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(11)

**EP 1 591 262 A2**

(12)

## EUROPEAN PATENT APPLICATION

(43) Date of publication:  
**02.11.2005 Bulletin 2005/44**

(51) Int Cl.7: **B41J 29/393**

(21) Application number: **05252683.7**

(22) Date of filing: **28.04.2005**

(84) Designated Contracting States:  
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR  
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**  
Designated Extension States:  
**AL BA HR LV MK YU**

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(30) Priority: **28.04.2004 JP 2004133193**

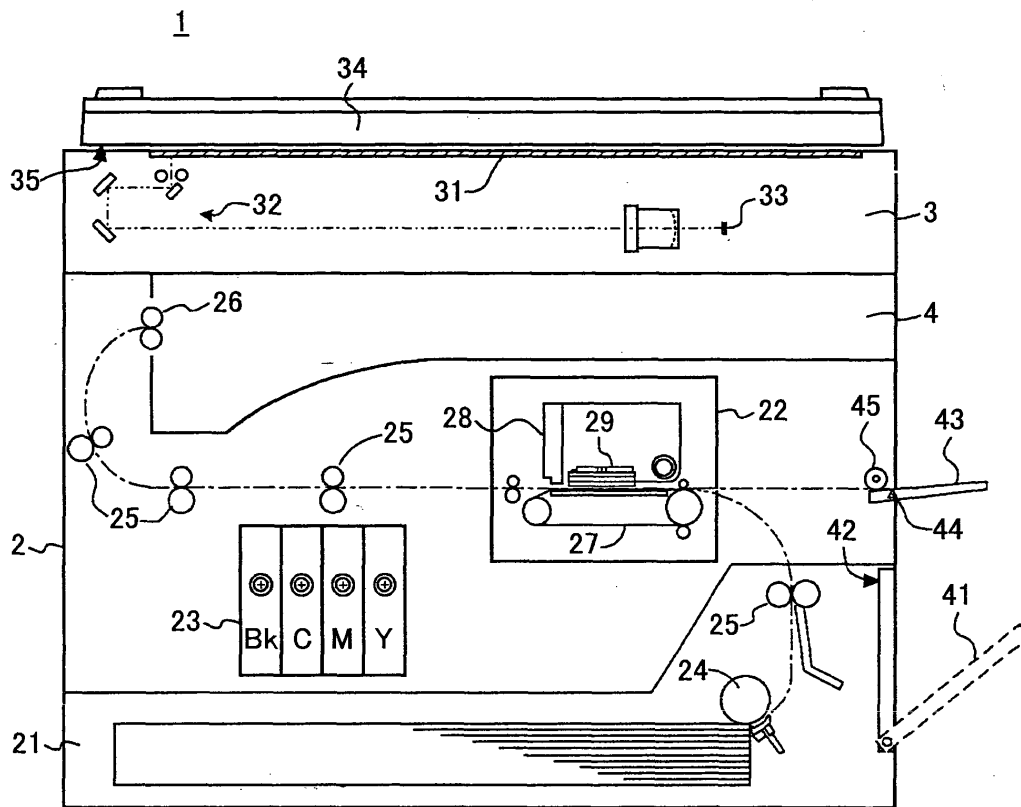
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(54) **Ink jet recording apparatus, controlling method for computer program and a computer readable storage medium**

(57) An ink jet recording apparatus (1) including an ink jet printer engine as an image forming part is characterized in that a printing preparation operation at a starting time of image forming by the ink jet engine and another preparation operation are processed in parallel.

acterized in that a printing preparation operation at a starting time of image forming by the ink jet engine and another preparation operation are processed in parallel.

**FIG.2**



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## Description

**[0001]** The present invention relates to ink jet recording apparatuses and controlling methods of the same, and more specifically, to an ink jet recording apparatus and a controlling method of the same whereby waiting time for image forming can be reduced.

**[0002]** An ink jet type image forming apparatus or recording apparatus has been well known. For example, Japan Laid-Open Patent Publication No. 11-268275 discloses a copier having means for reading a manuscript and an ink jet printer engine.

**[0003]** Furthermore, Japan Laid-Open Patent Publication No. 11-138790 discloses a technology whereby time for copying or printing at an ink jet type image forming apparatus is reduced, by controlling a print head so that a marginal part of a manuscript image is skipped.

**[0004]** However, the technology disclosed in the above-mentioned Japan Laid-Open Patent Publication No. 11-138790 has a problem in that the waiting time from an instruction to start copying by an operator to a time for actually starting printing cannot be reduced.

**[0005]** Meanwhile, FIG. 1 is a flowchart showing an example of an operation of a related art ink jet type copier. As shown in FIG. 1, first a manuscript size, a recording paper size, and the number of copies of papers are set at steps S21 through 23, and then copying is started by pushing a start button (S24). After that, printing preparation operations such as detection of an amount of ink residue (S25), supplying of the ink in a case where an ink cartridge is provided separately from the print head (S26), head cleaning (S27), and ejection of the ink by idling (S29) are implemented and then printing starts (S30). In the flow chart shown in FIG. 5, steps shown by diagonal lines are printing preparation operations peculiar to the ink jet recording apparatus and therefore cannot be omitted.

**[0006]** Accordingly, it is a general object of the present invention to provide a novel and useful ink jet recording apparatus and controlling method of the same.

**[0007]** Another and more specific object of the present invention is to provide an ink jet type image forming or recording apparatus and controlling method of the same whereby the above-mentioned problem can be solved and the waiting time for completion of an output of an image can be reduced so that good operability can be achieved.

