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(54) METHOD FOR DETERMINING PRINTED IMAGES

VERFAHREN ZUR BESTIMMUNG VON GEDRUCKTEN BILDERN

PROCÉDÉ DE DÉTERMINATION D'IMAGES IMPRIMÉES

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Description

Field of the Art

[0001] The present invention generally relates to a method of determining printed images, particularly applicable to a printer with printing groups each carrying a printing roller with a respective characteristic image to be printed on a material, but the determination or discernment of which is not initially possible, either because its belonging to a certain roller is in principle unknown or because some of the characteristic images would appear partly or completely superposed in the event of performing a first printing.

Prior State of the Art

[0002] Different types of printers, such as flexographic printers comprising a series of printing groups, with printing rollers, with characteristic images or marks to be printed incorporated in the rollers either directly, for example by intaglio printing, or by means of corresponding printing plates or engraved jacket in the case of flexography.

[0003] Said printing machines can incorporate automatic systems for adjusting the register of the printing or of the transfer of the ink through inspection of the characteristic images or marks printed on a material.

[0004] In such machines it is common to exchange the rollers or the printing plates for others when a new pattern is to be printed, therefore before adjusting them in relation to either the register or the pressure, and due to the fact that each new roller, jacket or printing plate mounted carries a new mark, it is necessary to assign each mark to a printing group.

[0005] In the event that the order of the marks with respect to the printing groups is pre-established by the work order, any change in this pre-established order must be reassigned manually.

[0006] If there is not pre-established order, an operator must check it visually, directly inspecting the rollers, printing plates or the already printed material, which delays performing the register and pressure adjustment operations necessary to begin printing the new pattern since in order to start it is necessary to wait until the operator finishes the visual inspection and enters the corresponding data in the automatic system responsible for performing said operations, or otherwise performing them manually.

[0007] The method proposed by the present invention is applicable for the mentioned case that the order of the marks is not always fixed with respect to the order of the printing groups.

[0008] In addition, there is a type of characteristic images or marks (generally as auxiliary images or marks for mounting or pre-mounting tasks) in the printing plates or printing jackets which, when they are printed on a laminar material, appear partially superposed, making it impossible to perform subsequent operations using said marks, such as the automatic register adjustment or pressure adjustment, as well as the mentioned determination of to which printing roller each mark belongs.

[0009] Proposals aimed at using said marks, which in the case of being printed appear superposed, for performing one or more of the operations mentioned in the previous paragraph are not known.

[0010] In either of the two mentioned cases, both the case referring to the fact that the order of the marks is not always fixed with respect to the order of the printing groups, and the case referring to the superposing of the marks used in the case of being printed, it is not possible to perform an initial determination or discernment of the marks, either because in principle it is unknown to which it belongs or because some of the characteristic images appear partly or completely superposed. EP-A-0 850 763 discloses a method according to the preamble of claims 1 and 9.

Explanation of the Invention

[0011] It seems necessary to offer an alternative to the state of the art which covers the gaps found therein by means of providing a method the application of which allows performing a determination of printed images, or marks when the order of the marks is not always fixed with respect to the order of the printing groups,.

[0012] Such objective is achieved with the present invention by means of providing a method the application of which allows clearly determining the different printed marks to perform subsequent operations, as well as determining which mark corresponds to each printing group, without needing to visually inspect the roller, jacket, printing plate or printed material, thus reducing the wait time prior to starting the register and pressure adjustment operations necessary to begin printing compared to conventional visual inspection methods described in the previous section.

[0013] To that end, the present invention relates to a method of determining printed images, of the type comprising the use of a printer with at least one first and one second printing groups including respective first and second printing rollers, generally with one and the same printing development, each of said printing rollers with at least one respective characteristic image to be printed on a material.

[0014] Said characteristic images are mounting marks used for positioning and mounting, or pre-mounting, printing plates on printing rollers, which are common in printing plates found on the market, whereby register marks are not necessary expressly to perform said pressure and register adjustments, since by means of the method proposed by the first aspect of the invention said mounting marks are used to perform their original function, i.e., the correct mounting of the printing plates on the printing rollers, in addition to performing the functions conventionally performed with other additional marks, i.e., the marks referring to the mentioned pressure ad-

justments and transverse and longitudinal register adjustment.

