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(54) **Image Forming Apparatus, Method of Controlling Image Forming Apparatus and Computer Readable Information Recording Medium**

(57) An image forming apparatus of plural image forming apparatuses includes an illuminance detecting part configured to detect illuminance; a communication part configured to carry out communication with other

ones of the plural image forming apparatuses; and a control part configured to obtain information obtained from the illuminance detecting parts of the plural image forming apparatuses using the communication parts, and return from an energy saving mode.

FIG.1A

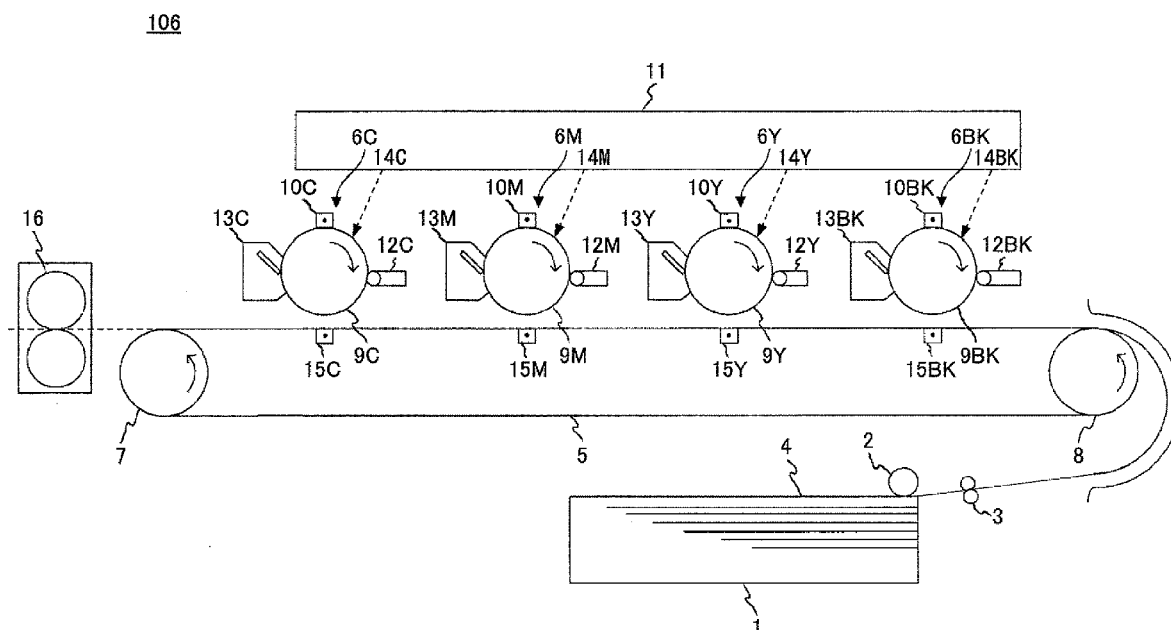
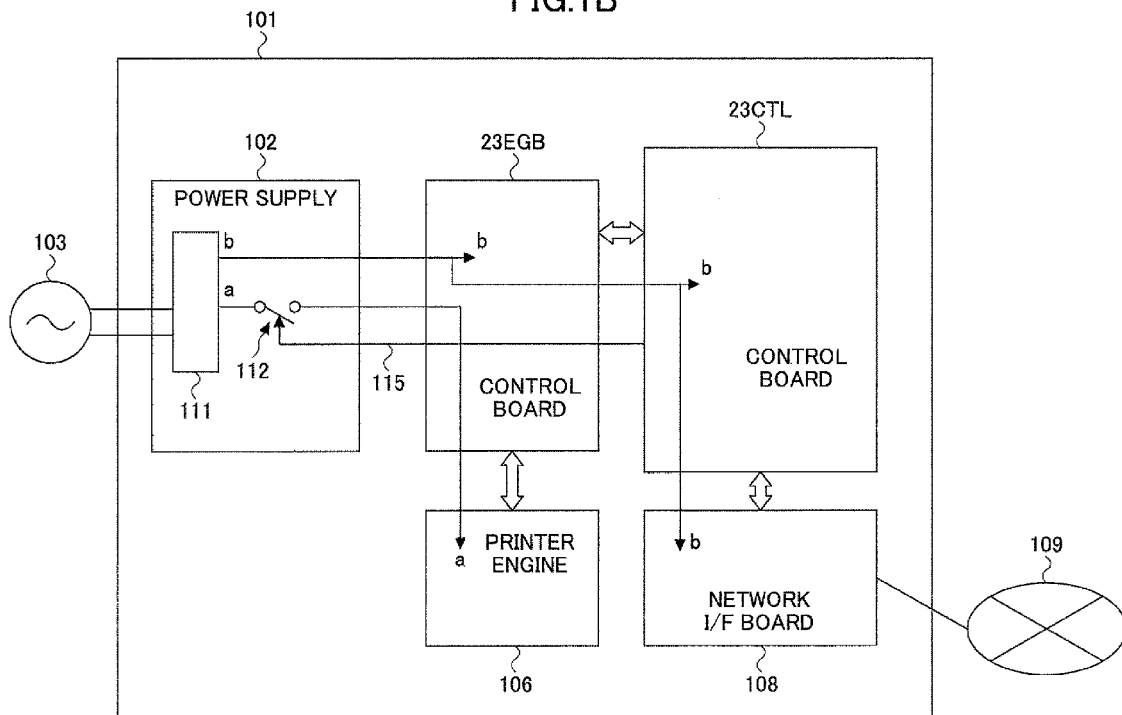


FIG.1B



Description

[0001] The present invention relates to a technique of an image forming apparatus returning from an energy saving mode by using an illuminance sensor.

[0002] There is a technology of an image forming apparatus such as a multifunction peripheral (MFP) which enters an energy saving mode when detecting that it has become dark around the image forming apparatus and the night has come by using an illuminance sensor, and returns to a regular standby mode when detecting that it has become bright around the image forming apparatus the next morning.

[0003] Japanese Laid-Open Patent Application No. 2004-248047 discloses a technology of entering an energy saving mode when detecting that it has become dark around the image forming apparatus and night has come by using an illuminance sensor, and returning to a regular standby mode when detecting that it has become bright around the image forming apparatus the next morning, for the purpose of improving the user's operating performance.

[0004] However, according to the technique disclosed by Japanese Laid-Open Patent Application No. 2004-248047 in which a MFP detects that the user exists by using the illuminance sensor, there may be a likelihood that although the user does not actually exist around the MFP, the MFP erroneously detects that the user exists around the MFP when it becomes bright with the morning sunlight or such, thus exiting from the energy saving mode, and therefore power is wasted.

[0005] According to an embodiment of the present invention, in a case where there are plural image forming apparatuses each thereof including an illuminance detecting part configured to detect illuminance; a communication part configured to carry out communication with other ones of the plural image forming apparatuses; and a control part configured to obtain information from the illuminance detecting parts of the plural image forming apparatuses using the communication parts, and exit from an energy saving mode.

