(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 202 587 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.06.2010 Bulletin 2010/26

(51) Int Cl.:
G03G 15/02 *(2006.01)*

(21) Application number: **08291267.6**

(22) Date of filing: **23.12.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(71) Applicant: **SAGEM COMMUNICATIONS SAS**
92848 Rueil Malmaison Cedex (FR)

(72) Inventor: **Sudrat, Erwan**
1050 Wien (AT)

(74) Representative: **Gibler & Poth Patentanwälte OEG**
Dorotheergasse 7
1010 Wien (AT)

(54) Arrangement for applying a predeterminable electric charge

(57) In an arrangement for applying a predeterminable electric charge to an image bearing member (5) of a xerographic system with an individual charge roller (1), it is proposed for providing the voltage necessary for each area of the charge roller, that first information on individual electric properties of the individual charge roller (1) is stored in a first memory (2), and that the first information is provided as the first input quantity for controlling an applying of a predeterminable electric voltage to the individual charge roller (1).

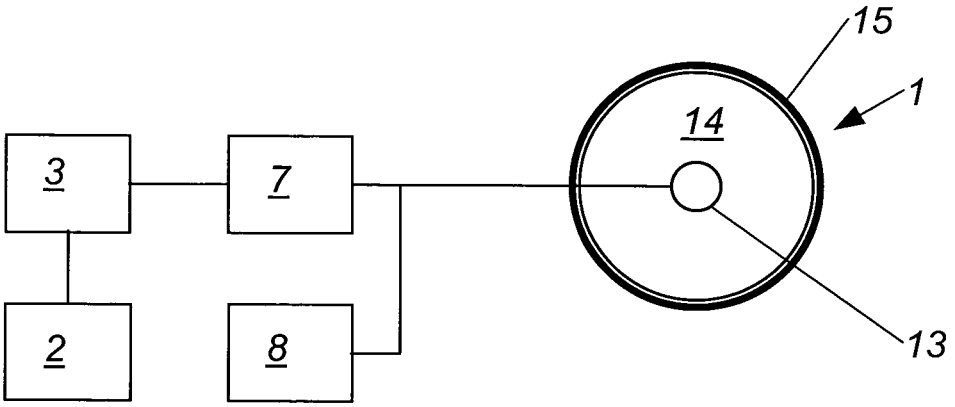


Fig. 2

EP 2 202 587 A1

Description

[0001] The invention relates to an arrangement according to the preamble of claim 1.

[0002] Xerographic systems generally comprise an image bearing member, which is often implemented in form of a so-called organic photo conductor (OPC), which is charged for example by a charge roller to a predeterminable surface potential. A writing head changes said surface charge in a predeterminable manner in certain sections and a so-called sleeve applies electrostatically charged toner to corresponding sections of the organic photo conductor. The toner is transferred by a transfer roller to the print medium, which is usually paper.

[0003] In order to achieve high printing quality it is important to have a constant homogeneous charge of the surface of the image bearing member. The application of a constant voltage on the charge roller does not lead to an even and constant charge on the image bearing member however because the charging behavior is further dependent on inhomogeneities of the charge roller and environmental parameters. It is known for this purpose to measure the current between the charge roller which is connected to a voltage source and the image bearing member, to draw conclusions on the respectively applied charge via the known voltage and to adjust the voltage to be applied in a control loop in such a way that the best constant charging of the surface of the image bearing member is achieved. The disadvantage in this known method is that such a control loop allows only one adjustment of the voltage on the charge roller. When the control loop determines a deviation of the current from the charge roller to the image bearing member and there has thus been a deviation from the setpoint values of the charge, the voltage is adjusted on the charge roller, as a result of which the result of such a charging process of the image bearing member is susceptible to errors on the basis of this principle. Moreover, control loops with feedback are difficult to implement and tend to oscillate and become unstable.

[0004] It is therefore the object of the invention to provide an arrangement of the kind mentioned above with which the mentioned disadvantages can be avoided, with which the voltage necessary for each section of the charge roller can be provided, especially by means of a simple control loop that is preferably feedback-free.

[0005] This is achieved in accordance with the invention by the features of claim 1.

[0006] In this way, the voltage necessary for each section of the charge roller can be provided and applied rapidly and precisely by means of a simple control loop before a measuring system determines that a deviation in the charge of the image bearing member has occurred. Errors can thus be avoided right from the start and complex readjustments are no longer necessary. Production-induced irregularities of the charge rollers can thus be compensated even before an uneven charge is transferred to the image bearing member as a result of said irregularities. Moreover, a control loop with feedback can thus be avoided in the voltage applying control unit or at least substantially simplified, which thus substantially simplifies the entire control of the process of applying a predeterminable electric voltage to the individual charge roller.

