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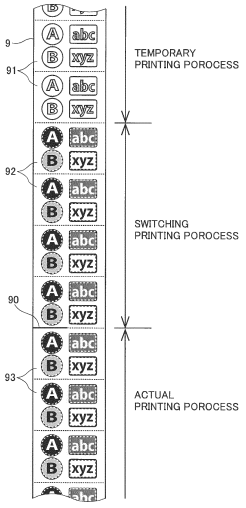
(54) PRINTING DEVICE, PRINTING SYSTEM, PRINTING METHOD, AND RECORDING MEDIUM

(57) A printing apparatus (10) includes: a recording part (11) for causing a recording agent to adhere to a base material, thereby recording a print image on the base material; and a printing controller (51) for controlling the recording part (11). The printing controller (51) includes: a temporary printing processing part (72) for causing the recording part (11) to execute a temporary printing process that records single pages of a temporary print image on the base material; an actual printing processing part (73) for causing the recording part (11) to execute an actual printing process that records single pages of an actual print image on the base material; and a printing process switching part (74) for causing the recording part (11) to execute switching from the temporary printing process to the actual printing process during the execution of the temporary printing process. The amount of recording agent used during printing of the temporary print image is smaller than that used during printing of the actual print image. This achieves the suppression of an increase in the amount of consumption of the recording agent in the printing apparatus used in conjunction with a post-processing apparatus, and precise alignment in the post-processing apparatus.

Fig.9



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Description

Technical Field

[0001] The present invention relates to a printing apparatus, a printing system, a printing method, and a recording medium which record a print image on an elongated strip-shaped base material.

Background Art

[0002] A printing system in which a printing apparatus for printing on an elongated strip-shaped base material and a post-processing apparatus for executing other processes including back surface printing, cutting, folding, and the like on the base material subsequently to the printing apparatus are arranged in succession has heretofore been known.

[0003] A conventional printing system is discussed in Patent Literature 1, for example. The printing system discussed in Patent Literature 1 includes a front surface printing apparatus and a back surface printing apparatus which perform printing on an elongated strip-shaped paper web, and a post-processing apparatus which executes a post-process on the printed paper web (in paragraphs 0040 and 0045). Thus, the multiple apparatuses execute multiple processes in succession on the paper web.

Citation List

Patent Literature

[0004] Patent Literature 1: Japanese Patent Application Laid-Open No. 2009-78886

Summary of Invention

Technical Problem

[0005] In such a printing system, it is necessary to adjust a position in which the post-process is to be executed on the base material in the post-processing apparatus to a position in which printing is performed on the base material by the printing apparatus. For precise alignment in the post-processing apparatus, it is preferable to use a base material printed by the printing apparatus so that the print position of the base material is identified.

[0006] Unfortunately, when the alignment in the post-processing apparatus is performed using a base material subjected to continuous printing, a recording agent such as ink adhering to part of the base material which has moved past the post-processing apparatus during the alignment is consumed uselessly.

[0007] In view of the foregoing, it is an object of the present invention to provide a technique capable of suppressing an increase in the amount of consumption of a recording agent in a printing apparatus used in conjunction with a post-processing apparatus and also precisely performing alignment in the post-processing apparatus.

Solution to Problem

[0008] To solve the aforementioned problem, a first aspect of the present invention is intended for a printing apparatus for recording a print image on a base material being transported in a transport direction. The printing apparatus comprises: a recording part for causing a recording agent to adhere to the base material, thereby recording a print image on the base material; and a printing controller for controlling the recording part, the printing controller including a temporary printing processing part for causing the recording part to execute a temporary printing process that records single pages of a temporary print image on the base material, an actual printing processing part for causing the recording part to execute an actual printing process that records single pages of an actual print image on the base material, and a printing process switching part for causing the recording part to execute switching from the temporary printing process to the actual printing process during the execution of the temporary printing process, wherein the amount of recording agent used during printing of the temporary print image is smaller than that used during printing of the actual print image.

[0009] A second aspect of the present invention is intended for the printing apparatus of the first aspect. The printing apparatus further comprises an input part for inputting print image data to the printing controller, wherein the printing controller further includes a job creation part for creating an actual printing job and a temporary printing job, based on the print image data inputted from the input part, wherein the actual printing processing part executes the actual printing process, based on the actual printing job, and wherein the temporary printing processing part executes the temporary printing process, based on the temporary printing job.

[0010] A third aspect of the present invention is intended for the printing apparatus of the first or second aspect, wherein the temporary print image is a print image obtained by decreasing densities of respective colors of the actual print image.

[0011] A fourth aspect of the present invention is intended for the printing apparatus of the first or second aspect, wherein the actual print image is a print image printed in multiple colors, and wherein the temporary print image is a print image printable in a single color.

[0012] A fifth aspect of the present invention is intended for the printing apparatus of the first or second aspect, wherein the temporary print image is a print image including a diagram obtained by representing only outlines of components of the actual print image in a single color.

[0013] A sixth aspect of the present invention is intended for the printing apparatus of any one of the first to fifth aspects. The printing apparatus is used in conjunction with a post-processing apparatus disposed downstream

of the printing apparatus and for executing a process on the base material.

[0014] A seventh aspect of the present invention is intended for the printing apparatus of the first or second aspect. The printing apparatus is used in conjunction with a cutting apparatus disposed downstream of the printing apparatus and for executing a cutting process on the base material, wherein the temporary print image is a print image obtained by representing a position at which the cutting process is to be executed in the cutting apparatus in a single color.

[0015] An eighth aspect of the present invention comprises: a printing apparatus as recited in any one of the first to fifth aspects; and a post-processing apparatus disposed downstream of the printing apparatus and for executing a process on the base material.

[0016] A ninth aspect of the present invention is intended for the printing apparatus of the first or second aspect, wherein a transport speed of the base material during the execution of the temporary printing process is equal to a first speed, and wherein a transport speed of the base material during the execution of the actual printing process is equal to a second speed higher than the first speed.

[0017] A tenth aspect of the present invention is intended for the printing apparatus of the ninth aspect, wherein the actual printing processing part causes the recording part to execute a switching printing process that records single pages of the actual print image on the base material while increasing the transport speed of the base material after the end of the temporary printing process and before the start of the actual printing process, and starts the actual printing process after the transport speed of the base material has reached the second speed.

[0018] An eleventh aspect of the present invention is intended for the printing apparatus of the tenth aspect, wherein the actual printing processing part causes the recording part to record a marker on a boundary between the last page printed in the switching printing process and the page to be printed next in the actual printing process.

[0019] A twelfth aspect of the present invention is intended for a printing method for causing a recording agent to adhere to a base material being transported in a transport direction, thereby recording a print image on the base material. The printing method comprises the steps of: a) executing a temporary printing process that records single pages of a temporary print image on the base material; b) judging whether a switching command signal is inputted during the execution of the step a) or not; c) stopping the step a) after it is judged that the switching command signal is inputted in the step b); and d) executing an actual printing process that records a desired number of pages of an actual print image on the base material after the step c), wherein the amount of recording agent used during printing of the temporary print image per page in the step a) is smaller than that used during printing of the actual print image per page in the step d).

[0020] A thirteenth aspect of the present invention is intended for the printing method of the twelfth aspect. The printing method further comprises the step of e) creating a temporary printing job for executing the temporary printing process and an actual printing job for executing the actual printing process, based on print image data inputted from an input part, the step e) being performed before the step a).

[0021] A fourteenth aspect of the present invention is intended for the printing method of the twelfth or thirteenth aspect, wherein the temporary print image is a print image obtained by decreasing densities of respective colors of the actual print image.

[0022] A fifteenth aspect of the present invention is intended for the printing method of the twelfth or thirteenth aspect, wherein the actual print image is a print image printed in multiple colors, and wherein the temporary print image is a print image printable in a single color.

[0023] A sixteenth aspect of the present invention is intended for the printing method of the twelfth or thirteenth aspect, wherein the temporary print image is a print image including a diagram obtained by representing only outlines of components of the actual print image in a single color.

[0024] A seventeenth aspect of the present invention is intended for the printing method of any one of the twelfth to fifteenth aspects. The printing method further comprises the steps of: f) performing alignment between the base material and a post-processing apparatus disposed downstream of a printing apparatus that executes the temporary printing process and the actual printing process, the step f) being performed in parallel with the step a); and g) inputting the switching command signal during the execution of the step a) and after the end of the step f).

[0025] An eighteenth aspect of the present invention is intended for the printing method of the twelfth or thirteenth aspect. The printing method further comprises the steps of: h) performing alignment between the base material and a cutting apparatus disposed downstream of a printing apparatus that executes the temporary printing process and the actual printing process, the step h) being performed in parallel with the step a); and i) inputting the switching command signal during the execution of the step a) and after the end of the step h), wherein the temporary print image is a print image obtained by representing a position at which the cutting process is to be executed in the cutting apparatus in a single color.

[0026] A nineteenth aspect of the present invention is intended for the printing method of the twelfth or thirteenth aspect, wherein a transport speed of the base material in the step a) is equal to a first speed, and wherein a transport speed of the base material in the step d) is equal to a second speed higher than the first speed.

[0027] A twentieth aspect of the present invention is intended for the printing method of the nineteenth aspect.

The printing method further comprises the steps of: j) executing a switching printing process that records single pages of the actual print image on the base material while increasing the transport speed of the base material after the step c); and k) judging whether the transport speed of the base material has reached the second speed during the execution of the step j) or not, wherein the step d) is executed after it is judged that the transport speed of the base material has reached the second speed in the step k).

[0028] A twenty-first aspect of the present invention is intended for the printing method of the twentieth aspect. The printing method further comprises the step of 1) recording a marker on a boundary between the last page printed in the step j) and the page to be printed next in the step d), the step l) being executed after it is judged that the transport speed of the base material has reached the second speed in the step k) and before the step d).

[0029] A twenty-second aspect of the present invention is intended for a computer-readable recording medium, the recording medium having stored thereon an operation control program for a printing apparatus for causing a recording agent to adhere to a base material being transported in a transport direction, thereby recording a print image on the base material. The operation control program causes a computer included in the printing apparatus to perform the steps of: A) causing the printing apparatus to execute a temporary printing process that records single pages of a temporary print image on the base material; B) judging whether a switching command signal is inputted during the execution of the step A) or not; C) stopping the step A) after it is judged that the switching command signal is inputted in the step B); and D) causing the printing apparatus to execute an actual printing process that records an actual print image on the base material after the step C), wherein the amount of recording agent used during printing of the temporary print image per page in the step A) is smaller than that used during printing of the actual print image per page in the step D).