[0006] 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. 1A illustrates a printer engine of a laser printer having a conveyance belt according to an embodiment of the present invention;

FIG. 1B illustrates an entire configuration of the laser printer in the embodiment of the present invention; FIG. 2 illustrates control boards in the embodiment of the present invention;

FIG. 3 illustrates a configuration of a communication network in the embodiment of the present invention; FIG. 4 is a flowchart of an energy saving mode returning determination control 1 in the embodiment of the present invention;

FIG. 5 is a flowchart of an energy saving mode returning determination control 2 in the embodiment of the present invention;

FIGS. 6A, 6B and 6C illustrate parameters that can be set from a panel in the embodiment of the present invention;

FIG. 7 illustrates a printer engine of a laser printer having an intermediate transfer belt according to the embodiment of the present invention; and

FIG. 8 illustrates a problem to be solved by the embodiment of the present invention.

FIG. 8 illustrates a problem to be solved by an embodiment of the present invention.

[0007] As shown in FIG. 8, multifunction peripherals MFP1, MFP2 and MFP3 are disposed on a side opposite that of a window, and multifunction peripherals MFP4 and MFP5 are disposed on a side near the window. In a case where the side near the window is the east side, there is a high likelihood that the morning sunlight comes in the window around six o'clock in the summer. Therefore, according to the above-mentioned technique disclosed by Japanese Laid-Open Patent Application No. 2004-248047, the multifunction peripherals MFP4 and MFP5 may return from the energy saving mode by the morning sunlight at 6 o'clock. As a result, when the start of business is at 8 o'clock in the office, the multifunction peripherals MFP4 and MFP5 may be in the standby state for 2 hours between 6 o'clock and 8 o'clock, and thus power may be unnecessarily wasted in the multifunction peripherals MFP4 and MFP5.

[0008] An object of the embodiment of the present invention is to provide an image forming apparatus in which illuminance is detected using an illuminance sensor, entering and exiting from the energy saving mode is controlled, exiting from the energy saving mode due to an erroneous detection is avoided, and thus the power consumption is reduced.

[0009] According to the embodiment of the present invention, it is possible to avoid exiting from the energy saving mode due to an erroneous detection caused by the morning sunlight or such, and it is possible to reduce the power consumption.

[0010] Below, the embodiment of the present invention will be described in detail using figures.

[0011] FIG. 1A illustrates a printer engine 106 of a laser printer 101 (as one example of an image forming apparatus, see FIG. 1B) having a conveyance belt according to the embodiment of the present invention.

[0012] The printer engine 106 of the laser printer 101 shown in FIG. 1A is of a so-called "tandem type" and has a configuration in which image forming parts of respective colors are arranged along a conveyance belt 5 as an endless moving part. That is, in the printer engine 106 of the laser printer 101 (image forming apparatus) of FIG. 1A, along the conveyance belt 5 that conveys a sheet of paper (recording paper) 4 which is supplied as a result of being separated from a paper supply tray 1 by a paper

supply roller 2 and a separation roller 3, the plural image forming parts (electrophotographic process parts) 6BK, 6Y, 6M and 6C are arranged downstream in the stated order.

[0013] The plural image forming parts 6BK, 6Y, 6M and 6C have a common configuration only except the colors to form toner images are different thereamong. The image forming part 6BK forms a black image; the image forming part 6Y forms a yellow image; the image forming part 6M forms a magenta image; and the image forming part 6C forms a cyan image.

[0014] Therefore, in the description below, the image forming part 6BK will be described specifically, and since the other image forming parts 6Y, 6M and 6C have the same configuration as that of the image forming part 6BK, the same reference alphanumerics as those given to the respective elements of the image forming part 6BK with the alphabet "BK" are given to the other image forming parts 6Y, 6M and 6C but are distinguished by the alphabets "Y", "M" and "C" instead of "BK", and the specific descriptions of the image forming parts 6Y, 6M and 6C will be omitted.

[0015] The conveyance belt 5 is an endless belt wound on a driving roller 7 and a driven roller 8. The driving roller 7 is driven and rotated counterclockwise by a driving motor (not shown). The driving motor, driving roller 7 and driven roller 8 function as a driving part that moves the conveyance belt 5 as an endless moving part.

[0016] When an image is to be formed in the printer engine 106 of the laser printer 101 shown in FIG. 1A, the sheets of paper 4 contained in the paper supply tray 1 are supplied, one by one, in sequence, from the top, the thus-supplied sheet of paper 4 is conveyed to the first image forming part 6BK by the driven conveyance belt 5 and is attracted by the conveyance belt 5 due to an electrostatic attraction function, and a black toner image is transferred there from the image forming part 6BK to the sheet of paper 4.

[0017] The image forming part 6BK includes a photosensitive drum 9BK as a photosensitive member, and an electrification unit 10BK, an exposure unit 11, a development unit 12BK, a photosensitive drum cleaner (not shown), an electricity removal unit 13BK and so forth which are arranged around the photosensitive drum 9BK. The exposure unit 11 is configured to emit laser light 14BK, 14Y, 14C and 14M as exposure beams corresponding to the image colors formed by the respective image forming parts 6BK, 6Y, 6C and 6M.

[0018] The outer circumference of the photosensitive drum 9BK is uniformly electrified by the electrification unit 10BK in the dark, and then is exposed to the laser light corresponding to the black image from the exposure unit 11, and thus, an electrostatic latent image is formed on the outer circumference of the photosensitive drum 9BK. The development unit 12BK converts the electrostatic latent image into a visible toner image by using the black toner, and thus, the black toner image is formed on the photosensitive drum 9BK.

[0019] The black toner image is transferred to the sheet of paper 4 by the function of a transfer unit 15BK at a position (transfer position) at which the photosensitive drum 9BK and the sheet of paper 4 on the conveyance belt 5 come into contact with one another. By this transference, the black toner image is formed on the sheet of paper 4. The residual useless toner on the outer circumference of the photosensitive drum 9BK from which the transference of the toner image has been thus finished is removed by the photosensitive drum cleaner, then the electricity on the photosensitive drum 9BK is removed by the electricity removal unit 13BK, and the photosensitive drum 9BK waits for subsequent image forming operations.

[0020] The sheet of paper 4 to which the black toner image has just been transferred by the image forming part 6BK is conveyed to the next image forming part 6Y by the conveyance belt 5. In the image forming part 6Y, a yellow toner image is formed on the photosensitive drum 9Y by the same process as that of the image forming part 6BK, and the yellow toner image is transferred to the sheet of paper 4 and is superposed on the black toner image already formed on the sheet of paper 4 as mentioned above.

[0021] The sheet of paper 4 is further conveyed to the further next image forming parts 6M and 6C, respectively, and through the same operations, a magenta toner image formed on the photosensitive drum 6M and a cyan toner image formed on the photosensitive drum 6C are transferred to the sheet of paper 4 in sequence and are superposed on the black and yellow toner images already residing on the sheet of paper 4 as mentioned above. Thus, on the sheet of paper 4, a full-color image is formed. The sheet of paper 4 on which the full-color superposed image has been thus formed is then separated from the conveyance belt 5, the full-color superposed image is fixed to the sheet of paper 4 by a fixing unit 16, and then the sheet of paper 4 is ejected to the outside of the laser printer 101.

[0022] FIG. 1B illustrates an entire configuration of the laser printer 101 in the embodiment of the present invention.