**[0008]** The above object of the present invention is achieved by an ink jet recording apparatus including an ink jet printer engine as an image forming part, characterized in that a printing preparation operation at a starting time of image forming by the ink jet engine and another preparation operation are processed in parallel.

**[0009]** The above object of the present invention is also achieved by a controlling method of an ink jet recording apparatus, the ink jet recording apparatus including an ink jet printer engine as an image forming part, characterized in that a printing preparation operation at a

starting time of image forming by the ink jet engine and another preparation operation are processed in parallel.

**[0010]** According to the above-mentioned invention, since the printing preparation operation at the starting time of image forming by the ink jet engine and another preparation operation are processed in parallel, it is possible to reduce the waiting time for completion of then output of the image.

**[0011]** The printing preparation operation may be a detection of an amount of ink residue.

**[0012]** Since the detection of the amount of the ink residue and another preparation operation are processed in parallel, it is possible to reduce the waiting time for completion of then output of the image.

**[0013]** The printing preparation operation may be a supplying of ink to a printing head.

**[0014]** Since the supplying of ink to the printing head and another preparation operation are processed in parallel, it is possible to reduce the waiting time for completion of then output of the image.

**[0015]** The printing preparation operation may be a head cleaning of a printing head.

**[0016]** Since cleaning of the printing head and another preparation operation are processed in parallel, it is possible to reduce the waiting time for the completion of then output of the image.

**[0017]** The printing preparation operation may be ejection of the ink by idling.

**[0018]** Since the ejection of the ink by idling and another preparation operation are processed in parallel, it is possible to reduce the waiting time for the completion of then output of the image.

**[0019]** The another preparation operation may be setting of a manuscript size.

**[0020]** Since the printing preparation operation and the setting of the manuscript size are processed in parallel, it is possible to reduce the waiting time for the completion of then output of the image.

**[0021]** The another preparation operation may be setting of a recording paper size.

**[0022]** Since the printing preparation operation and the setting of the recording paper size are processed in parallel, it is possible to reduce the waiting time for the completion of then output of the image.

**[0023]** The another preparation operation may be conveyance of a recording paper.

**[0024]** Since the printing preparation operation and the conveyance of the recording paper size are processed in parallel, it is possible to reduce the waiting time for the completion of then output of the image.

**[0025]** The ink jet recording apparatus may include a data storage device for storing print data received from outside, and the another preparation operation may be storage of the print data received from the outside in the data storage device.

**[0026]** Since the printing preparation operation and the storage of the print data received from the outside in the storage device are processed in parallel, it is pos-

sible to reduce the waiting time for completion of then output of the image.

[0027] The another preparation operation may be an analysis of print data received from outside and a process for making an image.

[0028] Since the printing preparation operation and the analysis of the print data received from the outside and the process for making the image are processed in parallel, it is possible to reduce the waiting time for completion of then output of the image.

[0029] The another preparation operation may be turning over of a paper.

[0030] Since the printing preparation operation and turning over of the paper are processed in parallel, it is possible to reduce the waiting time for the completion of then output of the image.

[0031] The another preparation operation may be a process for receiving a fax.

[0032] Since the printing preparation operation and a process for receiving the fax are processed in parallel, it is possible to reduce the waiting time for completion of then output of the image.

[0033] The ink jet recording apparatus may include manuscript reading means and manuscript set detection means, and the printing preparation operation may be started based on detection of the manuscript set detection means for setting of the manuscript in place.

[0034] The ink jet recording apparatus may include an automatic manuscript conveyance device for conveying the manuscript to the manuscript reading means, and the printing preparation operation may be started based on detection of setting of the manuscript in place on the automatic manuscript conveyance device.

[0035] The ink jet recording apparatus may include a human body sensing sensor for detecting an approach of an operator, and the printing preparation operation may be started based on detection by the human body sensing sensor of the approach of an operator.

[0036] The ink jet recording apparatus may include a cover for jam processing and opening and closing detection means for detecting opening and closing of the cover, and the printing preparation operation may be started based on detection by the opening and closing detection means of the closing of the cover.

[0037] The ink jet recording apparatus may include a manual tray and a paper sensor for detecting setting of a paper on the tray, and the printing preparation operation may be started based on detection by the paper sensor of setting of the paper on the tray.

[0038] The manual tray may be provided in a state where the manual tray can be opened and closed, the ink jet recording apparatus may include manual tray opening and closing detection means for detecting the opening and closing of the manual tray, and the printing preparation operation may be started based on detection by the manual tray opening and closing detection means of the opening and closing of the manual tray.

[0039] The ink jet recording apparatus may include an

energy-saving mode, and the printing preparation operation may be started based on switching from the energy-saving mode to a normal mode.

[0040] According to the above-mentioned invention, it is possible to reduce the waiting time for completion of then output of the image.

[0041] The ink jet recording apparatus may include a series process mode for processing the printing preparation operation and the another preparation operation in series, and one of a parallel process mode for processing the printing preparation operation and the another preparation operation in parallel and the series process mode can be selected.

[0042] Since the parallel process mode for processing the printing preparation operation and another preparation operation in parallel and the series process mode can be selected, it is possible to select operations mode desirable for the user.

[0043] Other objects, features, and advantages of the present invention will become more apparent from the following detailed description when read in conjunction with the accompanying drawings.