[0030] A twenty-third aspect of the present invention is intended for the recording medium of the twenty-second aspect, wherein the operation control program causes the computer to further perform the step of E) creating a temporary printing job for executing the temporary printing process and an actual printing job for executing the actual printing process, based on print image data, the step E) being performed before the step A).

[0031] A twenty-fourth aspect of the present invention is intended for the recording medium of the twenty-second or twenty-third aspect, wherein the operation control program causes the computer to further perform the steps of: causing a transport mechanism for the base material to transport the base material at a first speed during the execution of the step A); and causing the transport mechanism to transport the base material at a second speed higher than the first speed during the execution of the step D).

Advantageous Effects of Invention

[0032] The first to twenty-fourth aspects of the present invention are capable of suppressing an increase in the amount of consumption of a recording agent in the printing apparatus used in conjunction with the post-processing apparatus and also precisely performing alignment in the post-processing apparatus.

Brief Description of Drawings

[0033]

[fig. 1] Fig. 1 is a diagram conceptually showing a configuration of a printing system according to a first embodiment.

[fig. 2] Fig. 2 is a block diagram showing a control system for the printing system according to the first embodiment.

[fig. 3] Fig. 3 is a flow diagram showing a procedure for an operation performed during the actuation of the printing system according to the first embodiment.

[fig. 4] Fig. 4 is a view of an example of submitted data according to the first embodiment.

[fig. 5] Fig. 5 is a view of an example of a temporary print image according to the first embodiment.

[fig. 6] Fig. 6 is a view of another example of the temporary print image according to the first embodiment.

[fig. 7] Fig. 7 is a view of still another example of the temporary print image according to the first embodiment.

[fig. 8] Fig. 8 is a flow diagram showing a procedure for an operation performed during the actuation of the printing system according to a second embodiment.

[fig. 9] Fig. 9 is a schematic view showing an example of printing paper subjected to a printing process in the printing system according to the second embodiment.

Description of Embodiments

[0034] Embodiments according to the present invention will now be described with reference to the drawings. A direction in which printing paper 9 is transported is referred to as a "transport direction", and a horizontal direction orthogonal to the transport direction is referred to as a "width direction" hereinafter. The term "upstream" as used herein refers to being upstream as seen in the transport direction, and the term "downstream" as used herein refers to being downstream as seen in the transport direction.

<1. First Embodiment>

<1-1. Configuration of Printing System>

[0035] Fig. 1 is a diagram conceptually showing a configuration of a printing system 1 according to a first embodiment of the present invention. Fig. 2 is a block diagram showing a control system for the printing system 1. This printing system 1 is a processing system which executes a process such as printing on printing paper 9 that is an elongated strip-shaped base material while transporting the printing paper 9.

[0036] The printing system 1 includes a printing apparatus 10, an unwinding mechanism 21, a winding mechanism 22, a buffer apparatus 30, a cutting apparatus 40, a controller 50, and a manipulation part 60. In this printing system 1, the printing paper 9 is unwound from the unwinding mechanism 21, and is processed sequentially in the printing apparatus 10, the buffer apparatus 30, and the cutting apparatus 40. Thereafter, the printing paper 9 is wound and collected on the winding mechanism 22.

[0037] The unwinding mechanism 21, the winding mechanism 22, and a plurality of transport rollers 23 constitute a transport mechanism 20 in this printing system 1. The transport rollers 23 are included in the printing apparatus 10, the buffer apparatus 30, and the cutting apparatus 40. Some of the transport rollers 23 may be disposed between the apparatuses. The transport mechanism 20 is a mechanism for transporting the printing paper 9 in the transport direction that is a longitudinal direction of the printing paper 9 while holding the printing paper 9.

[0038] A motor (not shown) serving as a power source is coupled to each of the unwinding mechanism 21, the winding mechanism 22, and the plurality of transport rollers 23. The unwinding mechanism 21, the winding mechanism 22, and the plurality of transport rollers 23 rotate when the controller 50 drives the respective motors. Thus, the printing paper 9 is transported in the transport direction. At least one or all of the transport rollers 23 may be follower rollers which are not coupled to the motors but rotate in accordance with the motion of the printing paper 9.

[0039] The transport rollers 23 and various rollers 31 and 32 included in the buffer apparatus 30 constitute a transport path for the printing paper 9. Each of the transport rollers 23 rotates about a horizontal axis to guide the printing paper 9 downstream along the transport path. Specifically, after being unwound from the unwinding mechanism 21, the printing paper 9 is transported along the transport path, and wound and collected on the winding mechanism 22.

[0040] The printing apparatus 10 is an apparatus that records images on an upper surface of the printing paper 9 in a position upstream of the buffer apparatus 30 and the cutting apparatus 40. The printing apparatus 10 includes a recording part 11 disposed over the transport path of the printing paper 9, and a printing controller 51 to be described later in the controller 50. The recording part 11 ejects ink droplets toward the printing paper 9 being transported by the transport mechanism 20. Thus, the recording part 11 causes ink that is a recording agent to adhere to the printing paper 9, thereby recording a print image on the printing paper 9. In the present embodiment, the recording part 11 includes four recording heads 12. The four recording heads 12 sequentially eject the ink droplets of cyan (C), magenta (M), yellow (Y), and black (K), respectively, onto the upper surface of the printing paper 9.

[0041] The printing apparatus 10 according to the present embodiment is what is called a one-pass type inkjet printer that records a desired print image on the printing paper 9 by ejecting the ink droplets from the recording heads 12 having a recording width greater than the width of the printing paper 9 while the printing paper 9 passes under the recording heads 12 only once.

[0042] The buffer apparatus 30 is an apparatus that adjusts the tension of the printing paper 9 in a position lying between the printing apparatus 10 and the cutting apparatus 40. The buffer apparatus 30 includes a plurality of buffer rollers 31 and a dancer roller 32. The buffer rollers 31 and the dancer roller 32 are staggered in alternate upper and lower positions along the transport direction.

[0043] As indicated by an arrow in Fig. 1, the dancer roller 32 moves upwardly and downwardly to thereby adjust the tension of the printing paper 9. The upward and downward movement of the dancer roller 32 also adjusts the length of the printing paper 9 held in the buffer apparatus 30. This accommodates a temporary difference, if any, between the transport speed of the printing paper 9 in a position upstream of the buffer apparatus 30 and the transport speed of the printing paper 9 in a position downstream of the buffer apparatus 30 to hold the tension of the printing paper 9 constant.

[0044] The cutting apparatus 40 is a post-processing apparatus that executes a post-process on the printing paper 9 after the printing process. The cutting apparatus 40 is disposed downstream of the buffer apparatus 30, and executes a cutting process on the printing paper 9. In the present embodiment, a sticker base material having a sticker layer and a backing layer is used as the printing paper 9. The cutting apparatus 40 executes what is called a half-cutting process for cutting only the sticker layer, not the backing layer.

[0045] In place of the cutting apparatus 40, another cutting apparatus such as a die cutting apparatus for die cutting of the printing paper 9 or a cutting-off apparatus for cutting off the printing paper 9 may be provided as the post-processing apparatus. Alternatively, in place of the cutting apparatus 40, another printing apparatus for printing on a surface opposite from the surface printed in the printing apparatus 10 or a folding machine for folding the printing paper 9 in predetermined lengths may be provided as the post-processing apparatus. When the cutting-off apparatus or the folding machine is provided

in place of the cutting apparatus 40, the printing system 1 does not include the winding mechanism 22 because there is no need to wind the processed printing paper 9.

[0046] The cutting apparatus 40 according to the present embodiment is a rotary die cutter including a blade-equipped cylinder 41 and an anvil cylinder 42. Each of the blade-equipped cylinder 41 and the anvil cylinder 42 extends in a horizontal direction orthogonal to the transport path.

[0047] The blade-equipped cylinder 41 is disposed over the transport path of the printing paper 9. The blade-equipped cylinder 41 includes a cylindrical cylinder 411 and a punching blade 412 mounted around the cylinder 411. As indicated by an arrow in Fig. 1, the blade-equipped cylinder 41 is movable upwardly and downwardly between a standby position (shown in dashed lines in Fig. 1) in which the blade-equipped cylinder 41 is out of contact with the printing paper 9 and an actuation position (shown in solid lines in Fig. 1) in which the blade-equipped cylinder 41 is in contact with the printing paper 9.

[0048] The anvil cylinder 42 is disposed under the transport path of the printing paper 9. For cutting process, the blade-equipped cylinder 41 and the anvil cylinder 42 rotate as indicated by dashed arrows in Fig. 1 while the printing paper 9 being transported on the transport path is inserted between the blade-equipped cylinder 41 and the anvil cylinder 42 from above and below. Thus, the cutting process is executed on the printing paper 9.

[0049] The controller 50 is a control means for controlling the operations of the parts in the printing system 1. As conceptually shown in Fig. 1, the controller 50 according to the present embodiment is formed by a computer including an arithmetic processor 501 such as a CPU, a memory 502 such as a RAM, and a storage part 503 such as a hard disk drive. As shown in Fig. 2, the controller 50 is electrically connected to the printing apparatus 10, the transport mechanism 20, the buffer apparatus 30, the cutting apparatus 40, and the manipulation part 60.

[0050] The controller 50 according to the present embodiment is configured by installing an operation control program Pi for the printing apparatus 10 onto the computer. A computer program P including the operation control program Pi and data D are stored in the storage part 503 of the controller 50.

[0051] The controller 50 temporarily reads the computer program P and the data D which are stored in the storage part 503 onto the memory 502. The arithmetic processor 501 performs arithmetic processing based on the computer program P and the data D, whereby the controller 50 controls the operations of the parts in the printing system 1. Thus, the step of transporting the printing paper 9 by means of the unwinding mechanism 21, the winding mechanism 22, and the transport rollers 23, the step of printing in the printing apparatus 10, the step of adjusting tension by means of the buffer apparatus 30, and the step of cutting by means of the cutting apparatus 40 proceed. The controller 50 may be formed by electronic circuitry.

[0052] As shown in Fig. 2, the controller 50 includes the printing controller 51 for controlling the printing apparatus 10 and a cutting controller 52 for controlling the cutting apparatus 40 both of which are processing parts implemented in the form of software.