[0015] According to the invention, the proposed method is applied to the determination of printed images with respect to printing groups, and is of the type comprising:

i) actuating said printing groups to perform a first printing of said characteristic images on said material to be printed.

[0016] The method proposed by the second aspect of the invention comprises determining which roller is associated to each of said characteristic images by means of the automatic and sequential performance, after said step i), of the following steps:

ii) detecting, by means of an automatic detection system, said characteristic images once they have been printed on the material to be printed, to identify them and know their relative position within said printing development,
iii) moving in a controlled manner the transverse and/or longitudinal register of one or more of said printing rollers,
iv) actuating said printing groups to perform a second printing of one or more of said characteristic images on said material to be printed,
v) detecting on the material to be printed, by means of said automatic detection system, said characteristic images if they have been printed again on the material to be printed, to identify them and know their relative position within said printing development, vi) comparing the result of the detections of step v) with that of the detections of step ii) to determine a possible positional discrepancy for one or more of the characteristic images,
vii.1) determining that one of said printing rollers is associated to a characteristic image which has undergone a positional discrepancy at least if the transverse and/or longitudinal register of said printing roller has been moved in said step iii), and/or
vii.2) determining that one of said printing rollers is associated to one of said characteristic images, which has not undergone a positional discrepancy, if the register of said printing roller has not been moved in said step iii),
viii) comparing the relative positions detected in step ii) and/or step v) with the relative position of said area (Z) of the laminar material (2), to determine a possible positional discrepancy for at least one of the characteristic images (M_1, M_2); and
ix) performing at least one operation of register adjustment.

[0017] An alternative embodiment of the proposed method include following steps:

i) actuating at least said printing groups to perform a first printing of said characteristic images (M_1, M_2) on one single section of said material to be printed (2), corresponding to a printing development, said section comprising said definite area (Z);

and said method being **characterized** in that it comprises determining which roller is associated to each of said characteristic images (M_1, M_2) by means of the automatic and sequential performance, after said step i), of the following steps:

ii) detecting, by means of an automatic detection system, said characteristic images (M_1, M_2) once they have been printed on the material to be printed (2), to at least identify them and know their relative position within said printing development,
iii) withdrawn in a controlled manner the printing status from at least one of said printing rollers (R_2),
iv) actuating at least said printing groups to perform a second printing of said characteristic images (M_1, M_2) on one single section of said material to be printed (2), corresponding to a printing development, said section comprising said definite area (Z);
v) detecting on the material to be printed (2), by means of said automatic detection system, said characteristic images (M_1, M_2) if they have been printed again on the material to be printed (2), to at least identify them and know their relative position within said printing development, and detect the absence of the characteristic images (M_1, M_2) which have not been printed again on said laminar material (2) in said step iv),
vi) comparing the result of the detections of step v) with that of the detections of step ii) to determine the disappearance of one of said characteristic images (M_1, M_2),
vii.3) determining that one of said printing rollers (R_1, R_2) is associated to one of said characteristic images (M_1, M_2), which has disappeared from the printing, if said printing roller (R_1, R_2) has been withdrawn from the printing status in said step iii).
viii) comparing the relative positions detected in step ii) and/or step v) with the relative position of said area (Z) of the laminar material (2), to determine a possible positional discrepancy for at least one of the characteristic images (M_1, M_2);
ix) performing at least one operation of register adjustment.

[0018] Based on the foregoing description of the method proposed by both the first and the second embodiments of the present invention, it is deduced that for one embodiment applied to a machine with two printing rollers with respective characteristic images, such as auxiliary register marks, it is possible to determine which mark is associated to each roller:

First embodiment - by moving the transverse and/or

longitudinal register of one of the rollers and therefore determining that the mark which has undergone a positional discrepancy with respect to said area of the material, for the first aspect, or which has also been moved upon resuming printing, according to the second aspect, is the one corresponding to the roller which has been moved according to the step vii.1), and that the one which has not been moved belongs to the roller which has not been moved, according to the step vii.2), or

Second embodiment - withdrawing from printing status one of the rollers and therefore determining that the mark which has not been printed again in step iv) corresponds to the roller which has been withdrawn from printing according to the step vii.3).