[0023] The laser printer 101 includes a power supply circuit 102 that receives power supplied from a commercial alternate current power source 103 and supplies the power to the laser printer 101. The laser printer 101 further includes a control board 23EGB and a control board 23CTL. The control board 23EGB controls the printer engine 106 described above with reference to FIG. 1A. The control board 23CTL controls the entirety of the laser printer 101. It is noted that the control boards 23EGB and 23CTL will be further described later with reference to FIG. 2. The laser printer 101 further includes a network I/F (interface) board 108 which is a communication interface used for carrying out communication with a local area network (LAN) 109.

[0024] The power supply circuit 102 includes an AC-DC converter 111 which converts the commercial alter-

nate current power into direct current (DC) power and outputs the DC power. The DC power includes two systems "a" and "b" of the DC power which will be described later. The power supply circuit 102 further includes a switch 112 by which turning on and off controls the supply of the DC power "a" from the AC-DC converter 111 to the printer engine 106. Turning on and off of the switch 112 is controlled by the control board 23CTL via a signal line 115. The DC power "a" is used to drive the printer engine 106 and the DC power "b" is used to drive the control board 23EGB, control board 23CTL and network I/F board 108.

[0025] In the laser printer 101 (image forming apparatus) described above, in order to maintain the standby state, it is necessary to continuously maintain the temperature of the fixing unit 16 (see FIG. 1A) in the printer engine 106 at a certain level. When the laser printer 101 enters the standby state from the energy saving state, the power consumption increases for continuously maintaining the temperature of the fixing unit 16 at the certain level, even when no person exists and therefore no image forming operations (printing operations) seem to be carried out.

[0026] It is noted that the energy saving state of the laser printer 101 is, for example, a state where the switch 112 in the power supply circuit 102 is turned off, and therefore, the supply of the DC power "a" to the printer engine 106 including the fixing unit 16 is turned off. The standby state of the laser printer 101 is, in this example, a state where the switch 112 in the power supply circuit 102 is turned on, therefore the supply of the DC power "a" to the printer engine 106 including the fixing unit 16 is turned on, and therefore, the temperature of the fixing unit 16 is maintained at the certain level, whereby printing operations (image forming operations) of forming a full-color image on the sheet of paper 4 and fixing the full-color image onto the sheet of paper 4 described above with reference to FIG. 1A can be carried out immediately.

[0027] FIG. 2 illustrates the control boards 23EGB and 23CTL.

[0028] The control board 23CTL carries out control of the entirety of the laser printer 101 as mentioned above, including image development, controlling the user interface and so forth. The control board 23EGB carries out the printing operations (image forming operations) based on image information obtained from the image development. The control boards 23CTL and 23EGB are connected together by a data bus 24. Information input to an input and output (I/O) port 26CTL is transmitted to a central processing unit (CPU) 25CTL and a random access memory (RAM) 28CTL via a data bus 27CTL. Further, the CPU 25CTL transmits output information to the I/O port 26CTL via the data bus 27CTL. The same operations are carried out also in the control board 23EGB. The data bus 24 acts as an interface for transmitting and receiving data between the control boards 23CTL and 23EGB. Programs for controlling the operations of the control boards 23CTL and 23EGB performed under the control of the

CPU 25CTL and CPU 25EGB are stored in respective read only memories (ROMs) 29CTL and 29EGB. Information output from an illuminance sensor 30 (acting as an illuminance detecting part) is transmitted to the CPU 25CTL via the I/O port 26CTL. As the programs stored in the respective ROMs 29CTL and 29EGB are executed by the respective CPUs 25CTL and 25EGB, the control boards 23CTL and 23EGB perform the respective control operations. For example, the operations or the control of the operations according to a flowchart shown in FIG. 4 or 5, described later, are carried out mainly by the control board 23CTL as a result of the program stored in the ROM 29CTL being executed by the CPU 25CTL.

[0029] The laser printer 101 as one example of an image forming apparatus according to the embodiment of the present invention has been described above. Another example of the image forming apparatus according to the embodiment is a multifunction peripheral (MFP). Hereinafter, for the purpose of convenience, the description will be made assuming that the image forming apparatus according to the embodiment of the present invention is a MFP, and the same reference numeral 101 as that of the laser printer 101 will be used as a reference numeral of the MFP according to the embodiment of the present invention. The MFP 101 includes, in addition to the configuration of the laser printer 101 described above with reference to FIGS. 1A, 1B and 2, a scanner (not shown) that reads an image of an original document or such, a facsimile modem (not shown) or such by which the MFP 101 can be used as a facsimile machine, and so forth so that the MFP 101 can be used as not only a printer but also a facsimile machine, a copier, a scanner or such.

[0030] FIG. 3 illustrates a configuration of a communication network in the embodiment of the present invention.

[0031] According to the embodiment of the present invention, as shown in FIG. 3, plural MFP 101-1, 101-2, 101-3, 101-4 and 101-5, each of which has the same configuration as the MFP 101, are connected with the LAN 109. Further, plural personal computers 200-1, 200-2, 200-3, 200-4 are connected with the LAN 109. Each of the MFPs 101-1, 101-2, 101-3, 101-4 and 101-5 may print (or form) an image according to instructions and image data transmitted from any one of the personal computers 200-1, 200-2, 200-3 and 200-4 via the LAN 109, for example. Further, the plural MFPs 101-1, 101-2, 101-3, 101-4 and 101-5 may share illuminance values detected in the respective MFPs 101-1, 101-2, 101-3, 101-4 and 101-5. It is noted that when any one of the plural MFPs 101-1, 101-2, 101-3, 101-4 and 101-5 is referred, a term "MFP 101" may be used.

[0032] FIG. 4 is a flowchart of an energy saving mode returning determination control 1 in the embodiment of the present invention. The operations or the control of the operations according to the flowchart are carried out mainly by the control board 23CTL (as a control part) in each of the MFPs 101 repetitiously when the MFP 101

is in the energy saving mode.

[0033] In step f1-1, it is determined, in a certain MFP 101 of the MFPs 101-1, 101-2, 101-3, 101-4 and 101-5, whether panel operations have been carried out. Panel operations are operations carried out by the user from an operations panel (not shown) of the certain MFP 101 for the purpose of inputting instructions to the certain MFP 101, for example. When panel operations have been carried out (step f1-1 YES), it is determined that a person exists near the certain MFP 101, and then, the flowchart proceeds to step f1-8. In step f1-8, initiation of the certain MFP 101 is started. Initiation of the MFP 101 means, for example, the MFP 101 returning to the standby state from the energy saving mode. In contrast thereto, when no panel operations have been carried out (step f1-1 NO), the flowchart proceeds to step f1-2. In step f1-2, the illuminance values are obtained from all of the registered MFPs 101 using the functions of the respective network I/F boards 108 (acting as communication parts) via the LAN 109. It is noted that in the certain MFP 101, for example, all of the other MFPs 101 are registered in the RAM 28CTL (acting as a registration part). Further, in this example, the certain MFP 101 itself is also registered in the own RAM 28CTL, and therefore the certain MFP 101 obtains the illuminance value of also the own illuminance sensor 30 in step f1-2.