[0053] In the present embodiment, the operations of the printing apparatus 10, the unwinding mechanism 21, the winding mechanism 22, the buffer apparatus 30, and the cutting apparatus 40 are controlled by the single controller 50. However, the present invention is not limited to this. The apparatuses may be connected to respective different controllers. In that case, the printing apparatus 10 is at least connected to a controller including the printing controller 51, and the cutting apparatus 40 is at least connected to a controller including the cutting controller 52.

[0054] The arithmetic processor 501 comes in operation, based on the operation control program Pi, whereby the functions of the printing controller 51 are implemented. The printing controller 51 includes a job creation part 71, a temporary printing processing part 72, an actual printing processing part 73, and a printing process switching part 74.

[0055] The job creation part 71 creates a temporary printing job D2 and an actual printing job D3, based on submitted data D1 inputted from an input part 62. The submitted data D1 includes image data representing a print image desired by a user.

[0056] The temporary printing job D2 is a job (printing instruction data) for causing the recording part 11 of the printing apparatus 10 to control an operation so as to form a temporary print image on the printing paper 9. The temporary print image is a print image used for alignment in the cutting apparatus 40.

[0057] The actual printing job D3 is a job (printing instruction data) for causing the recording part 11 of the printing apparatus 10 to control an operation so as to form an actual print image on the printing paper 9. The actual print image is a reproduction of the print image desired by the user and included in the submitted data D1 through the use of the printing apparatus 10.

[0058] The temporary printing processing part 72 causes the recording part 11 of the printing apparatus 10 to execute a temporary printing process, based on the temporary printing job D2. In the temporary printing process, the recording part 11 records single pages of the temporary print image on the printing paper 9.

[0059] The actual printing processing part 73 causes the recording part 11 of the printing apparatus 10 to execute an actual printing process, based on the actual printing job D3. In the actual printing process, the recording part 11 records single pages of the actual print image on the printing paper 9.

[0060] The printing process switching part 74 outputs a stop command signal S2 and an execution command signal S3 to the temporary printing processing part 72 and the actual printing processing part 73, based on a

switching command signal S1 inputted from the input part 62.

[0061] Specifically, when the switching command signal S1 indicative of switching to the actual printing process is inputted from the input part 62 during the execution of the temporary printing process caused by the temporary printing processing part 72, the printing process switching part 74 outputs the stop command signal S2 indicative of stopping the temporary printing process to the temporary printing processing part 72, and outputs the execution command signal S3 indicative of starting the execution of the actual printing process to the actual printing processing part 73. Thus, the printing process switching part 74 causes the recording part 11 of the printing apparatus 10 to execute the switching from the temporary printing process to the actual printing process.

[0062] The manipulation part 60 includes a display part 61 and the input part 62. Information about the operating status and the like of the apparatuses which is inputted from the controller 50 is displayed on the display part 61. An operator may manipulate the input part 62 to input commands to the controller 50 and to input submitted data to the controller 50. A liquid crystal display, for example, is used for the display part 61.

[0063] The input part 62 includes a command input part 621 and a data and suchlike input part 622. A keyboard, a mouse, and a voice input device, for example, are used for the command input part 621. In the manipulation part 60 according to the present embodiment, the display part 61 and the command input part 621 are independent separate devices. However, a touch panel type device in which the display part 61 and the command input part 621 are integrated together may be used for the manipulation part 60.

[0064] The data and suchlike input part 622 according to the present embodiment is an optical drive that reads programs and data from an optical disc 600. The operation control program Pi and the submitted data D1 for the printing apparatus 10 are stored, for example, in the optical disc 600 that is a tangible recording medium. The data and suchlike input part 622 reads the operation control program Pi and the submitted data D1 for the printing apparatus 10 from the optical disc 600 to store the operation control program Pi and the submitted data D1 for the printing apparatus 10 in the storage part 503 of the controller 50. The data and suchlike input part 622 may be configured to input data by connection to a semiconductor memory in place of such an optical drive for reading the optical disc 600.

<1-2. Operation of Printing System>

[0065] Next, the operations of the recording part 11 and the printing controller 51 in the printing apparatus 10 during the actuation of the printing system 1 will be described with reference to Figs. 3 to 7. Fig. 3 is a flow diagram showing a procedure for the operations of the parts in the printing system 1 during the actuation of the printing system 1. Fig. 4 is a view of an example of the submitted data D1. Figs. 5 to 7 are examples of the temporary print image based on the temporary printing job D2 created from the example of the submitted data D1 shown in Fig. 4.

[0066] During the actuation of the printing system 1, the submitted data D1 is initially inputted through the data and suchlike input part 622 of the input part 62 to the controller 50 (Step ST101). The submitted data D1 includes image data D11 and cut position data D12. As shown in Fig. 4, the image data D11 is data indicative of the print image desired by the user and to be formed on the printing paper 9 by the recording part 11. The cut position data D12 is data indicative of cut positions at which the cutting process is to be executed in the cutting apparatus 40. In Fig. 4, the image data D11 that is a multicolor image is represented as a gray-scale image, and the cut positions are indicated by dashed lines.

[0067] Next, the controller 50 creates the temporary printing job D2 and the actual printing job D3 (Step ST102). Specifically, the temporary printing job D2 and the actual printing job D3 are created based on the submitted data D1 in the job creation part 71 of the printing controller 51.

[0068] The job creation part 71 creates the actual printing job D3 so that the actual print image to be formed on the printing paper 9 by the recording part 11 closely resembles the image data D11 in the submitted data D1. On the other hand, the job creation part 71 creates the temporary printing job D2 so that the amount of ink to be used during the printing of the temporary print image by the recording part 11 is smaller than the amount of ink to be used during the printing of the actual print image by recording part 11. The job creation part 71 also creates the temporary printing job D2 so that the alignment between the cutting apparatus 40 and the printing paper 9 is easily performed using the temporary print image.

[0069] The job creation part 71 according to the present embodiment creates the temporary printing job D2 so that the temporary print image is a print image obtained by decreasing the densities of respective colors of the actual print image, for example. The example of the temporary print image shown in Fig. 5 is a print image obtained by decreasing the densities of respective colors of the actual print image. This allows the amount of ink to be used during the printing of the temporary print image to be smaller than the amount of ink to be used during the printing of the actual print image. Also, a positional relationship in the actual print image is graspable from the temporary print image. This allows the precise alignment in the cutting apparatus 40.

[0070] The job creation part 71 may use other methods to create the temporary printing job D2. For example, the job creation part 71 may create the temporary printing job D2 so that the temporary print image is a print image obtained by representing the actual print image as a gray-scale image. In this manner, when the actual print image is a print image to be printed in multiple colors, the tem-

porary print image that is a print image printable in a single color of black achieves the reduction in the amounts of inks other than the black ink for use during the printing of the temporary print image. The color of the ink forming the temporary print image may be a color other than black.

[0071] Also, the job creation part 71 may create the temporary printing job D2 so that the temporary print image is a diagram obtained by representing only the outlines of the components of the actual print image in a single color as in the example shown in Fig. 6, for example. This further reduces the amount of ink to be used during the printing of the temporary print image.

[0072] Also, the job creation part 71 may create the temporary printing job D2 so that the temporary print image is a print image obtained by representing the cut positions at which the cutting process is to be executed in the cutting apparatus 40 in a diagram of a single color, for example. This further reduces the amount of ink to be used during the printing of the temporary print image. In the example shown in Fig. 7, cut positions P1 are indicated by solid lines, and mark positions P2 spaced outwardly and inwardly a predetermined distance apart from the cut positions PI are indicated by dashed lines. When the temporary print image includes not only the cut positions PI but also the mark positions P2, the alignment of the printing paper 9 in the cutting apparatus 40 is more easily performed.

[0073] When ejected ink droplets are constant in size, the amount of ink to be used during the printing of print images by the recording part 11 decreases as the sum (referred to hereinafter as the "total number of ejected pixels") of the numbers of ejected pixels obtained by ink ejection from the recording heads 12 responsible for the respective colors in an image to be formed on the printing paper 9 decreases. Thus, the job creation part 71 creates the temporary printing job D2 so that the total number of ejected pixels of the temporary printing job D2 is smaller than the total number of ejected pixels of the actual printing job D3, for example. This causes the amount of ink to be used during the printing of the temporary print image by the recording part 11 to be smaller than the amount of ink to be used during the printing of the actual print image by the recording part 11. When the temporary print image D2 is a single-color image as in the examples shown in Figs. 6 and 7, the total number of ejected pixels of the temporary printing job D2 is smaller than the total number of ejected pixels of the actual printing job D3 because the number of ejected pixels of inks of other colors is zero.

[0074] After the creation of the jobs is completed, the controller 50 subsequently starts the actuation of the transport mechanism 20 (Step ST103). Thus, the transport of the printing paper 9 is started.

[0075] Then, the temporary printing processing part 72 of the controller 50 causes the recording part 11 to execute the printing process on one page of the temporary print image, based on the temporary printing job D2 (Step ST104). The term "one page" as used herein refers to a region as seen in the transport direction of the printing paper 9 and corresponding to an area to be cut in a single cutting process in the cutting apparatus 40. In parallel with Step ST104, alignment between the parts in the cutting apparatus 40 and the printing paper 9 is performed in the cutting apparatus 40. This alignment is performed, for example, by making fine adjustments to the position of the blade-equipped cylinder 41 as seen in the width direction and in the direction of rotation. This alignment may be performed manually by the user. Alternatively, this alignment may be performed by the cutting controller 52 automatically or by the user who inputs a command signal from the command input part 621 to control the operation of the cutting apparatus 50.

[0076] After the alignment is completed, the user inputs the switching command signal S1 from the command input part 621 to the controller 50. Thus, the switching command signal S1 is inputted to the printing process switching part 74. The switching command signal S1 may be automatically inputted from the cutting controller 52 that has detected the completion of the alignment to the printing process switching part 74.

[0077] During the execution of the temporary printing process in Step ST104, the printing process switching part 74 of the controller 50 monitors whether the switching command signal S1 is inputted from the command input part 621 of the input part 62 or not. Upon judging that the switching command signal S1 is inputted, the printing process switching part 74 outputs the stop command signal S2 indicative of stopping the temporary printing process to the temporary printing processing part 72, and outputs the execution command signal S3 indicative of starting the execution of the actual printing process to the actual printing processing part 73.