[0019] As will be understood a combination of first and second embodiments can be produced as follows:

First and second embodiments combined - moving the transverse and/or longitudinal register of one of the rollers and withdrawing from printing status another one of the rollers, and therefore determining that the mark which has undergone a positional discrepancy with respect to said area of the material, for the first aspect, or which has also been moved upon printing again, is the one which corresponds to the roller which has been moved (step vii.1)), and that the one which has not been printed in step iv) corresponds to the roller which has been withdrawn from printing status (stepvii.3)).

[0020] In relation to said detected positions in said steps ii) and v), they are preferably respective longitudinal and transverse positions of each characteristic image within said printing development.

[0021] Once has been determined which mark corresponds to each printing group, steps viii) and ix) permits the determination of possible positional discrepancies of at least one of said characteristic images and performing at least one operation of register adjustment.

[0022] According an additional embodiment, an additional operation of pressure adjustment of said printing rollers can be also performed.

[0023] For other embodiments applied to machines of more than two printing groups, it is possible to perform all steps vii.1), vii.2 and vii.3), and even if necessary with some variations in relation to the movements of the transverse and/or longitudinal register of each roller, or a combination of movements, also taking into account the direction of said movements, as well as even the magnitude of the movement, depending on the number of groups incorporated by the machine.

[0024] Such embodiments applied to machines of more than two groups will be duly described in a later section.

Brief Description of the Drawings

[0025] The previous and other advantages and features will be more fully understood from the following detailed description of several embodiments with reference to the attached drawings, which must be considered in an illustrative and non-limiting manner and in which:

Figure 1a is a schematic perspective depiction of part of a flexographic machine with five printing rollers, in which some of the most relevant elements to be taken in account by the method proposed by the present invention for one embodiment can be seen,

Figure 1b is a schematic plan view of a series of marks printed in step i) of the method proposed by the second aspect of the invention, using the machine of Figure 1a,

Figure 1c is a schematic plan view of a series of marks printed in step iv) of the method proposed by the second aspect of the invention, using the machine of Figure 1a, for the same embodiment of Figure 1b,

Figure 2a is a schematic perspective depiction of part of a flexographic machine with seven printing rollers, in which some of the most relevant elements to be taken into account by the method proposed by the present invention for another embodiment can be seen,

Figure 2b is a schematic plan view of a series of marks printed in step i) of the method proposed by the second aspect of the invention using the machine of Figure 2a,

Figure 2c is a schematic plan view of a series of marks printed in step iv) of the method proposed by the second aspect of the invention using the machine of Figure 2a for the same embodiment of Figure 2b,

Figure 3a is a schematic perspective depiction of part of a flexographic machine with five printing rollers, in which some of the most relevant elements to be taken into account by the method proposed by the second aspect of the present invention for one embodiment can be seen,

Figure 3b is a schematic plan view of a series of marks as they would appear printed using the machine of Figure 3a for one embodiment for which all the marks would appear superposed,

Figure 3c is a schematic plan view of a series of marks printed in step ii) of the method proposed using the machine of Figure 3a for the same embodiment of Figure 3b, and

Figure 3d is another schematic plan view of a series of printed superposed marks after having performed a register adjustment of the printing rollers of the machine of Figure 3a according to the method proposed by the invention for the same embodiment of Figures 3b and 3c.

Detailed Description of several Embodiments

[0026] The present invention relates to a method of determining printed images, of the type comprising the use of a printer of any type but with at least two printing

groups with respective printing rollers with respective characteristic images to be printed.

[0027] The explanation of the proposed method applied to a printing machine with two printing rollers has already been provided in the section of the explanation of the invention, the proposed method being described in this section for several embodiments based on the use of a printing machine (specifically a flexographic machine but it could be another machine which a person skilled in the art would consider suitable) with a plurality of printing rollers: five for the embodiment shown in Figures 1a to 1c and 3a to 3d, and seven for the embodiment of Figures 2a to 2c.