[0034] Next, in a loop including steps f1-3 through f1-5, each of the illuminance values obtained in the in step f1-2 from the registered MFPs 101-1, 101-2, 101-3, 101-4 and 101-5 is processed, one by one, in sequence. In this case, "n" = 5. First, in step f1-3, each MFP 101-i (i = 1 through 5) is extracted from among the registered MFPs 101-1, 101-2, 101-3, 101-4 and 101-5, in sequence. In step f1-4, it is determined whether the illuminance value obtained from the MFP 101-i extracted in step f1-3 is equal to or more than a continuous threshold "I" for a period of time "s". When the illuminance value obtained from the extracted MFP 101-i is equal to or more than the continuous threshold "I" for the period of time "s" (step f1-4 YES), it is determined that it is bright around the extracted MFP 101-i (step f1-5). In contrast thereto, when the illuminance value obtained from the extracted MFP 101-i is less than the threshold "I" at least once during the period of time "s" (step f1-4 NO), it is determined that it is not bright around the extracted MFP 101-i and step f1-5 is skipped. The loop including steps f1-3, f1-4 and f1-5 is carried out for each of the registered MFPs 101-1, 101-2, 101-3, 101-4 and 101-5 in sequence. After that, in step f1-6, it is determined whether it is bright around each of all of the registered MFPs 101-1, 101-2, 101-3, 101-4 and 101-5. When it has been determined that it is bright around each of all of the registered MFPs 101-1, 101-2, 101-3, 101-4 and 101-5 (step f1-6 YES), initiation of the certain MFP 101 is carried out (actually in the printer engine 106 under the control of the control boards 23CTL and 23EGB) (step f1-8).

[0035] In contrast thereto, when it has been determined that it is not bright (or it is dark) around at least

any one of the registered MFPs 101-1, 101-2, 101-3, 101-4 and 101-5 (step f1-6 NO), a period of time "t" is waited for (step f1-7), and steps f1-1 through f1-6 are repeated. It is noted that the certain MFP 101 may be each of all of the plural MFPs 101-1, 101-2, 101-3, 101-4 and 101-5, and thus, the operations of the flowchart of FIG. 4 may be carried out in each of all of the plural MFPs 101-1, 101-2, 101-3, 101-4 and 101-5.

[0036] Thus, according to the embodiment of the present invention, whether to carry out initiation of the MFP 101 is determined using the illuminance values of all of the registered MFPs 101-1, 101-2, 101-3, 101-4 and 101-5. Therefore, the conditions for returning from the energy saving mode is strict. However, in a case where it is certain that the entirety of the office in which the plural MFPs 101-1, 101-2, 101-3, 101-4 and 101-5 are installed becomes bright (by a person turning on fitted lighting) when the person comes to the office in the morning, it is possible to eliminate the wasted power consumption by carrying out the setting.

[0037] FIG. 5 is a flowchart of an energy saving mode returning determination control 2 (another example of the energy saving mode returning determination control 1 described above with reference to FIG. 4) in the embodiment of the present invention. The operations or the control of the operations according to the flowchart are carried out mainly by the control board 23CTL (as a control part) in each of the MFPs 101 repetitiously when the MFP 101 is in the energy saving mode.

[0038] In step f2-1, it is determined, in a certain MFP 101 of the MFPs 101-1, 101-2, 101-3, 101-4 and 101-5, whether panel operations have been carried out. When panel operations have been carried out (step f2-1 YES), it is determined that a person exists around the MFP 101, and then, the flowchart proceeds to step f2-9. In step f2-9, initiation of the MFP 101 is started. In contrast thereto, when no panel operations have been carried out (step f2-1 NO), the flowchart proceeds to step f2-2. In step f2-2, the illuminance values are obtained from the MFPs 101 selected from among the registered MFPs 101 using the functions of the respective network I/F boards 108 (acting as communication parts) via the LAN 109. It is noted that in each of the plural MFPs 101-1, 101-2, 101-3, 101-4 and 101-5, for example, all of the other MFPs are registered in the RAM 28CTL (acting as a registration part). Further, in this example, the certain MFP 101 itself is also registered in the own RAM 28CTL, and therefore the certain MFP 101 obtains the illuminance value of also the own illuminance sensor 30 in step f1-2. Further, in each of the plural MFPs 101-1, 101-2, 101-3, 101-4 and 101-5, the MFPs 101 selected from among the registered MFPs 101 are recorded to the RAM 28CTL.

[0039] Next, in a loop including steps f2-3 through f2-6, each of the illuminance values obtained in the in step f2-2 from the selected MFPs 101 is processed, one by one, in sequence. In this case, "n" = 5. First, in step f2-3, each MFP 101-i (i = 1 through 5) is extracted from among the registered MFPs 101-1, 101-2, 101-3, 101-4 and

101-5, in sequence. In step f2-4, it is determined whether the extracted MFP 101 is included in the selected MFPs 101. When the extracted MFP 101 is included in the selected MFPs 101 (step f2-4 YES), the flowchart then proceeds to step f2-5. In contrast thereto, when the extracted MFP 101 is not included in the selected MFPs 101 (step f2-4 NO), then steps f2-5 and f2-6 are skipped. In step f2-5, it is determined whether the illuminance value obtained from the MFP 101-i extracted in step f2-3 is equal to or more than a continuous threshold "I" for a period of time "s". When the illuminance value obtained from the extracted MFP 101-i is equal to or more than the continuous threshold "I" for the period of time "s" (step f2-5 YES), it is determined that it is bright around the extracted MFP 101-i (step f2-6). In contrast thereto, when the illuminance value obtained from the extracted MFP 101-i is less than the threshold "I" at least once during the period of time "s" (step f2-5 NO), it is determined that it is not bright around the extracted MFP 101-i and then step f2-6 is skipped. The loop including steps f203, f2-4, f2-5 and f2-6 is carried out for each of the registered MFPs 101-1, 101-2, 101-3, 101-4 and 101-5 in sequence. After that, in step f2-7, it is determined whether it is bright around each of all of the selected MFPs 101. When it has been determined that it is bright around each of all of the selected MFPs 101 (step f2-7 YES), initiation of the certain MFP 101 is carried out (actually in the printer engine 106 thereof under the control of the control boards 23CTL and 23EGB) (step f2-9).

[0040] In contrast thereto, when it has been determined that it is not bright (or it is dark) around at least any one of the selected MFPs 101 (step f2-7 NO), a period of time "t" is waited for (step f2-8), and steps f2-1 through f2-7 are repeated. It is noted that the certain MFP 101 may be each of all of plural MFPs 101-1, 101-2, 101-3, 101-4 and 101-5, and thus, the operations of the flowchart of FIG. 5 may be carried out in each of all of the plural MFPs 101-1, 101-2, 101-3, 101-4 and 101-5.

[0041] Thus, according to the example of FIG. 5 in the embodiment of the present invention, whether to carry out initiation of the MFP 101 is determined using the illuminance values of the selected MFPs 101. Therefore, the determination as to whether to return from the energy saving mode depends on the specific MFPs 101 (selected MFPs 101). However, in a case where only a part of the office in which the plural MFPs 101-1, 101-2, 101-3, 101-4 and 101-5 are installed becomes bright (by a person turning on fitted lighting) when the person comes to the office on the morning, it is possible to eliminate the wasted power consumption by carrying out the setting (using the illuminance values of the MFPs 101 disposed at the above-mentioned part of the office).