[0078] After Step ST104 is completed, the temporary printing processing part 72 judges whether the stop command signal S2 is inputted or not. In other words, the temporary printing processing part 72 judges whether the switching command signal S1 is inputted to the printing process switching part 74 during the execution of Step ST104 or not (Step ST105).

[0079] If the temporary printing processing part 72 judges that the stop command signal S2 is not inputted in Step ST105, the procedure returns to Step ST104, and the temporary printing process is continued. In other words, if the switching command signal S1 is not inputted to the printing process switching part 74 during the execution of Step ST104, the temporary printing process is continued.

[0080] If the temporary printing processing part 72 judges that the stop command signal S2 is inputted in Step ST105, the temporary printing process is stopped. In other words, if the switching command signal S1 is inputted to the printing process switching part 74 during the execution of Step ST104, the temporary printing processing part 72 stops the temporary printing process after printing the temporary print image being printed to

the last of the page.

[0081] The actual printing processing part 73 to which the execution command signal S3 is inputted during the execution of Step ST104 starts the actual printing process (Step ST106) after the temporary printing processing part 72 completes the printing of the temporary print image being printed. In this manner, the printing process switching part 74 causes the recording part 11 to switch from the temporary printing process to the actual printing process.

[0082] In Step ST106, the actual printing processing part 73 causes the recording part 11 to execute the printing process on a determined number of pages of the actual print image, based on the actual printing job D3. After the actual printing process in Step ST106 is completed, the controller 50 completes the actuation of the transport mechanism 20 (Step ST107).

[0083] As described above, this printing system 1 performs alignment with the use of the temporary print image which uses a smaller amount of ink than the actual print image when alignment is performed in the post-processing apparatus (the cutting apparatus 40) disposed downstream of the recording part 11 of the printing apparatus 10. This suppresses an increase in the amount of consumption of ink and also achieves precise alignment in the post-processing apparatus.

[0084] For switching from the temporary printing to the actual printing independently of the switching command signal S1, it is necessary to estimate and previously determine the number of pages for the temporary printing required for the alignment. In this case, if the alignment is performed more speedily than the estimate, an unnecessary temporary printing process occurs to result in useless consumption of ink. On the other hand, if the alignment is later than the estimate, the alignment is continued using the base material subjected to the actual printing process. This results in more useless consumption of ink.

[0085] In the printing system 1 according to the present embodiment, the temporary printing process is ended in timed relation to the input of the switching command signal S1 without fixing the number of pages for the temporary printing. Thus, the temporary printing process is ended at the time that the alignment in the post-processing apparatus is judged to be completed. This further suppresses an increase in the amount of consumption of ink.

[0086] In the printing system 1 according to the present embodiment, the temporary printing job D2 and the actual printing job D3 are created based on the same submitted data D1. This allows the temporary print image to be formed on the printing paper 9 at the same position as the printing position of the actual print image. Thus, the alignment in the post-processing apparatus is performed precisely on the printing position of the actual print image.

<2. Second Embodiment>

[0087] Next, a second embodiment according to the present invention will be described. The second embodiment uses the same printing system 1 as the first embodiment to perform an operation different from that of the first embodiment. Fig. 8 is a flow diagram showing a procedure for operations of the parts of the printing system 1 during the actuation of the printing system 1 according to the second embodiment. The operations of the recording part 11 and the printing controller 51 in the printing apparatus 10 during the actuation of the printing system 1 will be described below with reference to Fig. 8.

[0088] During the actuation of the printing system 1, the submitted data D1 is initially inputted to the controller 50 in the second embodiment (Step ST201) as in the first embodiment. Then, the controller 50 creates the temporary printing job D2 and the actual printing job D3, based on the submitted data D1 (Step ST202). Steps ST201 and ST202 in the second embodiment, which are similar to Steps ST101 and ST102 in the first embodiment, will not be described in detail.

[0089] After the creation of the jobs is completed, the controller 50 subsequently starts the actuation of the transport mechanism 20 (Step ST203). At this time, the controller 50 actuates the transport mechanism 20 so that the transport speed of the printing paper 9 is equal to a first speed. The first speed is in the range of 5 [m/min] to 10 [m/min], for example.

[0090] Then, the temporary printing processing part 72 of the controller 50 causes the recording part 11 to execute the printing process on one page of the temporary print image, based on the temporary printing job D2 (Step ST204). In parallel with Step ST204, alignment between the parts in the cutting apparatus 40 and the printing paper 9 is performed in the cutting apparatus 40. In the present embodiment, alignment is performed manually by the user. If the transport speed is high, it is difficult to perform the alignment manually. The transport speed of the printing paper 9 during the execution of the temporary printing process in Step ST204 is equal to the aforementioned first speed. The first speed is a speed lower than the transport speed (for example, a second speed to be described later) suitable for the printing process in the recording part 11 and the cutting process in the cutting apparatus 40. The transport speed of the printing paper 9 equal to the first speed during the alignment in the cutting apparatus 40 facilitates the manual alignment.

[0091] During the execution of the temporary printing process in Step ST204, the printing process switching part 74 of the controller 50 monitors whether the switching command signal S1 is inputted from the command input part 621 of the input part 62 or not. Upon judging that the switching command signal S1 is inputted, the printing process switching part 74 outputs the stop command signal S2 indicative of stopping the temporary printing process to the temporary printing processing part 72, and outputs the execution command signal S3 indicative of starting the execution of the actual printing process to the actual printing processing part 73.

[0092] After Step ST204 is completed, the temporary printing processing part 72 judges whether the stop com-

mand signal S2 is inputted or not. In other words, the temporary printing processing part 72 judges whether the switching command signal S1 is inputted to the printing process switching part 74 during the execution of Step ST204 or not (Step ST205).

[0093] If the temporary printing processing part 72 judges that the stop command signal S2 is not inputted in Step ST205, the procedure returns to Step ST204, and the temporary printing process is continued. In other words, if the switching command signal S1 is not inputted to the printing process switching part 74 during the execution of Step ST204, the temporary printing process is continued.

[0094] If the temporary printing processing part 72 judges that the stop command signal S2 is inputted in Step ST205, the temporary printing process is stopped. In other words, if the switching command signal S1 is inputted to the printing process switching part 74 during the execution of Step ST204, the temporary printing processing part 72 stops the temporary printing process after printing the temporary print image being printed to the last of the page. Then, the controller 50 causes the transport mechanism 20 to start increasing the transport speed of the printing paper 9 (Step ST206). At this time, the controller 50 actuates the transport mechanism 20 so that the transport speed of the printing paper 9 is equal to the second speed higher than the first speed. The second speed is in the range of 50 [m/min] to 70 [m/min], for example.

[0095] On the other hand, the actual printing processing part 73 to which the execution command signal S3 is inputted during the execution of Step ST204 causes the recording part 11 to execute the printing process on one page of the actual print image simultaneously with the start of the increase in transport speed (Step ST207) after the temporary printing processing part 72 completes the printing of the temporary print image being printed. In Step ST207, a switching printing process in which the actual print image is printed while the transport speed of the printing paper 9 is increased from the first speed to the second speed is executed in this manner. During the execution of the switching printing process, the transport speed of the printing paper 9 increases gradually from the first speed to the second speed. Thus, the actual printing processing part 73 causes the recording part 11 to eject ink in accordance with the transport speed of the printing paper 9.

[0096] During the execution of the switching printing process in Step ST207, the controller 50 monitors the transport speed of the printing paper 9 in the transport mechanism 20. After Step ST207 is completed, the controller 50 judges whether the transport speed of the printing paper 9 has reached the second speed or not (Step ST208).

[0097] If the controller 50 judges that the transport speed of the printing paper 9 has not reached the second speed in Step ST208, the procedure returns to Step ST207, and the controller 50 causes the recording part 10 to execute the printing process as the switching printing process on single pages of the actual print image.

[0098] If the controller 50 judges that the transport speed of the printing paper 9 has reached the second speed in Step ST208, the procedure proceeds to Step ST209. In Step ST209, the actual printing processing part 73 initially causes the recording part 11 to record a constant-speed marker on a boundary between the last page printed in the switching printing process and the page to be printed next in the actual printing process.

[0099] In Step ST209, after the recording of the constant-speed marker, the actual printing processing part 73 causes the recording part 11 to execute the printing process on a determined number of pages of the actual print image. That is, the actual printing processing part 73 executes the actual printing process. In this manner, the printing process switching part 74 causes the recording part 11 to switch from the temporary printing process to the actual printing process. The transport speed of the printing paper 9 during the execution of the actual printing process in Step ST209 is equal to the second speed. The second speed is a transport speed suitable for the printing process in the recording part 11 and the cutting process in the cutting apparatus 40.

[0100] After the actual printing process in Step ST209 is completed, the controller 50 completes the actuation of the transport mechanism 20 (Step ST210).

[0101] In the present embodiment, the transport speed of the printing paper 9 during the execution of the temporary printing process for the alignment in the post-processing apparatus (the cutting apparatus 40) differs from the transport speed of the printing paper 9 during the execution of the actual printing process in this manner. This suppresses the useless consumption of the printing paper 9 during the alignment.

[0102] In the present embodiment, the constant-speed marker is printed on the printing paper 9 after the transport speed of the printing paper 9 has reached the second speed. Fig. 9 is a schematic view showing an example of the printing paper 9 subjected to the printing process in the printing system 1 according to the second embodiment. As shown in Fig. 9, temporary print pages 91 on which the temporary print image is printed by the temporary printing process in Step ST204, switching print pages 92 on which the actual print image is printed by the switching printing process in Step ST207, and actual print pages 93 on which the actual print image is printed by the actual printing process in Step ST209 are formed on the printing paper 9. A constant-speed marker 90 is printed on a boundary between the switching print pages 92 and the actual print pages 93.

[0103] Printing the constant-speed marker 90 in this manner makes it easy to distinguish between the switching print pages 92 and the actual print pages 93.

<3. Modifications>

[0104] While the embodiments according to the

present invention have been described hereinabove, the present invention is not limited to the aforementioned embodiments.

[0105] In the printing system according to the aforementioned embodiments, the buffer apparatus is interposed between the printing apparatus and the cutting apparatus that is the post-processing apparatus. However, the printing system according to the present invention need not include the buffer apparatus.