[0007] The sub-claims, which like claim 1 simultaneously form a part of the description, relate to further advantageous embodiments of the invention.

[0008] The invention is described in closer detail by reference to the enclosed drawings which merely show preferred embodiments on the basis of examples, wherein:

Fig. 1 shows a schematic view of a xerographic system with a preferred embodiment of an arrangement in accordance with the invention, and

Fig. 2 shows a schematic view of a preferred embodiment of an arrangement in accordance with the invention.

[0009] Fig. 2 shows an arrangement for applying a predeterminable electric charge to an image bearing member 5 of a xerographic system with an individual charge roller 1, with first information on individual electric properties of the individual charge roller 1 is stored in a first memory 2, and that the first information is provided as the first input quantity for controlling an applying of a predeterminable electric voltage to the individual charge roller 1. Fig. 1 shows a xerographic system with such an arrangement in accordance with the invention as described above.

[0010] The voltage necessary for any section of the charge roller 1 can be provided or applied rapidly and precisely by means of a simple control loop or a simple voltage applying control unit 3 before a measuring system determines that a deviation in the charge of the charge roller 1 and thus also the image bearing member 5 has occurred. An error can thus be avoided right from the start and it is not necessary to carry out any complex readjustments. Irregularities in the charge roller 1 which are caused by production can thus be compensated even before such irregularities cause an uneven charge to be transferred to the image bearing member 5. Moreover, a control loop with feedback in the voltage applying control unit 3 can thus be avoided or at least be simplified substantially, which thus simplifies the entire control of the process of applying a predeterminable electric voltage to the individual charge roller 1.

[0011] An arrangement in accordance with the invention for applying a predeterminable electric charge to an image bearing member 5 is provided for implementation in a xerographic system, with preferably any xerographic system being provided. An arrangement in accordance with the invention for applying a predeterminable electric charge to an image bearing member 5 of a xerographic system with an individual charge roller 1 can be arranged,

integrated or implemented in any individual part of a xerographic system. It is provided especially preferably that an arrangement in accordance with the invention is arranged, integrated or implemented in a toner cassette and/or in the region of an exchangeable imaging drum cassette for a xerographic system.

[0012] Any type of arrangement of a charge roller 1 can be used in combination with an arrangement in accordance with the invention. The individual charge roller 1 is arranged for applying a predeterminable electric charge to the image bearing member 5, so the charge roller 1 is preferably arranged close to the image bearing member 5. It is preferably provided that a charge roller 1 substantially has the cylindrical arrangement as shown schematically in Fig. 2, such that the charge roller 1 comprises a central conductive shaft 13, preferably comprising metal, especially stainless steel, a conductive cylindrical formed body 14 which encloses the shaft 13 in a substantially even manner and especially comprises polyurethane, and a conductive foil 15 which is applied to the formed body 14. Charge rollers 1 have an arrangement which is not completely even or have electric properties which are not completely the same, as a result of production. For applying the voltage to the charge roller 1 a voltage is applied to the central conductive shaft 13 which forwards the same via the conductive cylindrical formed body 14 to the conductive foil 15, thus applying an electric charge to the photo conductor of the image bearing member 5. At least a direct voltage is applied to the charge roller 1, whereby a direct voltage source 8 being provided for applying a direct voltage to the individual charge roller 1. Regarding a preferred simple implementation, the voltage applying control unit 3 controls at the direct voltage source 8. Preferably, a direct voltage and an alternating voltage are applied to the charge roller 1. At least one alternating voltage source 7 and at least one direct voltage source 8 for supplying the charge roller 1 with an alternating voltage and a direct voltage are therefore provided. The direct voltage source 8 is provided for charging the charge roller 1 with a direct voltage of between 500V and 900V, especially between 600V and 700V. Superimposed on the same and preferably separately regulated and controlled is the alternating voltage source 7 for charging the charge roller 1 with a changeable alternating voltage with a predeterminable frequency, preferably between 900 Hz and 1.1 kHz, with any waveform or signal form of the alternating voltage signal being provided.

[0013] It is provided in accordance with the invention that each individual charge roller 1 is measured with respect to its electric properties after its production and before its implementation into a xerographic system and that the first information thus determined on the individual electric properties of the charge roller 1 is stored in a first memory 2.