[0042] The reason why the determination is made in the examples of FIGS. 4 and 5 whether the illuminance value is equal to or more than the continuous threshold "I" for the period of time "s" is to avoid determining that it is bright around the MFP 101 only by such a situation in which the illuminance value becomes equal to or more

than the threshold merely temporarily due to a disturbance (i.e., an electrical noise, a detection of light of a flashlight of a guard or such).

[0043] FIGS. 6A, 6B and 6C illustrate parameters (i.e., the above-mentioned threshold "I", period of time "s" and period of time "t", from FIGS. 4 and 5) which may be set by the user from the operations panel (not shown) of the MFP 101. The parameters may be stored in the RAM 28CTL of the control board 23CTL of the MFP 101.

[0044] The illuminance value may be in a range between 0 through 1023, obtained from the illuminance sensor 30. The threshold "I" can be set from among three levels, i.e., a level 1 = 100, a level 2 = 200 and a level 3 = 300, as shown in FIG. 6A. In a case where the office is always relatively dark even during the business hours, the level 1 may be set. In a case where the office is always relatively bright during the business hours, the level 3 may be set. Thus, depending on the actual environment of the office, the user can freely set any one of the levels 1, 2 and 3.

[0045] As shown in FIG. 6B, the period of time "s" can be set at any one of three levels. The level of "short" is 5 minutes; the level of "ordinary" is 15 minutes; and the level of "long" is 30 minutes. In a case where the level of "short" has been set, the determination of returning from the energy saving mode can be made faster. However, in this case, a likelihood of an erroneous detection of the disturbance increases accordingly. Thus, depending on the actual environment of the office, the user can freely set any one of the three levels.

[0046] As shown in FIG. 6C, the period of time "t" can be set at any one of three levels. The level of "short" is 1 minute; the level of "ordinary" is 5 minutes; and the level of "long" is 10 minutes. In a case where the level of "short" has been set, the number of samples of the illuminance value increases, and therefore, the accuracy of determining that it is bright increases. However, the communication (via the LAN 109) amount increases, and a delay in transmission (via the LAN 109) of image data to be used for printing (image forming) may occur. The user can freely set any one of the three levels.

[0047] FIG. 7 illustrates a printer engine of a laser printer having an intermediate transfer belt according to the embodiment of the present invention.

[0048] The configuration of the printer engine 106' shown in FIG. 7 is another example of the printer engine 106 described above with reference to FIG. 1A. Except that the conveyance belt 5 in the printer engine 106 shown in FIG. 1A is replaced by an intermediate transfer belt 5 in the printer engine 106' shown in FIG. 7, the same reference numerals are given to the same or corresponding parts and units as those of the printer engine 106 shown in FIG. 1A, and duplicate description will be omitted. What is different from the printer engine 106 shown in FIG. 1A is that toner images of the respective colors are transferred to the intermediate transfer belt 5 at the respective positions (primary transfer positions) at which the photosensitive drums 9BK, 9Y, 9M and 9C come into

contact with the intermediate transfer belt 5 by the functions of the respective transfer units 15BK, 15Y, 15M and 15C, in the printer engine 106'. By these transferring operations, a full-color image in which the toner images of the respective colors are superposed on each other is formed on the intermediate transfer belt 5.

[0049] Then, the sheets of paper 4 contained in the paper supply tray 1 are supplied, one by one, in sequence, from the top, thus the supplied sheet of paper 4 is conveyed to the intermediate transfer belt 5, and the full-color image formed on the intermediate transfer belt 5 is transferred to the sheet of paper 4 at a position at which the intermediate transfer belt 5 and the sheet of paper 4 come into contact with one another (secondary transfer position).

[0050] It is noted that even when the printer engine 106 described above with reference to FIG. 1A is replaced by the printer engine 106' described above with reference to FIG. 7, the same functions as those of the laser printer or MFP 101 described above with reference to FIGS. 1B through 6C can be obtained and the same operations as those of the laser printer or MFP 101 described above with reference to FIGS. 1B through 6C can be carried out.

[0051] The present invention is not limited to the specifically disclosed embodiments, and variations and modifications may be made without departing from the scope of the present invention.

[0052] The present application is based on Japanese Priority Patent Application No. 2010-274670, filed December 9, 2010, the entire contents of which are hereby incorporated herein by reference.

Claims

1. An image forming apparatus arranged to communicate with plural image forming apparatuses, the apparatus comprising:

an illuminance detecting part configured to detect illuminance;
a communication part configured to carry out communication with another one of the plural image forming apparatuses; and
a control part configured to obtain information from the illuminance detecting parts of the plural image forming apparatuses using the communication parts, and return from an energy saving mode.

2. The image forming apparatus as claimed in claim 1, further comprising:

a registration part configured to register the plural image forming apparatuses, wherein the registration part is configured to register the image forming apparatuses with which commu-

nication can be carried out using the communication parts.

3. The image forming apparatus as claimed in claim 1 or 2, wherein the control part is configured to obtain the illuminance values of all of the registered image forming apparatuses, at intervals of a period of time "t", and in a case where the obtained illuminance values are equal to or more than a continuous threshold "I" for a period of time "s", the control part is configured to cause the image forming apparatus to return from the energy saving mode.
4. The image forming apparatus as claimed in claim 1 or 2, wherein the control part is configured to obtain the illuminance values of image forming apparatuses selected from among the registered image forming apparatuses, at intervals of a period of time "t", and in a case where the obtained illuminance values are equal to or more than a continuous threshold "I" for a period of time "s", the control part is configured to cause the image forming apparatus to return from the energy saving mode.
5. The image forming apparatus as claimed in claim 3 or 4, wherein the value of the period of time "s" can be selected by a user.
6. The image forming apparatus as claimed in claim 3, 4 or 5, wherein the value of the threshold "I" can be selected by a user.
7. The image forming apparatus as claimed in claim 3, 4, 5 or 6 wherein the value of the period of time "t" can be selected by a user.
8. The image forming apparatus as claimed in any one of claims 1 to 7, wherein the control part is configured to cause the image forming apparatus to return from the energy saving mode in a case where an operations panel of the image forming apparatus receives operations carried out by a user.
9. A method of controlling an image forming apparatus of plural image forming apparatuses, the method comprising:

obtaining information from illuminance detecting parts of the plural image forming apparatuses using communication parts; and
returning from an energy saving mode using the obtained information.
10. A computer readable information recording medium storing a program which, when executed by one or more processors, performs a method of controlling

an image forming apparatus of plural image forming apparatuses, the method comprising:

obtaining information from illuminance detecting parts of the plural image forming apparatuses using communication parts; and
returning from an energy saving mode using the obtained information.