FIG. 1 is a flowchart showing an example of an operation of a related art ink jet type copier;

FIG. 2 is a schematic cross-sectional view of an ink jet copier as an example of an image forming apparatus of the present invention;

FIG. 3 is a plan view showing an operations panel of the ink jet copier shown in FIG. 2;

FIG. 4 is a block diagram showing a structure of a control system of the ink jet copier shown in FIG. 2; and

FIG. 5 is a flowchart showing steps for copying by the ink jet copier shown in FIG. 2.

[0044] A description of the present invention and details of drawbacks of the related art are now given, with reference to FIG. 2 through FIG. 5.

[0045] FIG. 2 is a schematic cross-sectional view of an ink jet copier as an example of an image forming apparatus of the present invention. In an ink jet copier 1, a scanner part 3 is provided above a printer part 2. A paper discharging part 4 is provided between the scanner part 3 and the printer part 2.

[0046] The scanner part 3 is provided under a contact glass 31 in a state where scanning means 32 can move. A reflection light from a manuscript irradiated by a light source is led to a CCD 33 via a mirror lens so that a manuscript image is read out. A pressure plate 34 is provided on the compact glass 31 so as to be capable of opening and closing. In this example, the pressure plate 34 includes an opening and closing detection sensor 35 for detecting opening and closing of the pressure plate 34. The scanner part 3 includes a manuscript sensor (not shown in FIG. 2) for determining the size of a manuscript set on the contact glass 31.

[0047] A paper feeding part 21 is provided at a lower

part of the printer part 2 and an ink jet engine 22 is provided above the paper feeding part 21. A recording paper conveyance path is formed from the paper feeding part 21 to the paper discharging part 4 as shown by a one dotted line. Conveyance rollers 25 are properly provided at designated parts of the recording paper conveyance path. In FIG. 29, a numerical reference 24 represents a paper feeding roller and numerical reference 26 represents paper discharge rollers.

**[0048]** A paper conveyance system using an electrostatic attraction belt 27 is applied to the ink jet engine 22, and therefore it is possible to stably move papers as compared with a conventional roller conveyance method. A printing head 29 is provided in a carriage 28 and reciprocates in a main scanning direction (in a direction orthogonal to the plane of the drawing of FIG. 1) so that printing is implemented. The printing head 29 has a nozzle line length of 3.23 cm (1.27 in) that is wider than conventional heads. In this example, a four head structure where one head is used for each of colors yellow (Y) ink, magenta (M) ink, cyan (C) ink, and black (Bk) is used. However the number of the heads is not limited to this and a two head structure where one head is used for two colors, or other structures may be used.

**[0049]** Ink cartridges 23 for respective colors are provided separately from the printing head 29 in the ink jet copier of this example. Ink in the cartridge 23 is supplied to the printing head 29 via supply tubes (not shown in FIG. 2). In a way where the ink cartridges for respective colors are provided separately from the printing head, a mass volume type ink cartridge corresponding to an increase of ink consumption based on high speeding printing can be used. Hence, this way is proper for business use.

**[0050]** A cover 41 for jam processing is provided on a side surface of the printer part 2 in a state where the cover 41 can be opened and closed. The printer part 2 also has a cover opening and closing detection sensor 42 for detecting opening and closing the cover 41. A manual tray 43 is situated above the cover 41 for jam processing. A paper set sensor 44 is provided at the manual tray 43 so as to detect the setting of recording papers in place. The recording papers set in the manual tray 43 are fed by the paper feeding roller 45.

**[0051]** FIG. 3 is a plan view showing an operations panel of the ink jet copier shown in FIG. 2. As shown in FIG. 3, various input keys such as a ten key 52, a start key (enter key) 53, a clear/stop key 54, a program key 55, a reset/preheating key 56, an intruding key 57, and function switching keys 58, in addition to a large size touch panel 51, are arranged in the operations panel 50. The image forming apparatus of this embodiment is a copier having a copying function and also functions as a printer or facsimile. The function is switched by pushing one of the function switching keys 58.

**[0052]** A human body sensing sensor 59 is provided at a front surface in the substantially center part of the operations panel 50. The human body sensing sensor

59 is an infrared sensor in this example. A mode of this ink jet copier is changed to or from an energy-saving mode by detecting a human (operator) by the human body sensing sensor 59.

**[0053]** FIG. 4 is a block diagram showing a structure of a control system of the ink jet copier shown in FIG. 2. In this block diagram, an ink residue detection part 61, a head cleaning part 62, a manuscript reading part 63, a printing part 64, and others are controlled by a control part 60.

**[0054]** The ink residue detection part 61 detects ink residue inside of the ink cartridges 23 (See FIG. 2) of the respective colors and includes an ink residue sensor having an optional structure such as a photo sensor.

**[0055]** The head cleaning part 62 cleans the printing head 29 of the ink jet engine. The printing head 29 includes a cam or motor for moving a cap covering the head 29 at the time of cleaning. In addition, the printing head 29 includes an absorbing pump for absorbing the ink, and a wiper for wiping the head 20 at the time of completion of the cleaning.

**[0056]** The manuscript reading part 63 corresponds to the scanner part 3 shown in FIG. 2. The manuscript reading part 63 includes a manuscript sensor, a recording paper sensor, and the like. The printing part 64 corresponds to the ink jet engine 22 shown in FIG. 2. The printing part 64 includes a carriage motor for moving the carriage 28 in a main scanning direction, a motor for driving the electrostatic attraction belt 27 for moving the recording paper in a sub-scanning direction, a motor for other conveyance rollers, and the like.