[0106] In the printing system according to the aforementioned embodiments, the printing apparatus 1 includes the job creation part 71 provided therein. Thus, the temporary printing job D2 and the actual printing job D3 are created in the printing apparatus 1, based on the submitted data D1. The present invention, however, is not limited to this. The temporary printing job D2 and the actual printing job D3 may be created in a data processing apparatus provided outside the printing apparatus 1, based on the submitted data D1. In that case, the temporary printing job D2 and the actual printing job D3 created in the data processing apparatus may be configured to be inputted to the printing apparatus 1.

[0107] The printing system according to the aforementioned embodiments is designed to process the printing paper that is an elongated strip-shaped base material. However, the printing system according to the present invention may be designed to print on a sheet-like base material other than general paper (for example, a film made of resin and the like).

[0108] An inkjet printing apparatus is used as the printing apparatus in the aforementioned embodiments. However, the printing apparatus according to the present invention may be a plateless printing apparatus of other types such as electrophotography.

[0109] The components described in the aforementioned embodiments and in the modifications may be consistently combined together, as appropriate.

Reference Signs List

[0110]

1	Printing system
9	Printing paper
10	Printing apparatus
11	Recording part
20	Transport mechanism
40	Cutting apparatus
50	Controller
51	Printing controller
52	Cutting controller
62	Input part
71	Job creation part
72	Temporary printing processing part
73	Actual printing processing part
74	Printing process switching part
501	Arithmetic processor
502	Memory
503	Storage part
Pi	Operation control program
S1	Switching command signal
S2	Stop command signal
S3	Execution command signal

Claims

1. A printing apparatus for recording a print image on a base material being transported in a transport direction, comprising:

a recording part for causing a recording agent to adhere to said base material, thereby recording a print image on said base material; and
a printing controller for controlling said recording part,
said printing controller including
a temporary printing processing part for causing said recording part to execute a temporary printing process that records single pages of a temporary print image on said base material,
an actual printing processing part for causing said recording part to execute an actual printing process that records single pages of an actual print image on said base material, and
a printing process switching part for causing said recording part to execute switching from said temporary printing process to said actual printing process during the execution of said temporary printing process,

wherein the amount of recording agent used during printing of said temporary print image is smaller than that used during printing of said actual print image.

2. The printing apparatus according to Claim 1, further comprising
an input part for inputting print image data to said printing controller,
wherein said printing controller further includes
a job creation part for creating an actual printing job and a temporary printing job, based on said print image data inputted from said input part,
wherein said actual printing processing part executes said actual printing process, based on said actual printing job, and
wherein said temporary printing processing part executes said temporary printing process, based on said temporary printing job.

3. The printing apparatus according to Claim 1 or 2, wherein said temporary print image is a print image obtained by decreasing densities of respective colors of said actual print image.

4. The printing apparatus according to Claim 1 or 2,

wherein said actual print image is a print image printed in multiple colors, and wherein said temporary print image is a print image printable in a single color.

5. The printing apparatus according to Claim 1 or 2, wherein said temporary print image is a print image including a diagram obtained by representing only outlines of components of said actual print image in a single color.

6. The printing apparatus according to any one of Claims 1 to 5,
said printing apparatus being used in conjunction with a post-processing apparatus disposed downstream of said printing apparatus and for executing a process on said base material.

7. The printing apparatus according to Claim 1 or 2,
said printing apparatus being used in conjunction with a cutting apparatus disposed downstream of said printing apparatus and for executing a cutting process on said base material,
wherein said temporary print image is a print image obtained by representing a position at which the cutting process is to be executed in said cutting apparatus in a single color.

8. A printing system comprising:

a printing apparatus as recited in any one of Claims 1 to 5; and
a post-processing apparatus disposed downstream of said printing apparatus and for executing a process on said base material.

9. The printing apparatus according to Claim 1 or 2,
wherein a transport speed of said base material during the execution of said temporary printing process is equal to a first speed, and
wherein a transport speed of said base material during the execution of said actual printing process is equal to a second speed higher than said first speed.

10. The printing apparatus according to Claim 9,
wherein said actual printing processing part causes said recording part to execute a switching printing process that records single pages of the actual print image on said base material while increasing the transport speed of said base material after the end of said temporary printing process and before the start of said actual printing process, and starts said actual printing process after the transport speed of said base material has reached said second speed.

11. The printing apparatus according to Claim 10,
wherein said actual printing processing part causes said recording part to record a marker on a boundary between the last page printed in the switching printing process and the page to be printed next in the actual printing process.

12. A printing method for causing a recording agent to adhere to a base material being transported in a transport direction, thereby recording a print image on said base material, the method comprising the steps of:

a) executing a temporary printing process that records single pages of a temporary print image on said base material;
b) judging whether a switching command signal is inputted during the execution of said step a) or not;
c) stopping said step a) after it is judged that said switching command signal is inputted in said step b); and
d) executing an actual printing process that records a desired number of pages of an actual print image on said base material after said step c),

wherein the amount of recording agent used during printing of said temporary print image per page in said step a) is smaller than that used during printing of said actual print image per page in said step d).

13. The printing method according to Claim 12, further comprising the step of

e) creating a temporary printing job for executing the temporary printing process and an actual printing job for executing the actual printing process, based on print image data inputted from an input part, said step e) being performed before said step a).

14. The printing method according to Claim 12 or 13, wherein said temporary print image is a print image obtained by decreasing densities of respective colors of said actual print image.

15. The printing method according to Claim 12 or 13, wherein said actual print image is a print image printed in multiple colors, and wherein said temporary print image is a print image printable in a single color.

16. The printing method according to Claim 12 or 13, wherein said temporary print image is a print image including a diagram obtained by representing only outlines of components of said actual print image in a single color.

17. The printing method according to any one of Claims 12 to 16, further comprising the steps of:

f) performing alignment between said base ma-

terial and a post-processing apparatus disposed downstream of a printing apparatus that executes said temporary printing process and said actual printing process, said step f) being performed in parallel with said step a); and
g) inputting said switching command signal during the execution of said step a) and after the end of said step f).

18. The printing method according to Claim 12 or 13, further comprising the steps of:

h) performing alignment between said base material and a cutting apparatus disposed downstream of a printing apparatus that executes said temporary printing process and said actual printing process, said step h) being performed in parallel with said step a); and
i) inputting said switching command signal during the execution of said step a) and after the end of said step h),

wherein said temporary print image is a print image obtained by representing a position at which the cutting process is to be executed in said cutting apparatus in a single color.

19. The printing method according to Claim 12 or 13,
wherein a transport speed of said base material in said step a) is equal to a first speed, and
wherein a transport speed of said base material in said step d) is equal to a second speed higher than said first speed.

20. The printing method according to Claim 19, further comprising the steps of:

j) executing a switching printing process that records single pages of the actual print image on said base material while increasing the transport speed of said base material after said step c); and
k) judging whether the transport speed of said base material has reached said second speed during the execution of said step j) or not,

wherein said step d) is executed after it is judged that the transport speed of said base material has reached said second speed in said step k).

21. The printing method according to Claim 20, further comprising the step of

l) recording a marker on a boundary between the last page printed in said step j) and the page to be printed next in said step d), said step 1) being executed after it is judged that the transport speed of said base material has reached said second speed in said step k) and before said step d).

22. A computer-readable recording medium,
said recording medium having stored thereon an operation control program for a printing apparatus for causing a recording agent to adhere to a base material being transported in a transport direction, thereby recording a print image on said base material,
said operation control program causing a computer included in said printing apparatus to perform the steps of:

A) causing said printing apparatus to execute a temporary printing process that records single pages of a temporary print image on said base material;
B) judging whether a switching command signal is inputted during the execution of said step A) or not;
C) stopping said step A) after it is judged that said switching command signal is inputted in said step B); and
D) causing said printing apparatus to execute an actual printing process that records an actual print image on said base material after said step C),

wherein the amount of recording agent used during printing of said temporary print image per page in said step A) is smaller than that used during printing of said actual print image per page in said step D).

23. The recording medium for the printing apparatus according to Claim 22,
wherein said operation control program causes said computer to further perform the step of

E) creating a temporary printing job for executing the temporary printing process and an actual printing job for executing the actual printing process, based on print image data, said step E) being performed before said step A).

24. The recording medium for the printing apparatus according to Claim 22 or 23,
wherein said operation control program causes said computer to further perform the steps of:

causing a transport mechanism for said base material to transport said base material at a first speed during the execution of said step A); and
causing said transport mechanism to transport said base material at a second speed higher than said first speed during the execution of said step D).