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FIG.1A

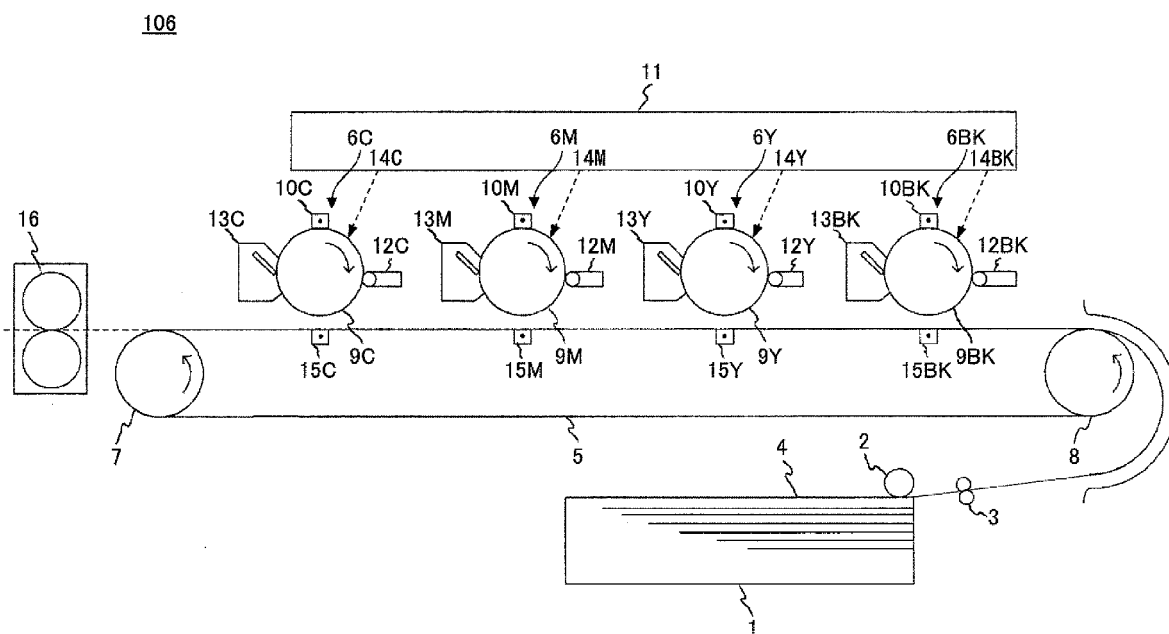
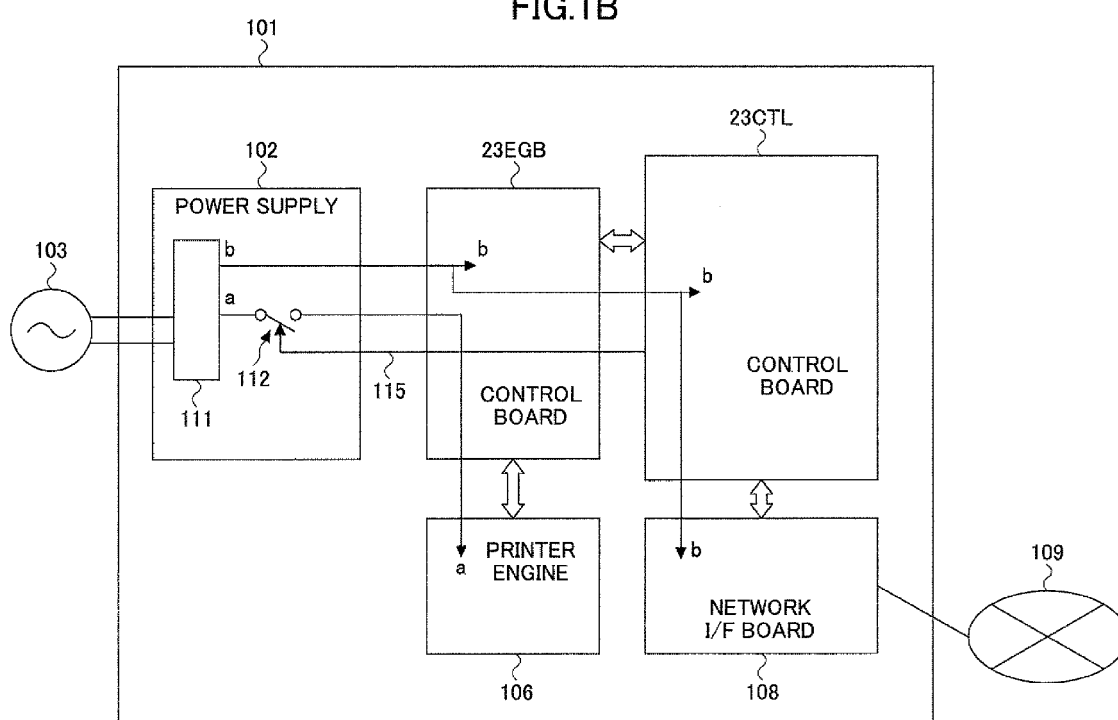