[0014] The measured electric properties of the charge roller 1 can concern any type of electric properties which prevent an even distribution of charge on the image bearing member 5 when applying a constant voltage to the central shaft 13 of the charge roller 1. This preferably concerns electric conductance values and/or electric resistances. The thus determined first information therefore preferably describes the electric resistance or conductance value of the charge roller 1 as a function of the rotational angle and/or as a function of the so-called cylinder or polar coordinates of the charge roller 1. As a result, information on the electric properties of the charge roller 1 prevailing between the central shaft 13 and the contact point 16 of the charge roller 1 to the image bearing member 5 are stored in the first memory 2 in connection with each position of the charge roller 1. The voltage to be applied to the charge roller 1 can thus be regulated depending on the position of the charge roller 1.

[0015] The first memory 2 can concern any kind of memory, with electronic semiconductor memories preferably being provided, especially so-called read-only memories or ROMs. The first memory 2 is preferably associated with a voltage applying control unit 3 for controlling the process of applying the voltage to the individual charge roller 1. The first memory 2 is especially connected in a conductive manner with the same. The voltage applying control unit 3 regulates or controls at least one of the alternating voltage source 7 or direct voltage source 8, with the first input quantity being provided for closed-loop control or open-loop control of the alternating voltage source 7. Furthermore, open-loop or closed-loop control of the direct voltage source 8 can also be provided. As a result of the allocation of the first memory 2 and the first information which is stored in the same, a complex arrangement of the voltage applying control unit 3 can be substantially avoided.

[0016] Fig. 2 shows a schematic view of a preferred embodiment of an arrangement in accordance with the invention with a charge roller 1, whose central shaft 13 can be applied to voltage from a direct voltage source 8 and an alternating voltage source 7. The alternating voltage source 7 is controlled or regulated by the voltage applying control unit 3 which has access to the first information stored in the first memory 2 as input quantity. This enables a precise control of the charge applied to the image bearing member 5.

[0017] In addition to the irregularities of charge roller 1, the application of a precisely even charge to the image bearing member 5, which is preferably an organic photo conductor, is further influenced by environmental parameters such as humidity, electric charging of the ambient environment and/or the temperature. It is therefore provided in an especially preferred embodiment of the present invention that the arrangement in accordance with the invention comprises at least first means 4 for determining at least a first value which is depending upon an environmental parameter, especially humidity and/or temperature. By determining such a first value and considering the same in the control of the charging or voltage applying process of the individual charge roller 1, the charge distribution caused on the image bearing member

5 can be homogenized even further.

[0018] The first means 4 for determining the at least one first value can be arranged in different ways, e.g. as a thermometer or as a hygrometer. It is provided in accordance with an especially preferred embodiment of the present invention that the first means 4 are means for measuring the first current flow between the image bearing member 5 and a transfer roller 6, and/or that the first means 4 are designed respectively formed as a current measuring apparatus for measuring the first current flow between an image bearing member 5 and a transfer roller 6

[0019] It has been noticed that said current flow which is in the magnitude of a few μA represents very precisely the environmental parameters such as humidity and/or temperature and is proportional to the same, and has the special advantage that it already concerns a purely electric measured variable which therefore can be processed especially easily by an electronically arranged voltage applying control unit 3. It is therefore provided especially preferably that the first current flow is provided as the second input quantity for controlling the charging process of the individual charge roller 1, which thus allows achieving an especially homogeneous charge distribution on the surface of image bearing member 5.

[0020] Fig. 1 shows a schematic view of a xerographic system with a preferred embodiment of an arrangement in accordance with the invention, with the charge roller 1 being arranged adjacent to the image bearing member 5, which charge roller 1 can be applied with direct and alternating voltage by an integral direct and alternating voltage source 7, 8. The direct and alternating voltage source 7, 8 is controlled or regulated by the voltage applying control unit 3 which reads out the first information from the first memory 2 as first input quantity and is further connected with the first means 4 for determining at least a first value which is proportional to an environmental parameter, which means are designed respectively formed as a current measuring apparatus and measure the first current flow between the organic photo conductor 5 and the transfer roller 6. The first current flow is included in the open-loop and closed-loop control by the voltage applying control unit 3 as a second input quantity, with the first input quantity and/or the second input quantity being provided at least for controlling the alternating voltage source 7 or the direct voltage source 8. The transfer roller 6 further comprises a transfer roller voltage source 11. The illustrated xerographic system further comprises a writing head 10 and a toner application arrangement 9 which is called a sleeve and which is also associated with a separate voltage source 12.

