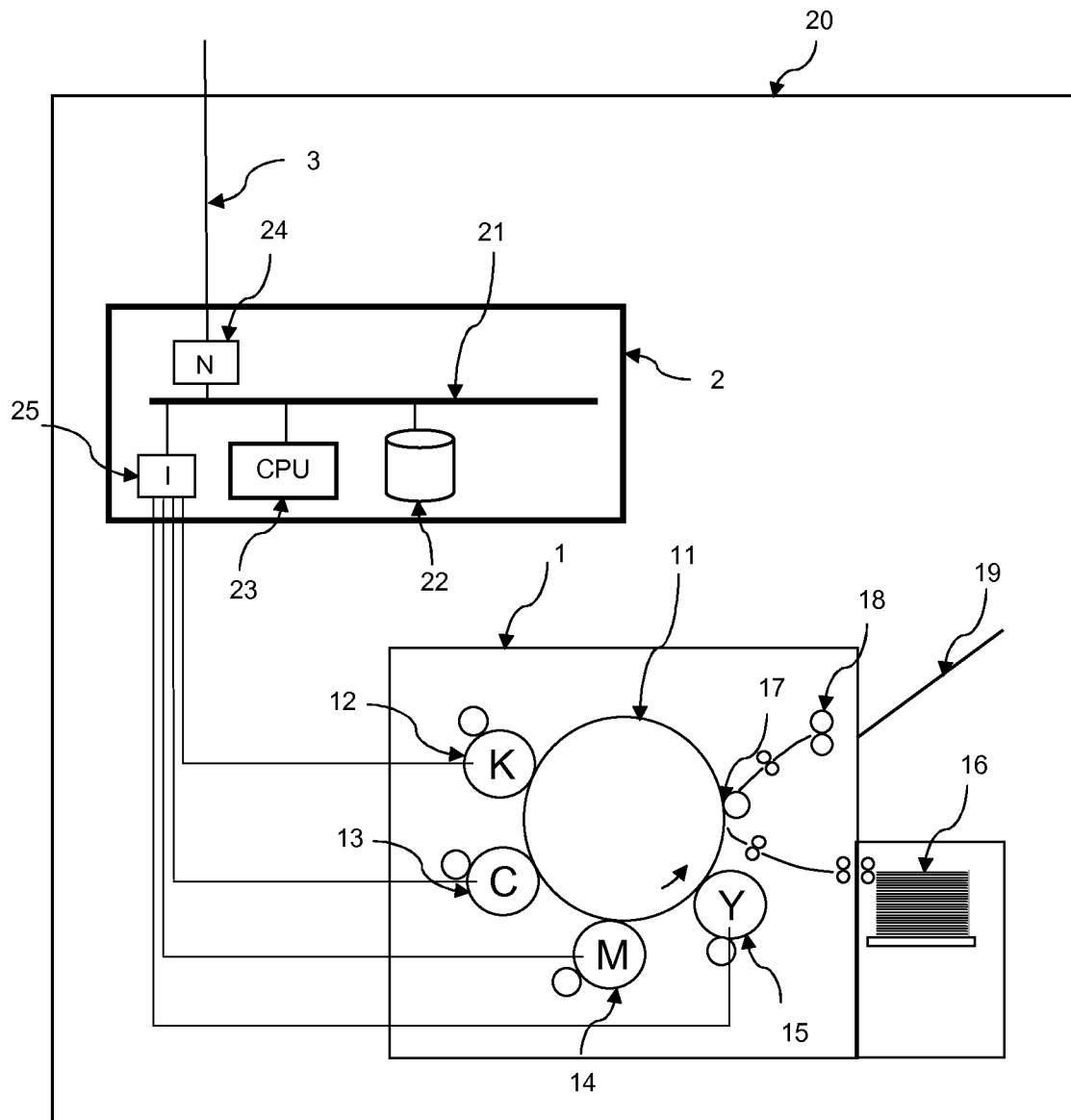


FIG. 2

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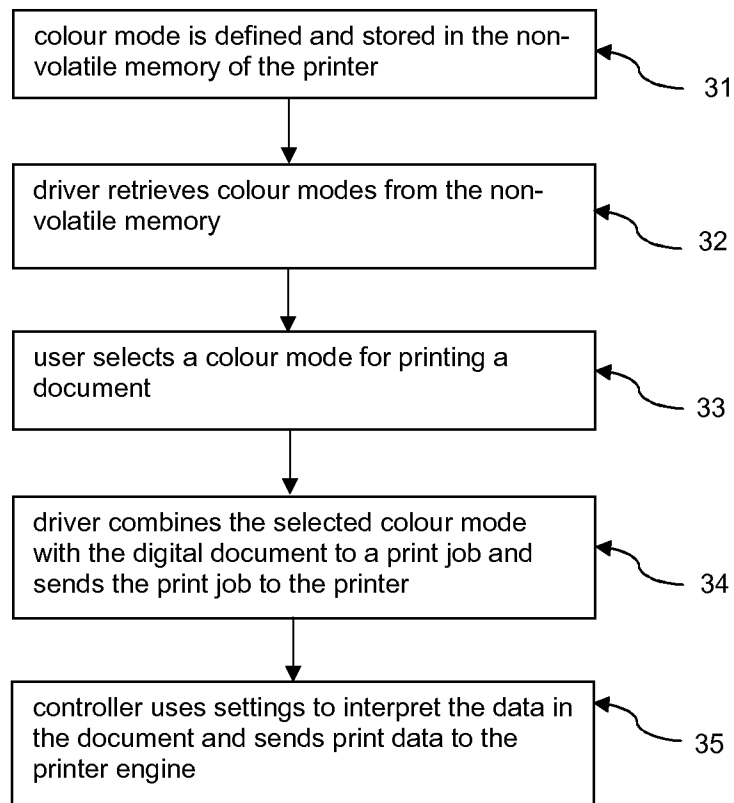