FIG.1B



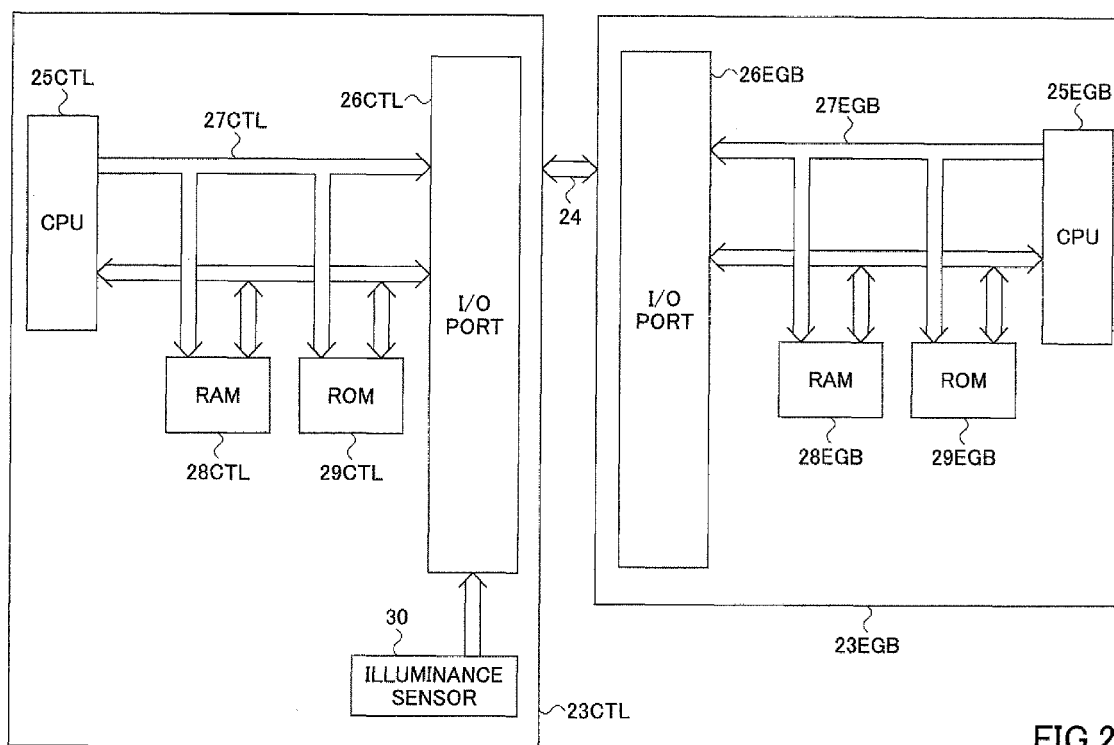


FIG.2

FIG.3

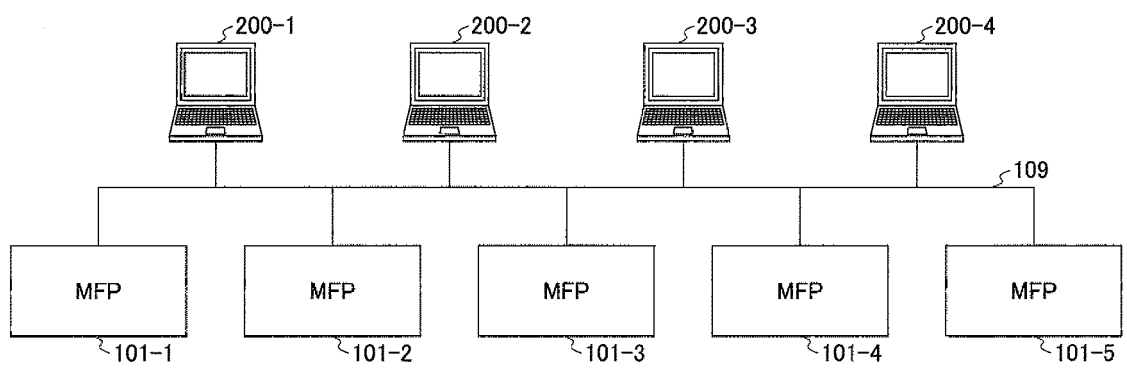


FIG.4

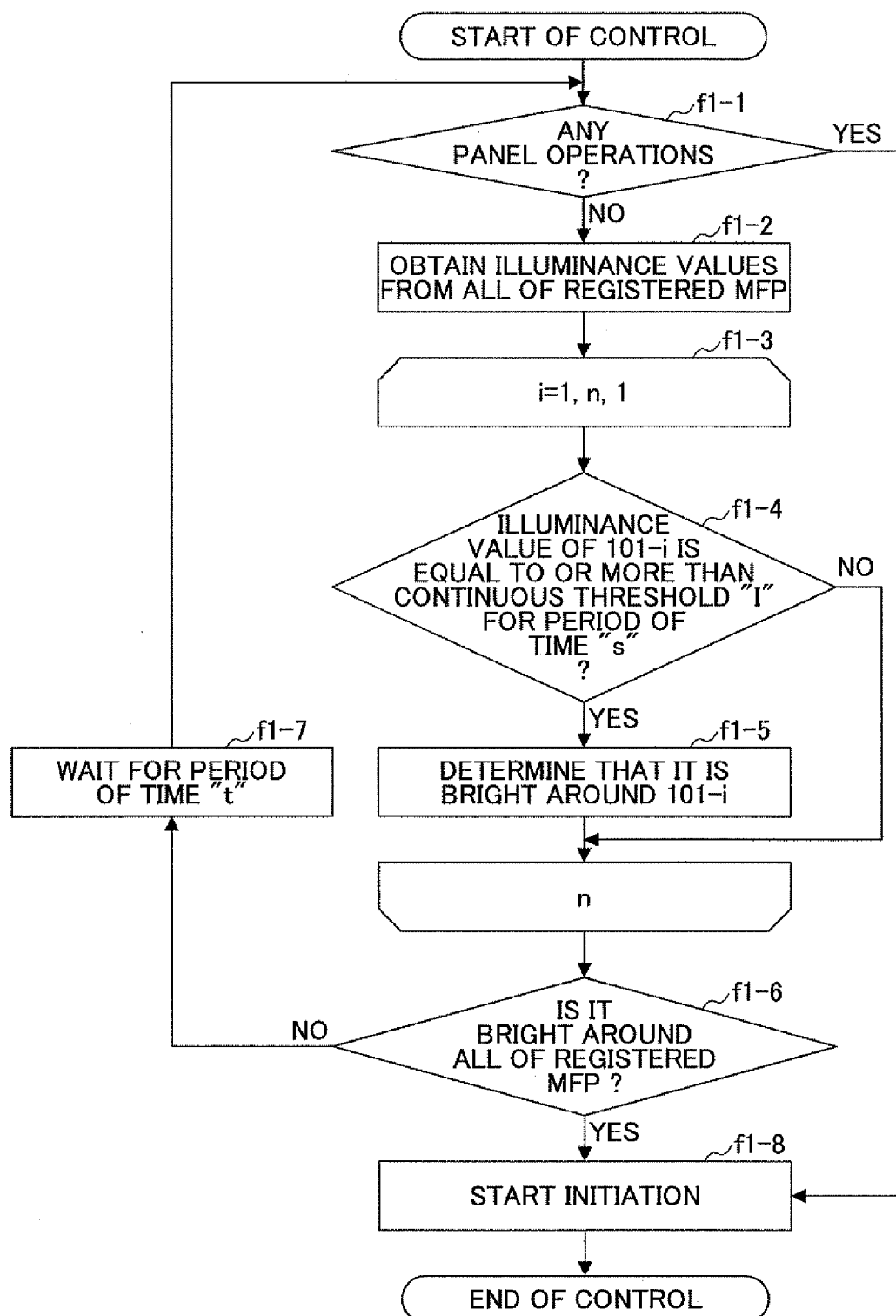


FIG.5

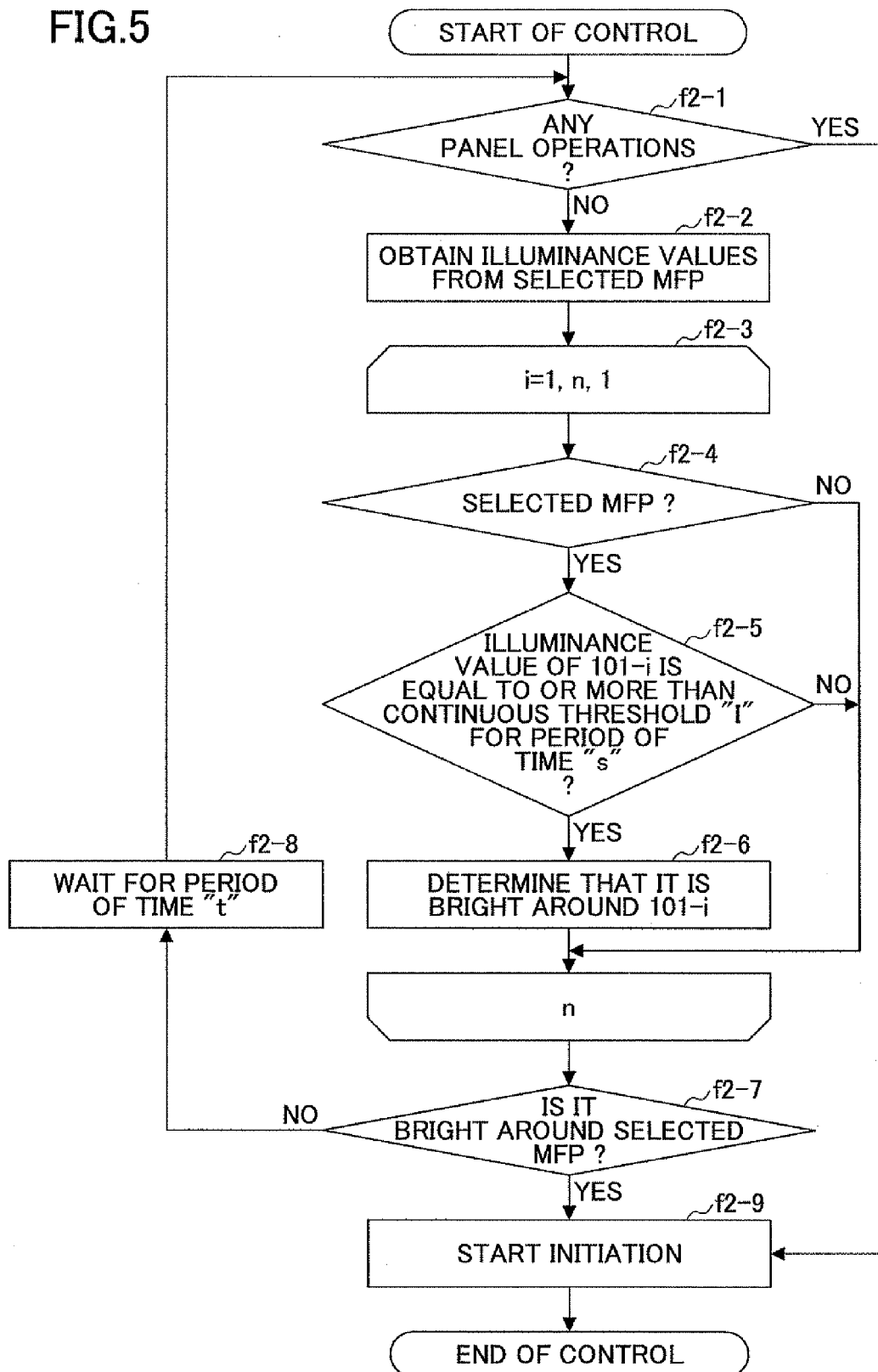


FIG.6A

SETTING OF THRESHOLD 1

PANEL INDICATION	THRESHOLD 1
LEVEL 1	100
LEVEL 2	200
LEVEL 3	300

FIG.6B

SETTING OF PERIOD OF TIME "s"

PANEL INDICATION	PERIOD OF TIME "s"