[0021] Further embodiments in accordance with the invention merely have a part of the described features, with any combination of features being provided, especially also such of different described embodiments.

Claims

1. Arrangement for applying a predeterminable electric charge to an image bearing member (5) of a xerographic system with an individual charge roller (1), **characterized in that** first information on individual electric properties of the individual charge roller (1) is stored in a first memory (2), and that the first information is provided as the first input quantity for controlling an applying of a predeterminable electric voltage to the individual charge roller (1).

2. Arrangement according to claim 1, **characterized in that** the individual charge roller (1) is arranged for applying the predeterminable electric charge to the image bearing member (5).

3. Arrangement according to claim 1 or 2, **characterized in that** the first memory (2) is associated with a voltage applying control unit (3) for controlling the process of applying the electric voltage to the individual charge roller (1), and is especially connected with the same in a conductive manner.

4. Arrangement according to claim 1, 2 or 3, **characterized in that** it comprises at least first means (4) for determining at least a first value which is proportional to an environmental parameter, especially the humidity and/or the temperature.

5. Arrangement according to claim 4, **characterized in that** the first means (4) are means (4) for measuring the first current flow between the image bearing member (5) and a transfer roller (6).

6. Arrangement according to claim 5, **characterized in that** the image bearing member (5) is an organic photo conductor.

7. Arrangement according to claim 5 or 6, **characterized in that** the first current flow is provided as the second input quantity for controlling the process of applying the electric voltage to the individual charge roller (1).

8. Arrangement according to claim 7, with a direct voltage source (8) being provided for applying a direct voltage to the individual charge roller (1), **characterized in that** the first input quantity and/or the second input quantity are provided at least for controlling the direct voltage source (8).

9. Arrangement according to claim 8, **characterized in that** the voltage applying control unit (3) controls at least the direct voltage source (8).

10. Arrangement according to claim 7, 8 or 9, with an alternating voltage source (7) and a direct voltage

source (8) being provided for applying a direct voltage and an alternating voltage to the individual charge roller (1), **characterized in that** the first input quantity and/or the second input quantity are provided at least for controlling the alternating voltage source (7).

11. Arrangement according to claim 10, **characterized in that** the voltage applying control unit (3) controls at least the alternating voltage source (7).

12. Toner cassette for a xerographic system, **characterized by** an arrangement according to one of the claims 1 to 11.

13. Method for determining information on individual electric properties of an individual charge roller (1) for a xerographic system, **characterized in that** the charge roller (1) is measured with respect to its electric properties after its production and before its implementation in a xerographic system, and that the first information thus determined on the individual electric properties of the charge roller (1) are stored in a first memory (2).