FIG. 3

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41 Edit colour mode ? X

42 Name European photo

43 Description Use for photographic documents from the European market

44 Colour ☒ Colour ☐ Black & White

45 Device RGB

Source profile sRGB ▼

Rendering intent Perceptual ▼

46 Device CMYK

Source profile Euroscale Coated ▼

Rendering intent Perceptual ▼

48 ☐ Black point compensation

☒ Spot colour matching

☐ Spot colour overprint

☐ Preserve K only black

Delete Save

FIG. 4

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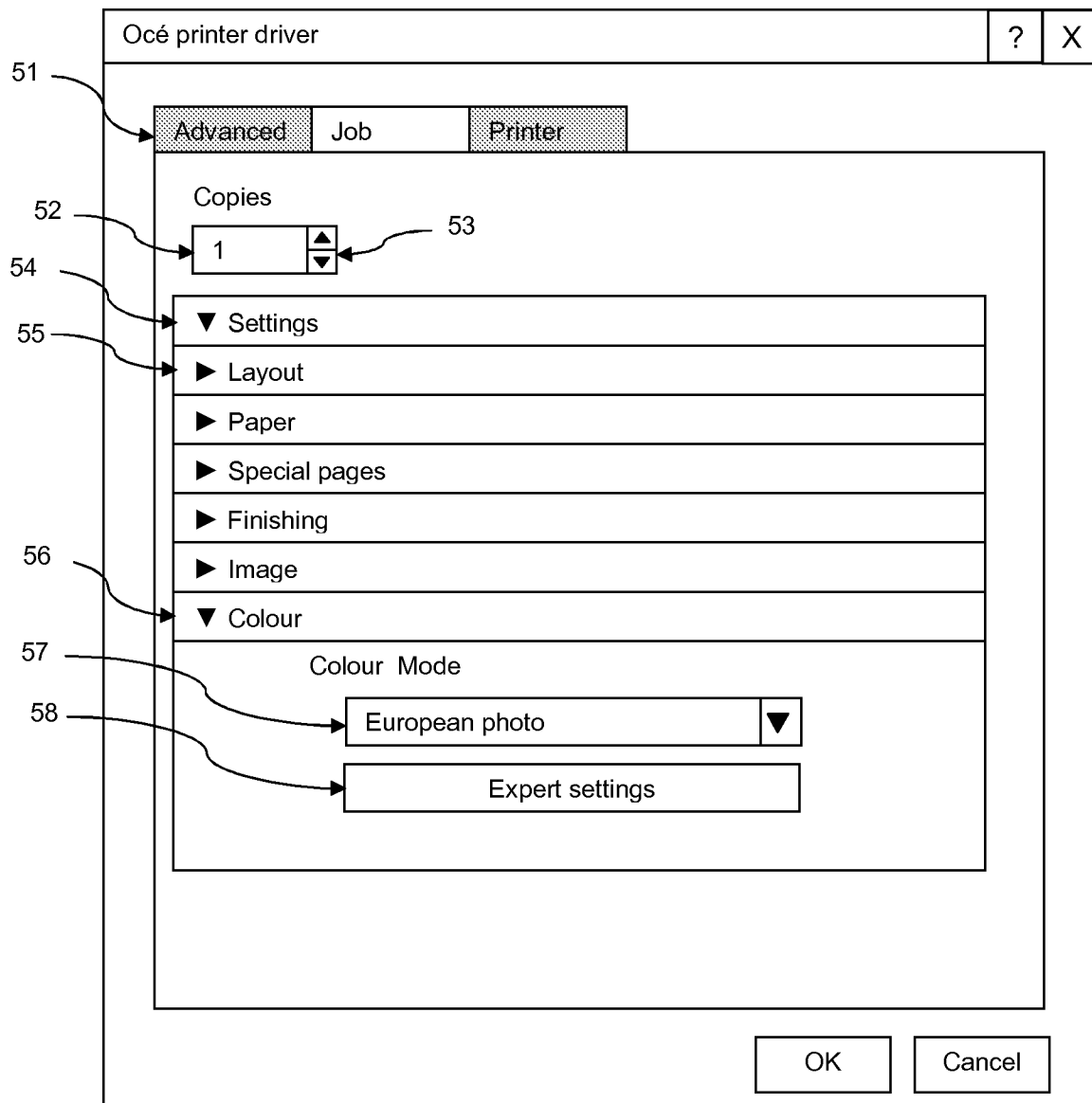


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/055979

A. CLASSIFICATION OF SUBJECT MATTER

INV. G06F3/12

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)

G06F H04N

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 practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2001/006423 A1 (SUBRAMANIAM THILEEPAN [SG]) 5 July 2001 (2001-07-05) paragraphs [0006] - [0008] paragraphs [0013] - [0023] figures 1-3 -----	1-6

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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- *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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- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

24 August 2009

Date of mailing of the international search report

31/08/2009

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2009/055979

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2001006423 A1	05-07-2001	JP 2001236299 A	31-08-2001