Fig.1

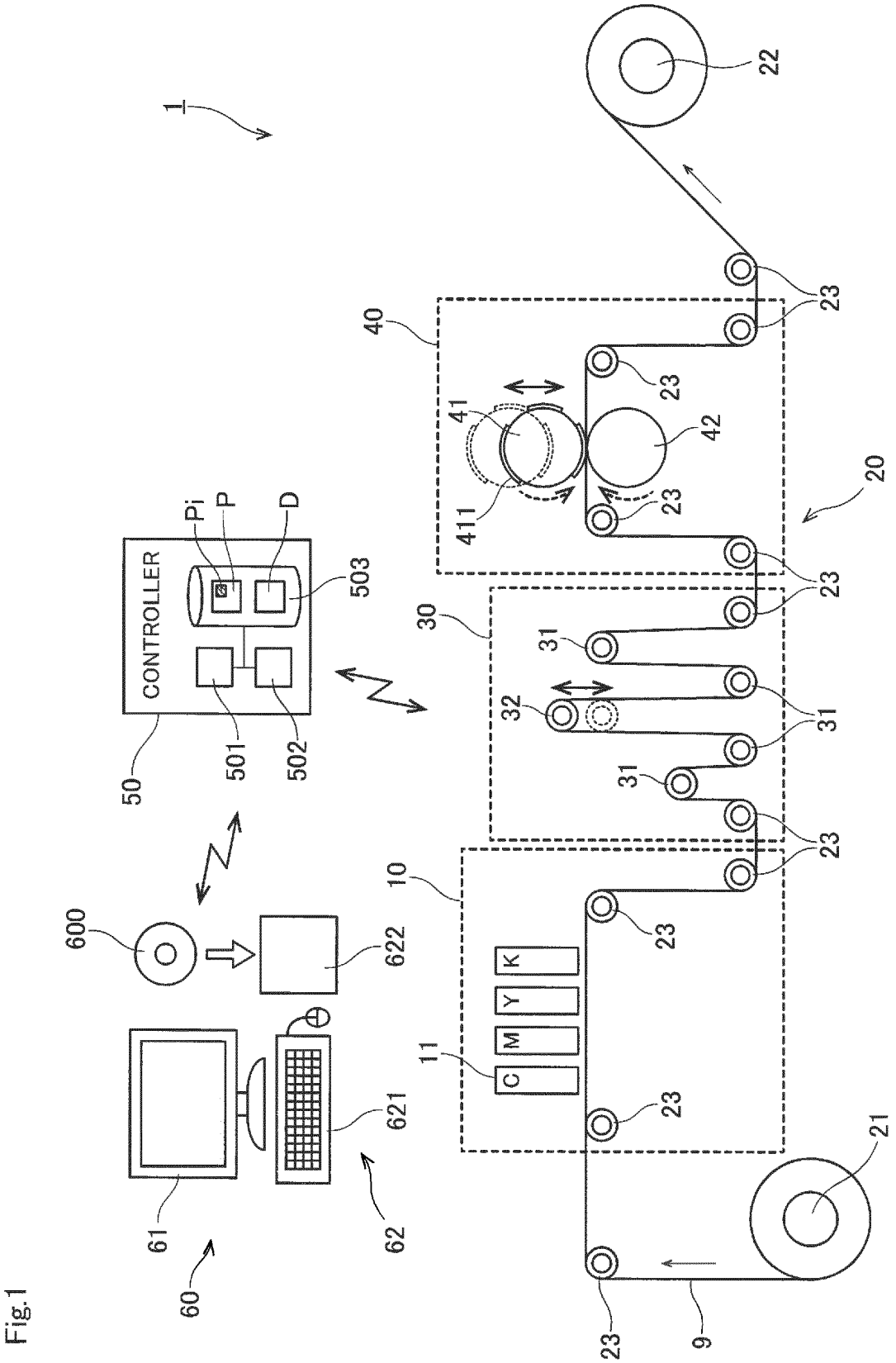

1
22
23
40
41
411
42
20
30
31
32
10
11
C
M
Y
K
21
9
CONTROLLER
Pi
P
D
503
50
501
502
600
622
621
61
62
60

Fig.1

Fig.2

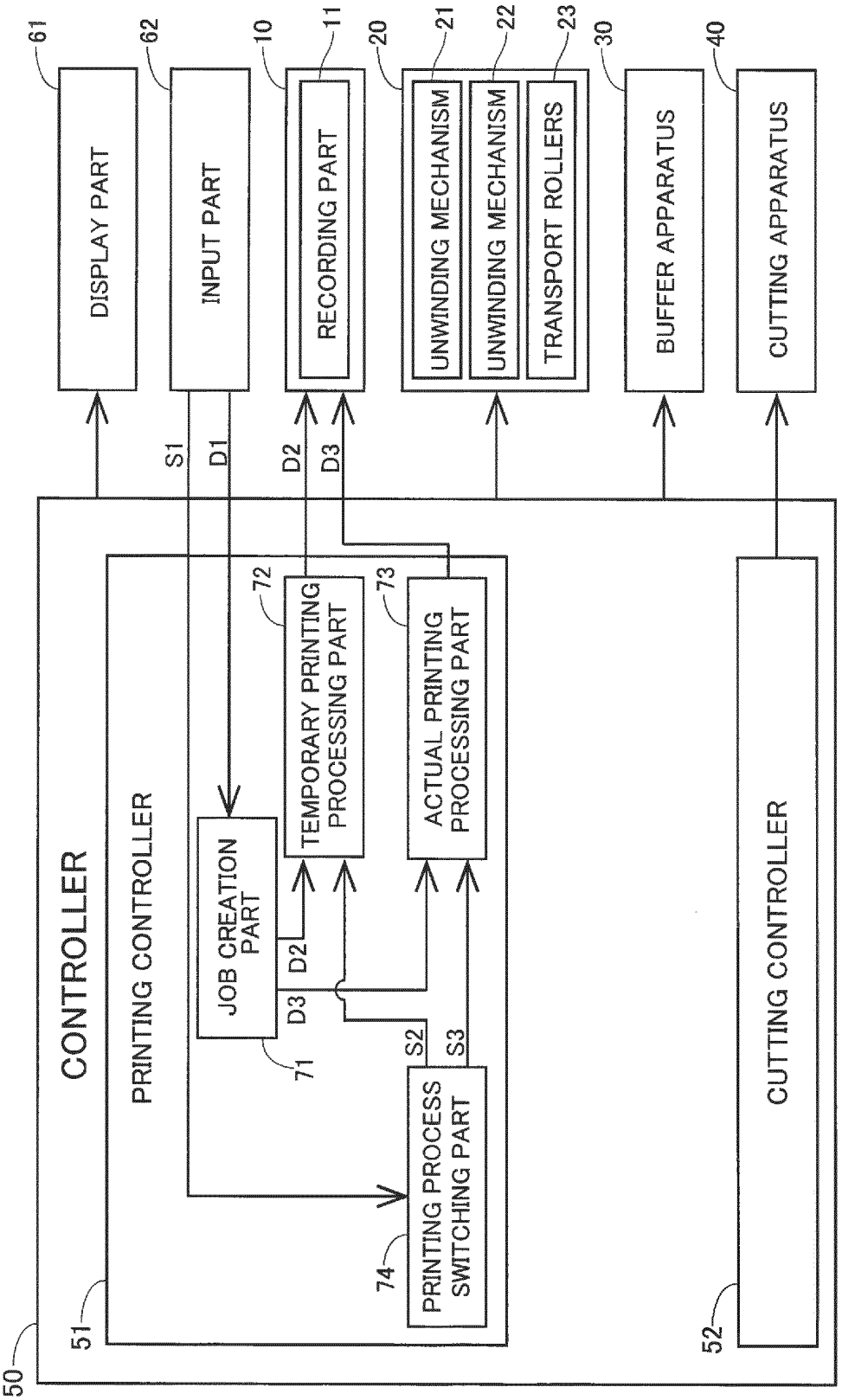

61
DISPLAY PART
62
INPUT PART
10
11
RECORDING PART
20
21
UNWINDING MECHANISM
22
UNWINDING MECHANISM
23
TRANSPORT ROLLERS
30
BUFFER APPARATUS
40
CUTTING APPARATUS
S1
D1
D2
D3
CONTROLLER
PRINTING CONTROLLER
72
TEMPORARY PRINTING PROCESSING PART
73
ACTUAL PRINTING PROCESSING PART
JOB CREATION PART
D2
D3
71
S2
S3
74
PRINTING PROCESS SWITCHING PART
CUTTING CONTROLLER
50
51
52

Fig.3

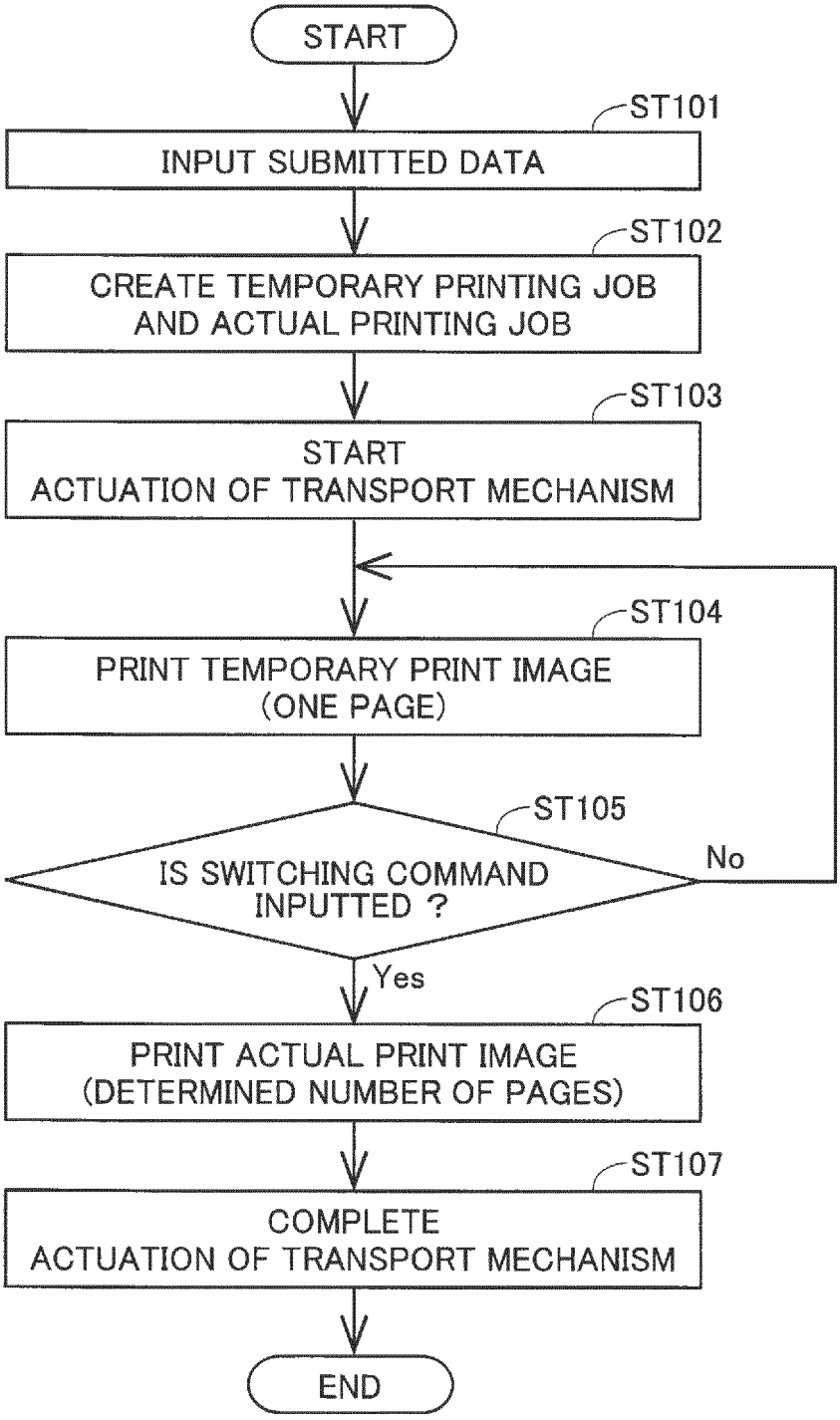

START
ST101
INPUT SUBMITTED DATA
ST102
CREATE TEMPORARY PRINTING JOB AND ACTUAL PRINTING JOB
ST103
START ACTUATION OF TRANSPORT MECHANISM
ST104
PRINT TEMPORARY PRINT IMAGE (ONE PAGE)
ST105
IS SWITCHING COMMAND INPUTTED ?
No
Yes
ST106
PRINT ACTUAL PRINT IMAGE (DETERMINED NUMBER OF PAGES)
ST107
COMPLETE ACTUATION OF TRANSPORT MECHANISM
END