**[0057]** The control part 60 includes clock means 65. The clock means 65 are provided separately from clock generation means necessary for the operation of a CPU so as to signal date and time. By using this clock means 65, it is possible to implement a cleaning operation of the printing head when a designated time has passed or at a set date and time.

**[0058]** The ink jet copier 1 having the above-discussed structure processes a printing preparation operation peculiar to an ink jet type at a starting time of image forming (copying or printing) and another preparation operation. The copying operation of this embodiment is discussed with reference to the flow chart shown in FIG. 5.

**[0059]** As shown in FIG. 5, based on detection that the manuscript is set on the contact glass 31 (S1), the amount of the ink residue in the ink cartridge 23 is detected (S2), the ink is supplied from the ink cartridge 23 to the printing head 29 (S3), and then the printing head 29 is cleaned (S4). While this printing preparation operation is implemented, the manuscript size is set (S5), the recording paper size is set (S6), and the number of the copies of papers is set, as another preparation operations.

**[0060]** In this embodiment, setting of the manuscript in place is detected by detecting that the pressure plate 34 is closed (the state of the pressure plate 34 is

changed from an opening state to a closing state) via the opening and closing detection sensor 35. The setting of the manuscript in place may be detected by other structures or methods. For example, in a case where the apparatus has an ADF, a sensor may be provided on a manuscript stand so as to detect the setting of the manuscript in place.

**[0061]** In addition, setting of the manuscript size and setting of the recording paper size may be input by the operations panel 50 operated by an operator or may be automatically set by the manuscript sensor (automatic paper selection).

**[0062]** The setting of the number of copies of papers is implemented by input via the ten key 52 of the operations panel 50. Since "1" is originally set, "1" is automatically set as the number of the copies of papers if no input via the ten key 52 is implemented or setting of the number of the copies of papers at the previous time does not remain.

**[0063]** When the steps from S1 to S7 are completed, there is a state where copying can be implemented. Based on pushing of the start key 53 of the operations panel 50 by the operator, reading the manuscript at the scanner part 3 starts (S9) and ejection of the ink by idling (S10) are implemented in parallel. Based on the completion of the reading of the manuscript and the ejection of the ink by idling, printing starts (S11). Based on the completion of printing one page, output (one page) is completed.

**[0064]** Thus, in this embodiment, since the printing preparation operation as shown in steps S2 through S4 and another preparation operations as shown in steps S5 through S7 are processed in parallel, it is possible to reduce the waiting time for copying. Furthermore, the ejection of the ink by idling (S10) as a printing preparation operation and the reading operation of the manuscript (S9) as another preparation operation are processed in parallel so that the waiting time after the start button is pushed can be further reduced. Although the ejection of the ink by idling (S10) may be processed in parallel with another preparation operation shown in the step S5 through S7, the ejection of the ink by idling (S10) and the reading operations of the manuscript (S9) are processed in parallel in this embodiment so that the ejection of the ink by idling can be done just before the printing process. In addition, a pattern of the ejection of the ink by idling, such as a time for implementing the ejection or whether the ejection should be implemented, can be automatically selected based on a passing time after the previous printing or whether the head cleaning is done. On the other hand, in the related art as shown in FIG. 1, since the detection of the amount of the ink residue (S25), the supplying of the ink (S26), and the head cleaning (S27) are implemented after the operator pushes the start button (S24), the waiting time after the start button is pushed is long.

**[0065]** A process for reducing the waiting time at the time of copying by starting the printing preparation op-

erations based on the detection of the manuscript setting is discussed above with reference to FIG. 5. However, in the ink jet copier 1 of this embodiment, the printing preparation operations may be started based on detection other than the detection of the manuscript setting.

**[0066]** That is, the waiting time at the time of copying can be reduced by starting the printing preparation operations based on that the above-mentioned human body sensing sensor 59 detects (See FIG. 3) the operator. In this case, "detection by the human body sensing sensor 59 of the operator" corresponds to the "S1" in FIG. 5 and the remaining steps are done in the same way as the process shown in FIG. 5.

**[0067]** Furthermore, the waiting time at the time of copying can be reduced by starting the printing preparation operations based on the determination that the jam clearance process is completed when the cover 41 (See FIG. 2) is closed (when the state of the cover 41 is changed from an opening state to a closing state). In this case, "detection by the closing of the cover 41" corresponds to the "S1" in FIG. 5 and the remaining steps are done in the same way as the process shown in FIG. 5.

**[0068]** In addition, the waiting time at the time of copying can be reduced by starting the printing preparation operations based on the detection by the paper setting sensor 44 that the manuscript is set in the manual tray 43 shown in FIG. 2. In this case, "detection of the manuscript by the paper setting sensor 44" corresponds to the "S1" in FIG. 5 and the remaining steps are done in the same way as the process shown in FIG. 5.

**[0069]** Furthermore, in a case where the manual tray 43 is provided in a state where the tray 43 can be opened or closed, the printing preparation operations may be started by the detection that the tray is opened by a sensor for detecting the opening and closing state of the tray 43. In this case, "detection by the sensor for detecting the opening and closing state of the tray 43" corresponds to the "S1" in FIG. 5 and the remaining steps are done in the same way as the process shown in FIG. 5.