SHORT	5min.
ORDINARY	15min.
LONG	30min.

FIG.6C

SETTING OF PERIOD OF TIME "t"

PANEL INDICATION	PERIOD OF TIME "t"
SHORT	1min.
ORDINARY	5min.
LONG	10min.

FIG. 7

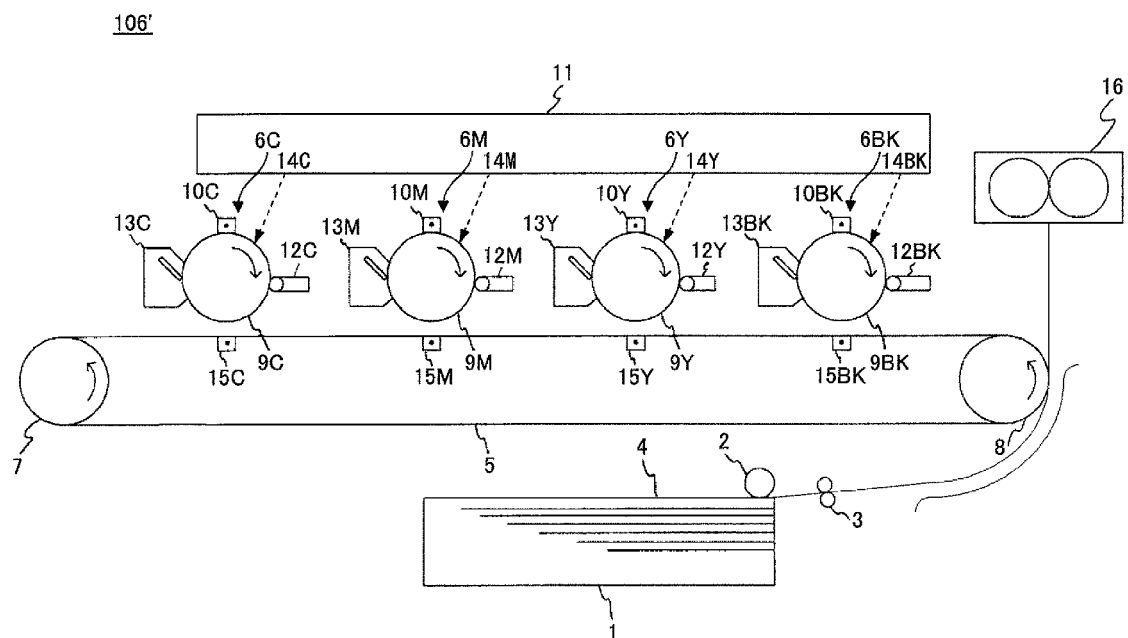
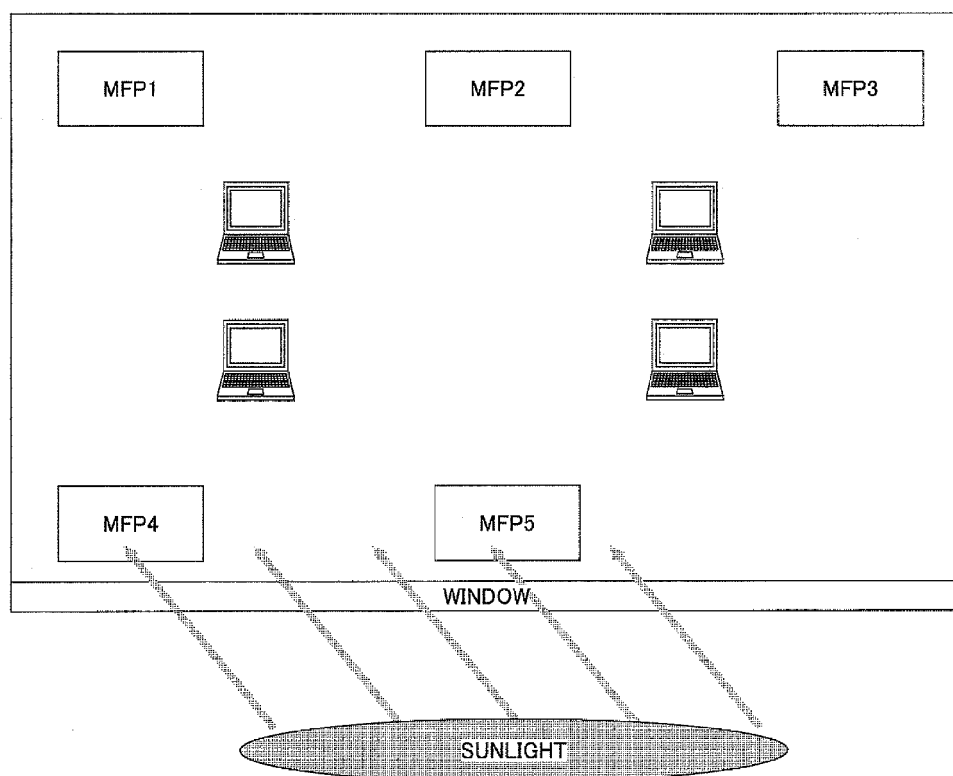


FIG.8



REFERENCES CITED IN THE DESCRIPTION

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- JP 2010274670 A [0052]