Fig.4

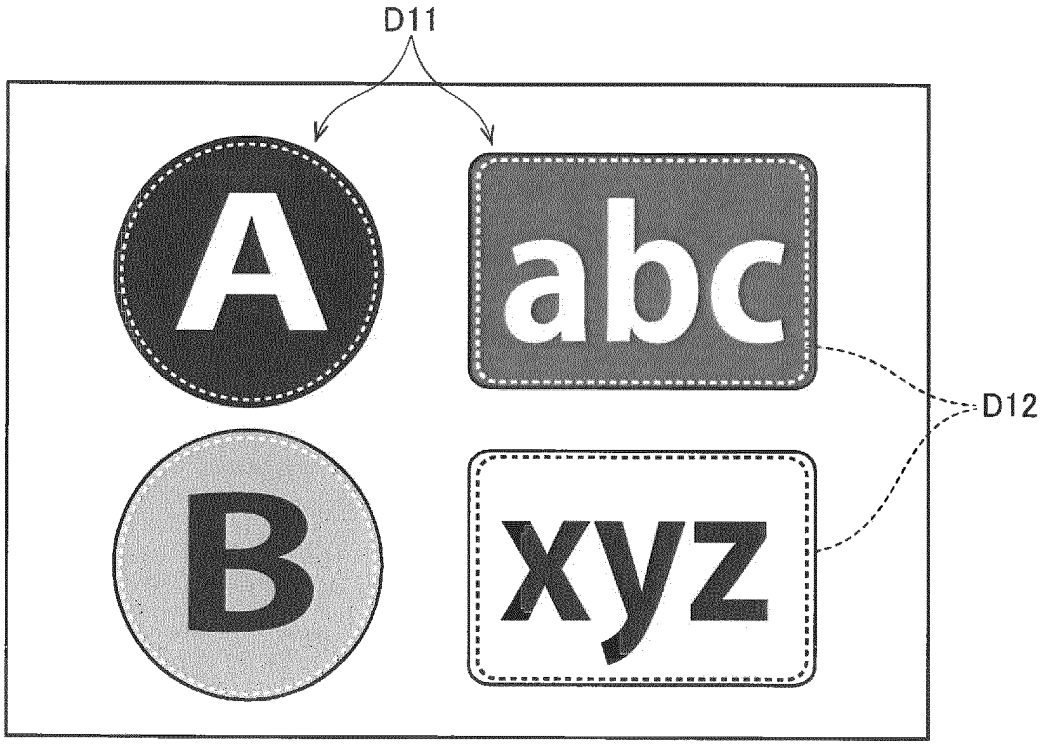


Fig.5

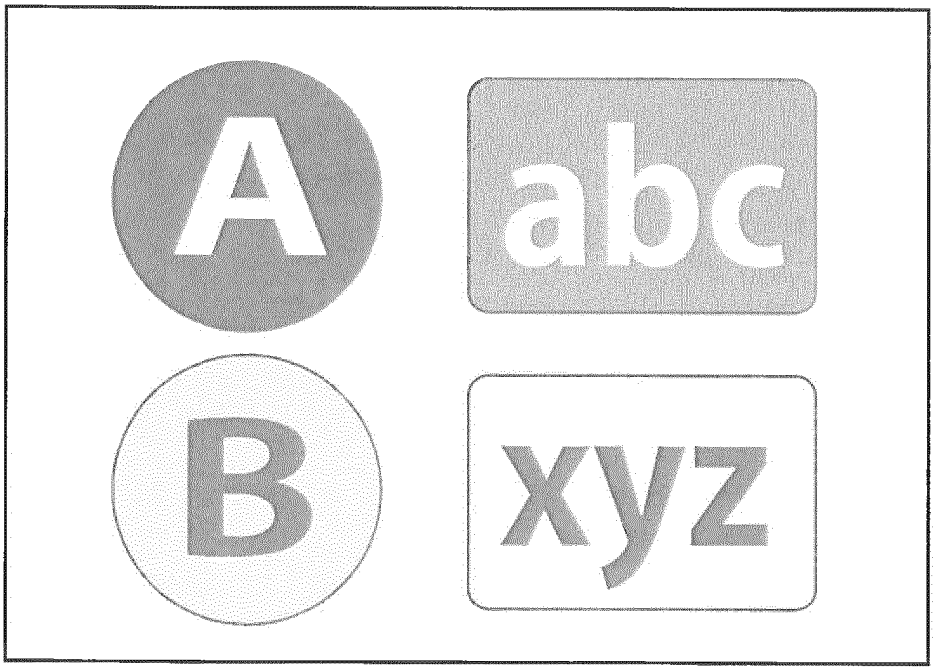


Fig.6

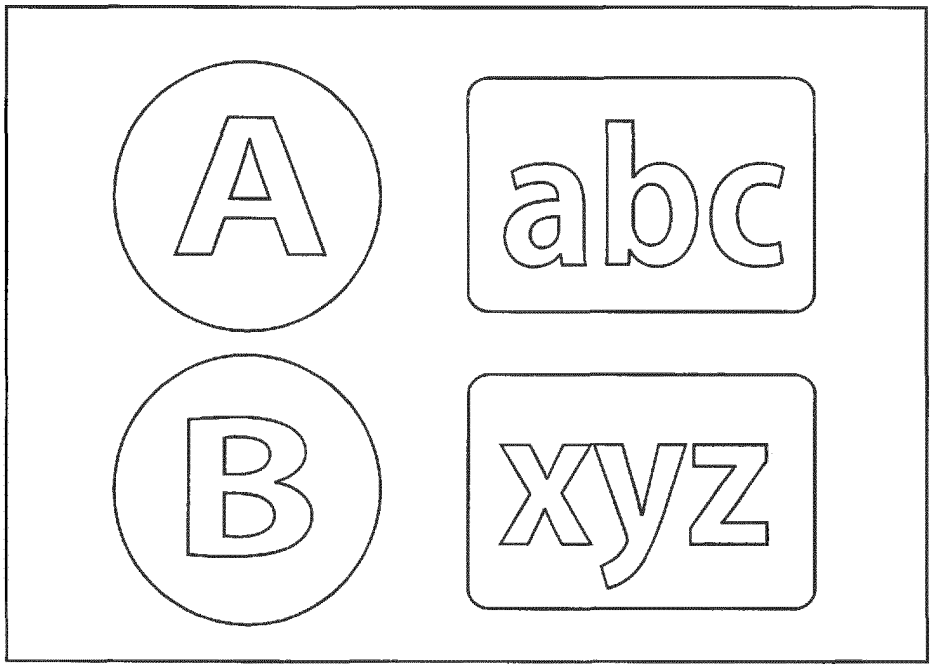


Fig.7

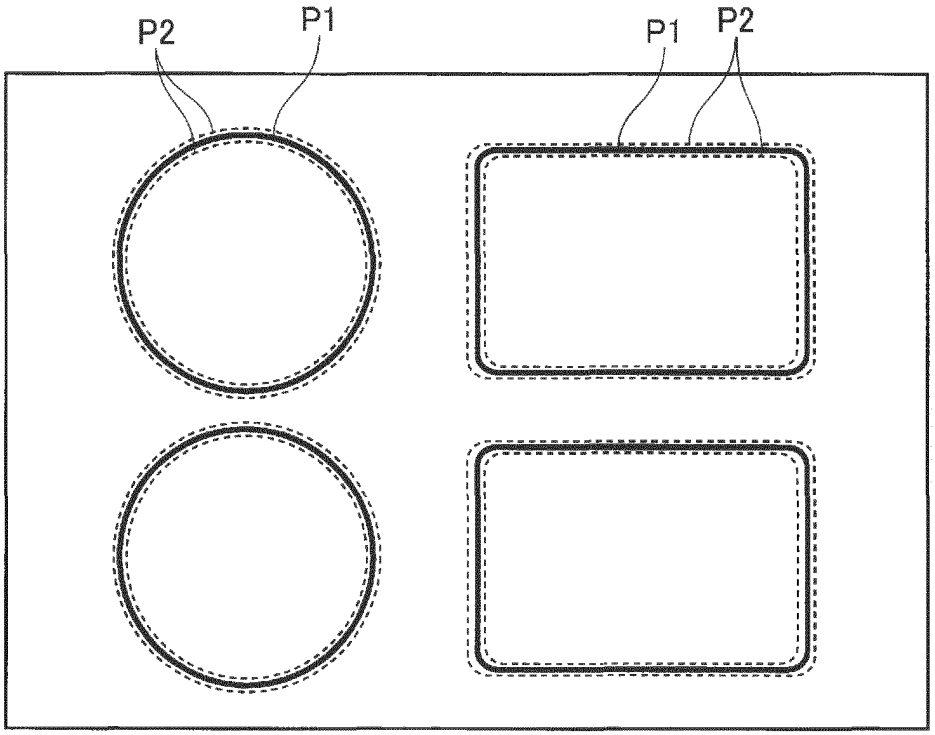


Fig.8

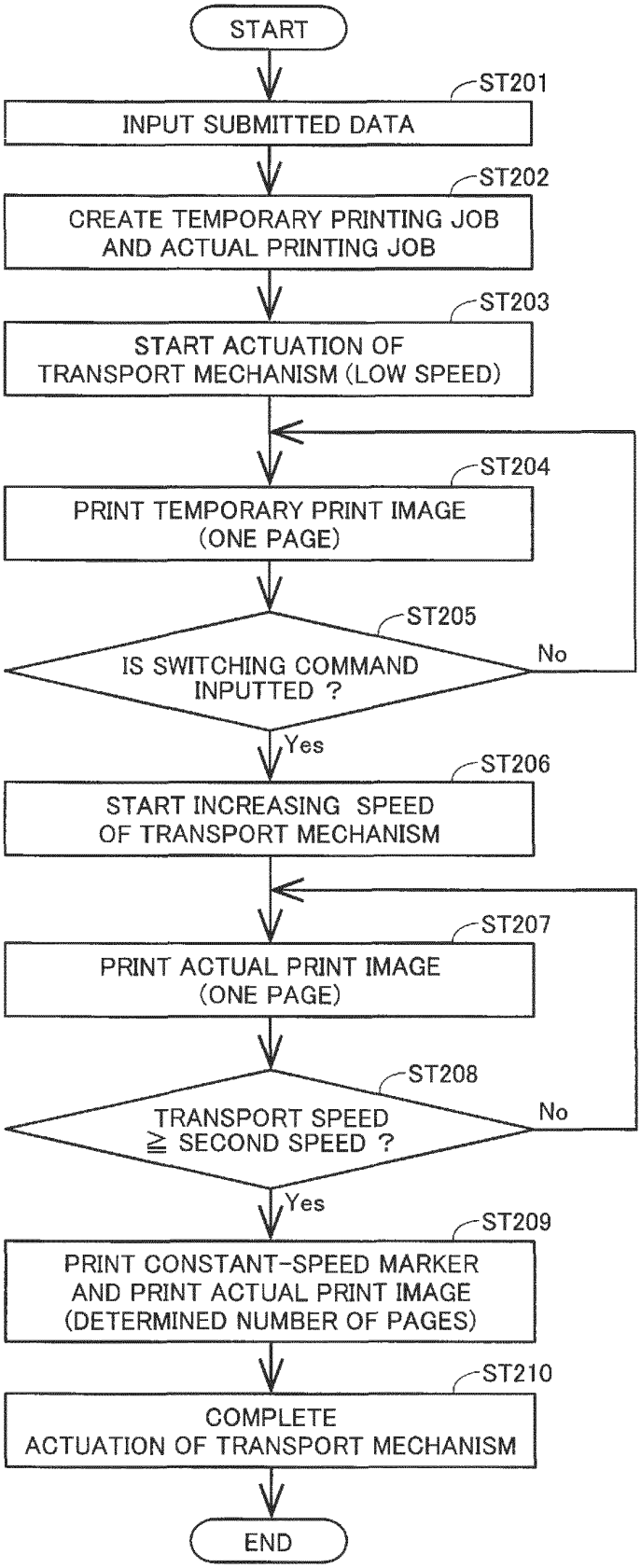
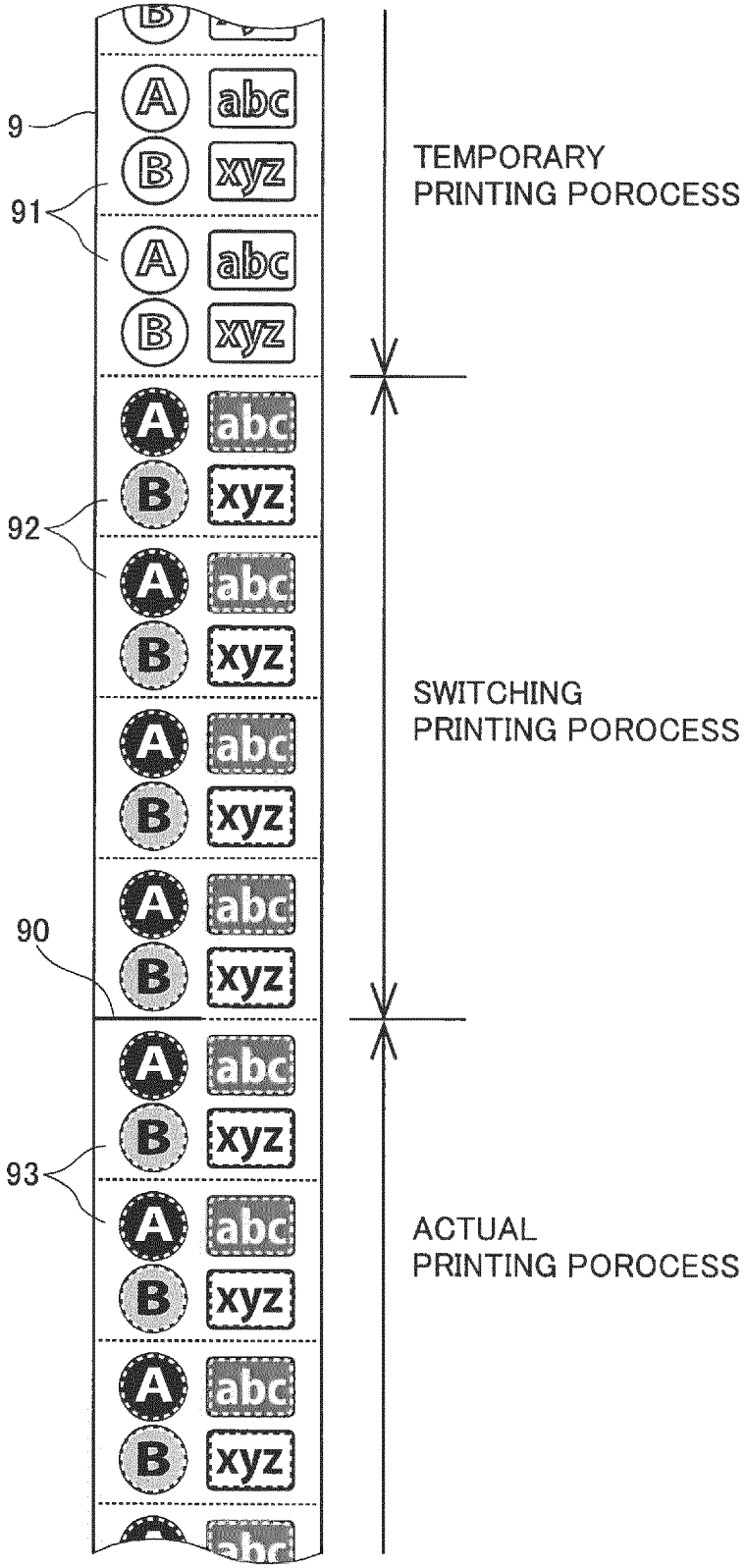

START
ST201
INPUT SUBMITTED DATA
ST202
CREATE TEMPORARY PRINTING JOB AND ACTUAL PRINTING JOB
ST203
START ACTUATION OF TRANSPORT MECHANISM (LOW SPEED)
ST204
PRINT TEMPORARY PRINT IMAGE (ONE PAGE)
ST205
IS SWITCHING COMMAND INPUTTED ?
No
Yes
ST206
START INCREASING SPEED OF TRANSPORT MECHANISM
ST207
PRINT ACTUAL PRINT IMAGE (ONE PAGE)
ST208
TRANSPORT SPEED ≧ SECOND SPEED ?
No
Yes
ST209
PRINT CONSTANT-SPEED MARKER AND PRINT ACTUAL PRINT IMAGE (DETERMINED NUMBER OF PAGES)
ST210
COMPLETE ACTUATION OF TRANSPORT MECHANISM
END

Fig.9


9
91
92
90
93
TEMPORARY
PRINTING POROCESS
SWITCHING
PRINTING POROCESS
ACTUAL
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/005708

A. CLASSIFICATION OF SUBJECT MATTER
B41J29/38(2006.01)i, *B41J11/66*(2006.01)i, *B41J21/00*(2006.01)i, *B41J25/20*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B41J29/38, B41J11/66, B41J21/00, B41J25/20, B41J2/01-2/215

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

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2017
Kokai Jitsuyo Shinan Koho	1971-2017	Toroku Jitsuyo Shinan Koho	1994-2017

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 07-299936 A (Ricoh Co., Ltd.), 14 November 1995 (14.11.1995), paragraphs [0024] to [0031]; fig. 1 to 2 (Family: none)	1-8,12-18, 22-23 9-11,19-21, 24
Y A	JP 2000-225731 A (Funai Electric Co., Ltd.), 15 August 2000 (15.08.2000), paragraphs [0014] to [0016], [0019]; fig. 1 to 5 (Family: none)	1-3,6-8, 12-14,17-18, 22-23 4-5,9-11, 15-16,19-21, 24

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"P" document published prior to the international filing date but later than the priority date claimed