**[0070]** The ink jet copier 1 of this embodiment has an energy-saving mode whereby the electric power consumption in a case where the copier 1 is not used for a designated time can be reduced. The printing preparation operations may be started by the detection that the energy-saving mode is switched to a normal mode. In this case, "detection that the energy-saving mode is switched to the normal mode" corresponds to the "S1" in FIG. 5 and the remaining steps are done in the same way as the process shown in FIG. 5.

**[0071]** In the meantime, the image forming apparatus of this embodiment is a multi-purse apparatus having not only a copying function but also a function as a printer or facsimile. Therefore, in a case where the apparatus is used as not only a copier but also as a printer or a facsimile, it is possible to reduce the waiting time by processing the printing preparation operations at the

starting time of printing and another preparation operations in parallel.

**[0072]** For example, in a case where the apparatus functions as the facsimile, the printing preparation operations such as the detection of the amount of ink residue in the ink cartridge 23, a supplying of the ink from the ink cartridge 23 to the printing head 29, head cleaning of the printing head 29, and ejection of the ink by idling are started based on a receipt of fax, so that the process for receiving the fax and the printing preparation operations are processed in parallel. Therefore, the waiting time for completion of outputting can be reduced. On the other hand, in the related art, the printing preparation operation starts after the fax is completed being received, and therefore the waiting time for the completion of outputting is long.

**[0073]** The printing preparation operation based on the receipt of the fax may not be implemented for a designated setting time period. This is because quick outputting may not be required for the receipt of the fax at night. A setting time for processing the process for receiving the fax and the printing preparation operation in parallel can be known by the clock means 65 of the control part 60 as discussed with reference to FIG. 4.

**[0074]** In a case where the image forming apparatus functions as a printer, based on the receipt of print data, the printing preparation operation and another preparation operations can be processed in parallel. For example, the received print data are read in a memory, the data in the memory are analyzed, and a dot pattern is generated (image is made), while the printing preparation operation is processed in parallel. The printing preparation operation may be implemented in parallel with a conveyance operation of the recording paper. In the example shown in FIG. 2, a single step of the paper feeding tray is provided. However, in a structure where plural steps of the paper feeding trays or cassettes are optionally provided, it may take time to convey the recording paper from the paper feeding tray or cassette situated in a far position. Therefore, it is possible to obtain a better effect for reducing the waiting time for outputting than a case where the recording paper is conveyed after the printing preparation operation is completed.

**[0075]** Alternatively, under a structure where a paper turning over part for printing on both sides of the paper is provided, the printing preparation operation may be implemented in parallel while a recording paper after one side of the paper is printed is conveyed through the paper turning over part.

**[0076]** In addition, under a structure where a storage device such as a hard disk for a large amount of the print data is provided, the waiting time for completion of outputting may be reduced by processing a spool of the print data and the printing preparation operation in parallel.

**[0077]** Meanwhile, an operation, wherein the printing preparation operations and the another preparation operations are processed in parallel based on the detec-

tion by the human body sensing sensor 59 of the operator, the detection of the closing of the cover 41, detection of the manuscript being place by the paper setting sensor 44, the detection by the sensor for detecting the opening and closing state of the tray 43, or the detection that the energy-saving mode is switched to the normal mode, as discussed above in the description of the copying function, can be implemented for the facsimile function or the printer function.

**[0078]** Depending on a user, or a working situation, a parallel process of the printing preparation operations and other preparation operations for reducing the waiting time for the completion of outputting may not be necessary. Because of this, in the ink jet copier 1 of this embodiment, a parallel process mode for implementing the above-mentioned printing preparation operations and other preparation operations in parallel and a series process mode for implementing the above-mentioned printing preparation operations and other preparation operations in series are provided and can be optionally selected. For example, a mode selection button for selecting the parallel process mode or the series process mode may be provided on the operations panel shown in FIG. 3. In a case where the parallel process mode is selected, it is possible to reduce the waiting time until the completion of outputting as described above. In a case where the series process mode is selected, since the parallel process is not implemented, it is possible to reduce the workload on the control part or the consumption of ink.

**[0079]** The present invention is not limited to the above-discussed embodiments, but variations and modifications may be made without departing from the scope of the present invention.

**[0080]** For example, the number of colors of the ink in the ink jet type is not limited to four but may be optional. The number of the printing heads may be optional. Furthermore, as a recording paper conveyance type at the ink jet engine part, not only the electrostatic attraction belt type but also any type such as a conventional roller type can be applied. In addition, the number of steps of the paper feeding trays or cassettes in the paper feeding part may be optional. A structure or position to be provided of the cover for jam processing or the manual tray, a structure of the scanner part, and existence of the ADF, may be optional. Furthermore, the present invention can be applied to a printer not having a scanner part as the image forming apparatus.

## Claims

1. An ink jet recording apparatus including an ink jet printer engine as an image forming part, **characterized in that** said ink jet recording apparatus is configured such that a printing preparation operation at a starting time of image forming by the ink jet engine and another preparation operation are processed in

parallel.

2. An ink jet recording apparatus according to claim 1,  
wherein said printing preparation operation  
relates to the processing of ink. 5
3. An ink jet recording apparatus according to either  
claim 1 or claim 2,  
wherein said another preparation operation  
relates to the paper or the data to be provided. 10
4. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the printing preparation operation  
comprises a detection of an amount of ink residue. 15
5. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the printing preparation operation  
comprises a supplying of ink to a printing head. 20
6. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the printing preparation operation  
comprises a head cleaning of a printing head. 25
7. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the printing preparation operation  
comprises ejection of the ink by idling. 30
8. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the another preparation operation  
comprises setting of a manuscript size. 35
9. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the another preparation operation  
comprises setting of a recording paper size. 40
10. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the another preparation operation  
comprises conveyance of a recording paper. 45
11. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the ink jet recording apparatus in-  
cludes a data storage device for storing print data  
received from outside, and 50  
wherein the another preparation operation  
comprises storage of the print data received from  
the outside in the data storage device. 55
12. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the another preparation operation

comprises an analysis of print data received from  
outside and a process for making an image.

13. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the another preparation operation  
comprises turning over of a paper.
14. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the another preparation operation  
comprises a process for receiving a fax.
15. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the ink jet recording apparatus in-  
cludes manuscript reading means and manuscript  
set detection means, and  
wherein the printing preparation operation is  
started based on detection of the manuscript set de-  
tection means for setting of the manuscript in place.
16. The ink jet recording apparatus as claimed in claim  
15,  
wherein the ink jet recording apparatus in-  
cludes an automatic manuscript conveyance device  
for conveying the manuscript to the manuscript  
reading means, and  
wherein the printing preparation operation is  
started based on detection of setting of the manu-  
script in place on the automatic manuscript convey-  
ance device.
17. The ink jet recording apparatus according to either  
claim 15 or claim 16,  
wherein the ink jet recording apparatus in-  
cludes a human body sensing sensor for detecting  
an approach of an operator, and  
wherein the printing preparation operation is  
started based on detection by the human body  
sensing sensor of the approach of an operator.
18. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the ink jet recording apparatus in-  
cludes a cover for jam processing and opening and  
closing of the cover, and  
wherein the printing preparation operation is  
started based on detection by the opening and clos-  
ing detection means of the closing of the cover.
19. The ink jet recording apparatus according to any  
one of the preceding claims,  
wherein the ink jet recording apparatus in-  
cludes a manual tray and a paper sensor for detect-  
ing setting of a paper on the tray, and  
wherein the printing preparation operation is  
started based on detection by the paper sensor of

setting of the paper on the tray.

20. The ink jet recording apparatus as claimed in claim 19,

wherein the manual tray is provided in a state 5  
where the manual tray can be opened and closed,  
wherein the ink jet recording apparatus in-  
cludes manual tray opening and closing detection  
means for detecting the opening and closing of the  
manual tray, and 10  
wherein the printing preparation operation is  
started based on detection by the manual tray open-  
ing and closing detection means of the opening and  
closing of the manual tray. 15

21. The ink jet recording apparatus according to any  
one of the preceding claims,

wherein the ink jet recording apparatus in-  
cludes an energy-saving mode, and 20  
wherein the printing preparation operation is  
started based on switching from the energy-saving  
mode to a normal mode.

22. The ink jet recording apparatus according to any  
one of the preceding claims, 25

wherein the ink jet recording apparatus in-  
cludes a series process mode for processing the  
printing preparation operation and the another  
preparation operation in series, and  
wherein one of a parallel process made for 30  
processing the printing preparation operation and  
the another preparation operation in parallel and the  
series process mode can be selected.

23. A controlling method of an ink jet recording appara- 35  
tus, the ink jet recording apparatus including an ink  
jet printer engine as an image forming part,  
**characterized in that** a printing preparation oper-  
ation at a starting time of image forming by the ink  
jet engine and another preparation operation are 40  
processed in parallel.

24. A computer program comprising program code  
means that, when executed on a computer system  
instructs an ink jet recording apparatus to carry out 45  
the steps according to claim 23.

25. A computer readable storage medium having re-  
corded thereon program code means that, when ex-  
ecuted on a computer system instructs an ink jet 50  
recording apparatus to carry out the steps accord-  
ing to claim 23.