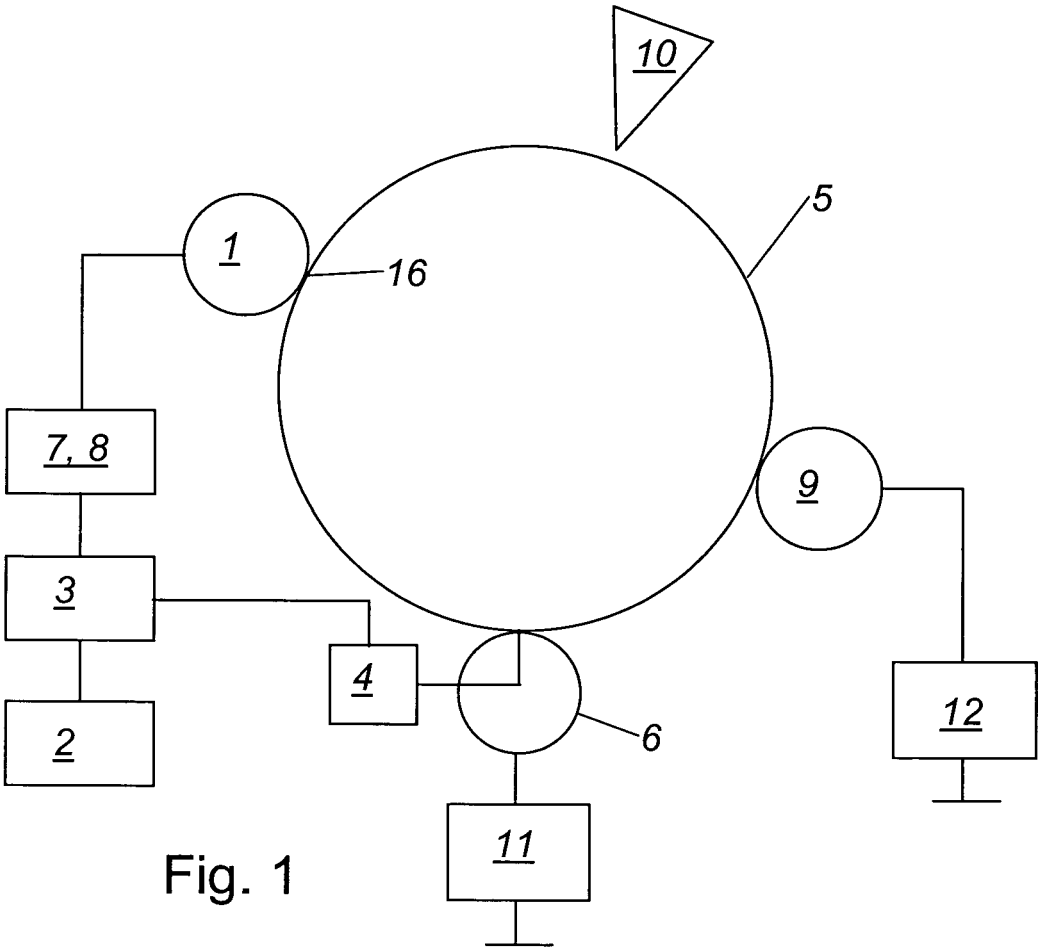


Fig. 1

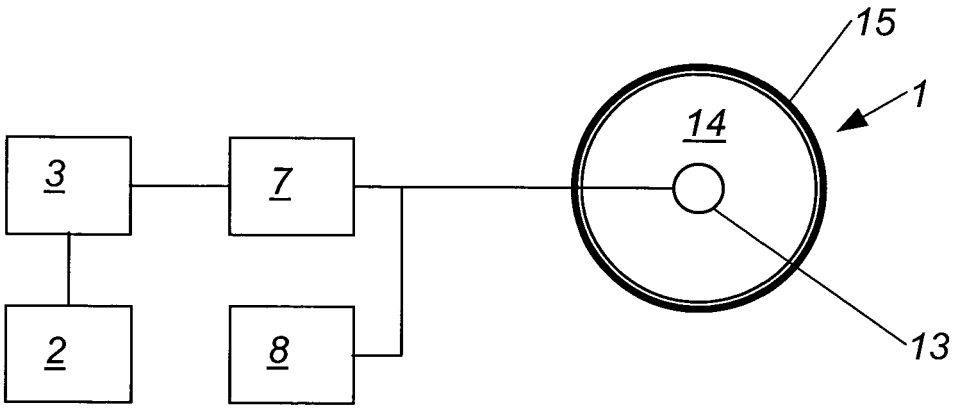


Fig. 2

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 08 29 1267

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 2004/190921 A1 (BAE DYOUNG-CHUL [KR] ET AL) 30 September 2004 (2004-09-30) * paragraphs [0028] - [0050]; figures 3,4 * -----	1-9,12, 13 10,11	INV. G03G15/02
X Y	US 2004/037576 A1 (ASHIKAWA YOSHIHISA [JP]) 26 February 2004 (2004-02-26) * paragraphs [0019], [0039] - [0045]; claims 1-4; figures 3-5 * -----	1-4,12, 13 5-11	
X Y	US 2002/037172 A1 (SAITO SEIJI [JP]) 28 March 2002 (2002-03-28) * paragraphs [0031] - [0050]; claims 1-7; figures 1-3 * -----	1-3,12, 13 5-11	
X Y	JP 09 190144 A (CANON KK) 22 July 1997 (1997-07-22) * paragraphs [0105] - [0125]; figures 17-19 * -----	1-4,12, 13 5-11	
Y	JP 03 094282 A (CANON KK) 19 April 1991 (1991-04-19) * abstract; figure 1 * -----	5-9	TECHNICAL FIELDS SEARCHED (IPC) G03G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 April 2009	Billmann, Frank

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 29 1267

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-04-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004190921 A1	30-09-2004	CN 1532645 A	29-09-2004
		KR 20040084033 A	06-10-2004
US 2004037576 A1	26-02-2004	JP 2004086156 A	18-03-2004
US 2002037172 A1	28-03-2002	JP 2001343797 A	14-12-2001
JP 9190144 A	22-07-1997	NONE	
JP 3094282 A	19-04-1991	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82