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"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	Date of mailing of the international search report
27 April 2017 (27.04.17)	16 May 2017 (16.05.17)
Name and mailing address of the ISA/ Japan Patent Office 3-4-3,Kasumigaseki,Chiyoda-ku, Tokyo 100-8915,Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/005708

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 03-180868 A (Matsushita Electric Industrial Co., Ltd.), 06 August 1991 (06.08.1991), page 3, upper right column, line 5 to page 4, lower left column, line 7; fig. 1 (Family: none)	1-3,6-8, 12-14,17-18, 22-23 4-5,9-11, 15-16,19-21, 24
Y A	JP 11-277773 A (Konica Corp.), 12 October 1999 (12.10.1999), paragraphs [0036], [0041]; fig. 1 to 3 (Family: none)	1-2,4-8, 12-13,15-18, 22-23 3,9-11,14, 19-21,24
Y A	JP 11-136515 A (Ricoh Co., Ltd.), 21 May 1999 (21.05.1999), paragraphs [0002], [0011], [0014]; fig. 3 to 7 (Family: none)	1-3,5-8, 12-14,16-18, 22-23 4,9-11,15, 19-21,24
Y A	JP 2015-123665 A (Canon Inc.), 06 July 2015 (06.07.2015), paragraphs [0011], [0049]; fig. 4 & US 2015/0183214 A1 paragraphs [0020], [0058]; fig. 4	6-8,17-18 1-5,9-16, 19-24
P,X P,A	US 2017/0011286 A1 (KOUGUCHI, Masatsugu), 12 January 2017 (12.01.2017), paragraphs [0037], [0043], [0049] to [0054], [0075], [0091]; fig. 1 to 16 & JP 2017-62536 A paragraphs [0018], [0024], [0030] to [0036], [0056], [0072]; fig. 1 to 16	1-2,4-8, 12-13,15-18, 22-23 3,9-11,14, 19-21,24
A	JP 2001-001425 A (Canon Aptex Inc.), 09 January 2001 (09.01.2001), paragraphs [0013], [0031] to [0043], [0060] to [0067]; fig. 1 to 13 (Family: none)	1-24
A	US 6112658 A (GUNTHER, William G.), 05 September 2000 (05.09.2000), column 3, line 47 to column 12; fig. 1 to 8 (Family: none)	1-24

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2009078886 A **[0004]**