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## FIG.1 RELATED ART

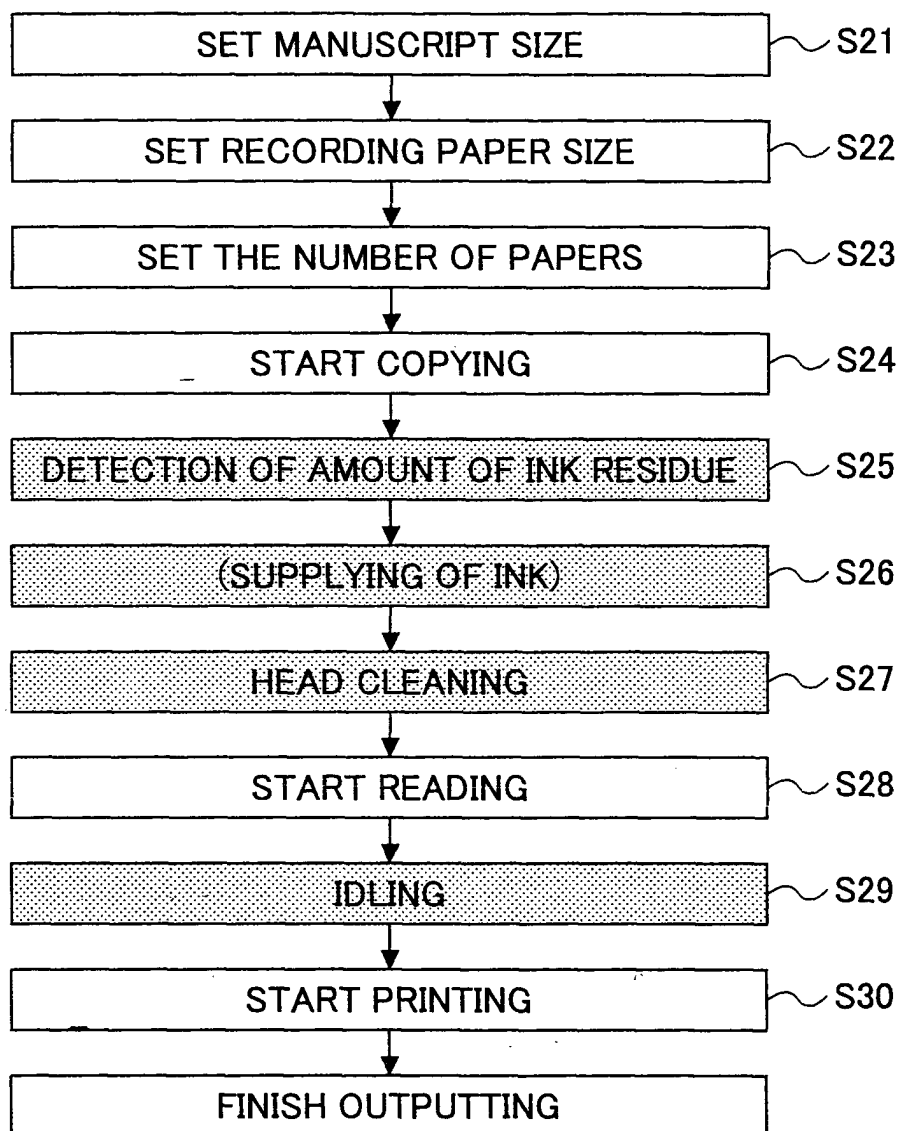


FIG.2

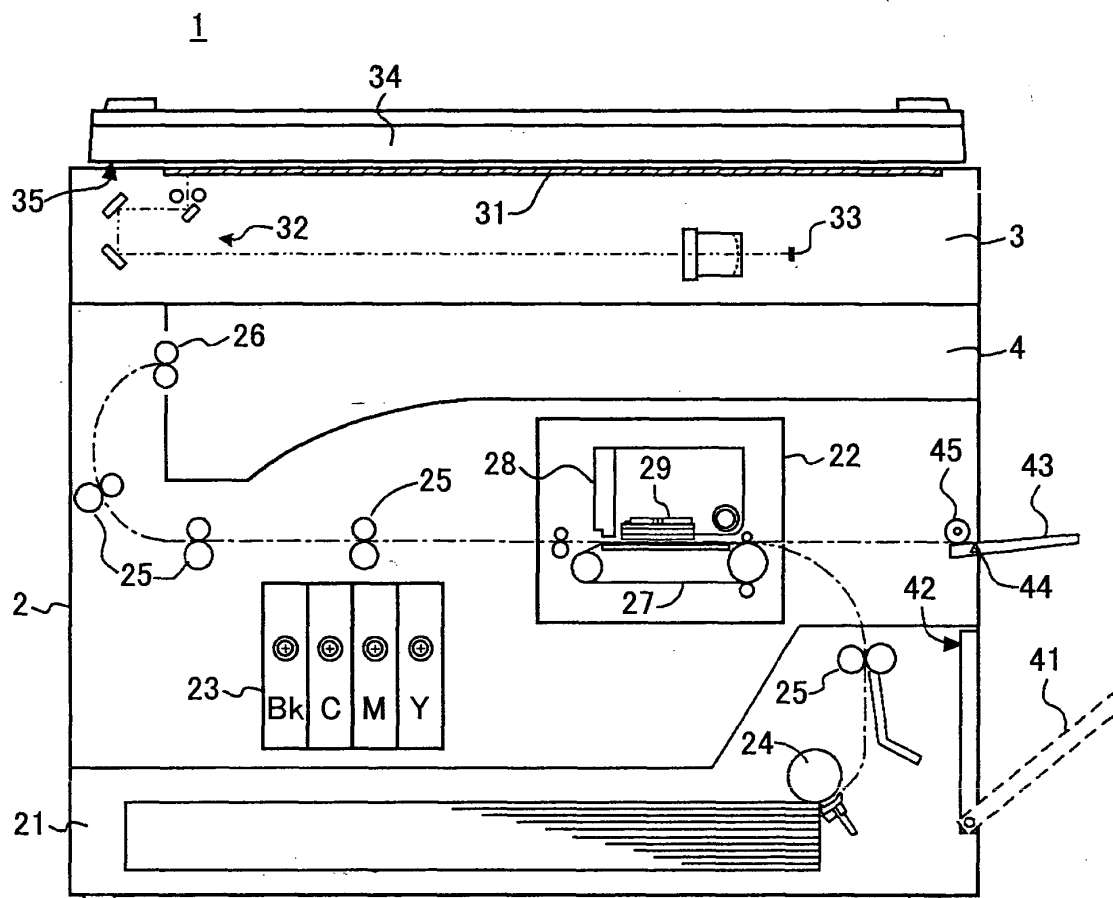


FIG.3

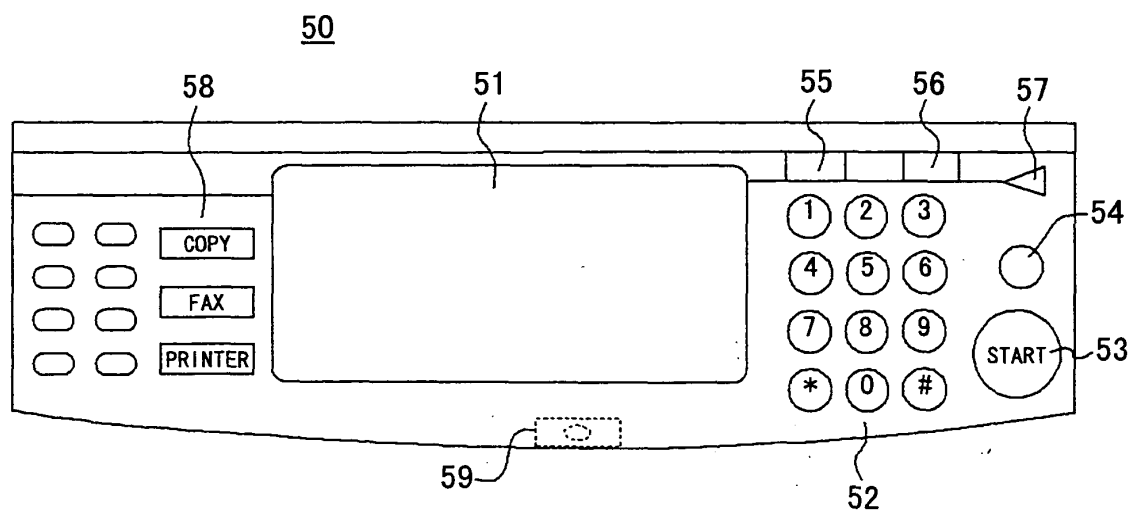


FIG.4

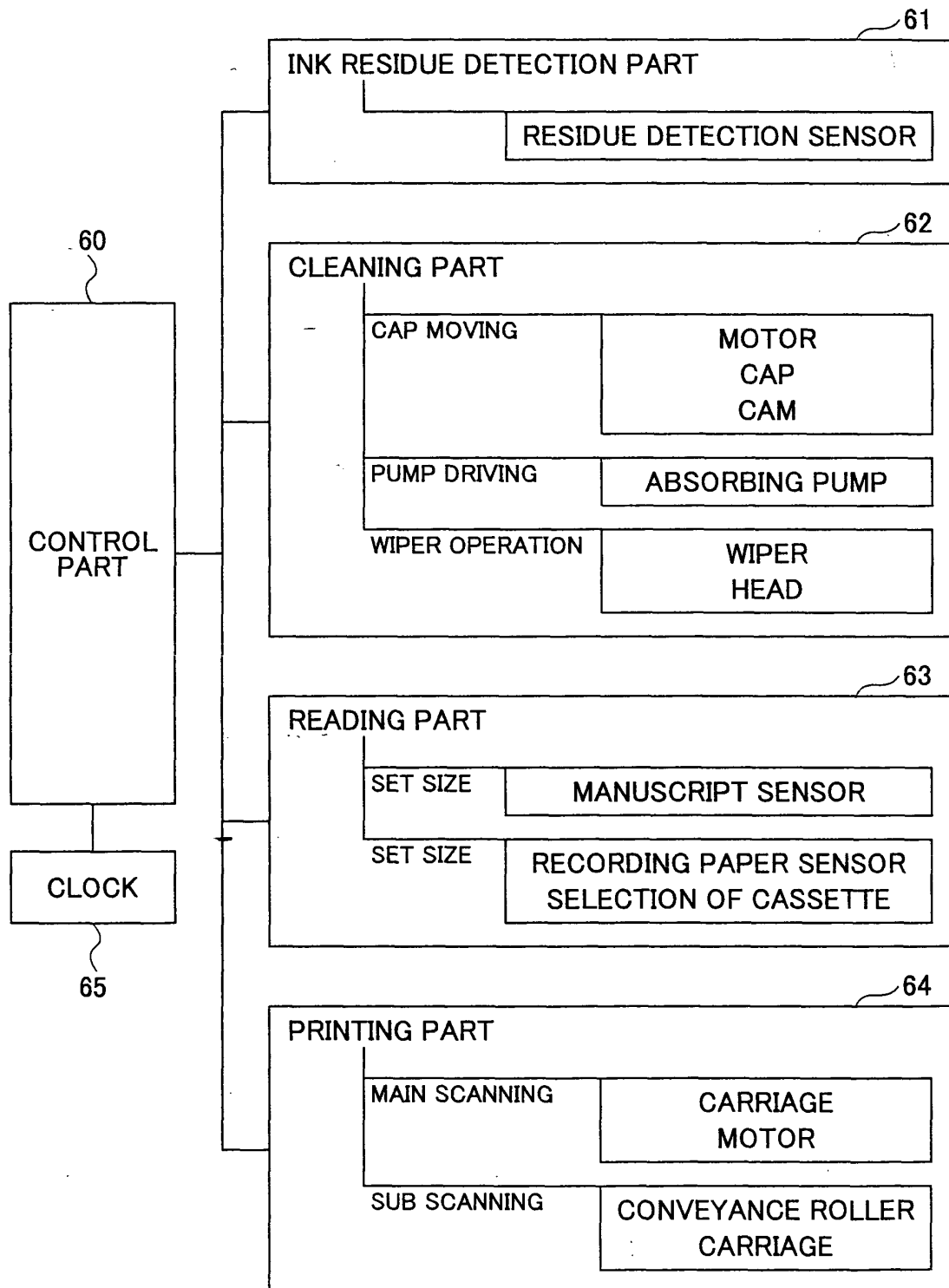


FIG.5