[0028] Although the method is applicable for any type of characteristic image, of any size and location, for the embodiments shown in the Figures 1a to 1c and 2a to 2c referring to the second aspect of the invention, said characteristic images are auxiliary marks for register M_1, M_2, M_3...M_n located in respective sides of printing plates C_1, C_2, C_3...C_n, for being printed in a side margin of a laminar material 2 to be printed.

[0029] The preceding paragraph refers to the marks and to the printing plates, and reference will also later be made to the rollers, indicating the maximum number as n, due to the fact that said number n may vary depending on the embodiment, specifically for the embodiment shown in Figures 1a to 1c and 3a to 3d n=5, and for the embodiment shown in Figures 2a to 2c n=7.

[0030] As can be seen in Figures 1a, 2a and 3a, for several embodiments, the method is applied to a flexographic printer of the type comprising a rotating support drum 1 (shown transparently for the sake of visual clarity) on which a laminar material to be printed 2 (shown only in part for the sake of clarity) is supported, with a plurality of printing groups (not all shown) arranged around said support drum 1 and spaced along its perimeter, including respective printing rollers R_1, R_2, R_3... R_n, each of them with at least one respective mark to be printed M_1, M_2, M_3...M_n.

[0031] For said embodiments shown, the method comprises performing all the steps for all the printing groups and all the marks M_1, M_2, M_3...M_n.

[0032] Figures 1b and 2b show the marks printed by the first printing of step i) of the method proposed by the second aspect of the invention (said figures do not show the laminar material 2 on the they have been printed).

[0033] It can be seen both in Figure 1b and in the 1c, and, though not as well, in Figure 1a, how the marks M_1, M_2, M_3, M_4, M_5 therein shown are respective circles which, although it cannot be seen since the drawings are in black and white, have each been printed with a different color, the mentioned color of each mark M_1, M_2, M_3, M_4, M_5 for one embodiment being the characteristic which allows distinguishing them from one another.

[0034] For another embodiment, the mentioned distinguishing characteristic of the marks is the relative position within the printing, there being for said embodiment a series of windows (one per mark) delimiting respective areas where it is possible to detect a mark, each mark being moved, according to the proposed method, only through the inside of its respective window, without the possibility of entering in the window of another mark. In other words, even though the marks, for example the marks shown in Figures 1b and 1c M_1, M_2, M_3, M_4, M_5, are of the same color, the fact that each of them can be moved only through the inside of its respective window (not shown) allows distinguishing them by their relative position, despite the fact that all of them are identical and the same color.

[0035] In said Figure 1b, the marks M_1, M_2, M_3, M_4, M_5 have been printed longitudinally separated along the mentioned margin of the laminar material 2, and they also appear out of both transverse and longitudinal register.

[0036] In relation to marks M_1, M_2, M_3, M_4, M_5, M_6, M_7 shown in Figures 2a to 2c, these marks are respective segments of lines, each of them with a different inclination, and which unlike the marks of Figures 1a to 1c, have been printed substantially on one and the same marginal area of the laminar material 2, without being longitudinally separated along the laminar material 2 by more than the small (longitudinal and transverse) separations typical of register errors (which can be seen in Figure 2b), or the separations forced in step iii) of the proposed method which can be seen in Figure 2c (as also occurs with the embodiment of Figure 1c).

[0037] For another embodiment not shown, the marks M_1, M_2, M_3...M_n are different geometric figures.

[0038] It can be seen in Figures 1a, 2a and 3a how for the embodiments therein shown the marks M_1, M_2, M_3...M_n are defined or incorporated in respective printing plates C_1, C_2, C_3...C_n, said printing rollers R_1, R_2, R_3... R_n being associated to said characteristic images M_1, M_2, M_3...M_n since each of them carries one of said printing plates C_1, C_2, C_3...,C_n.

[0039] The method proposed by the second aspect of the invention comprises performing previously described step ii) for detecting the marks as they are depicted in Figures 1b and 2b.

[0040] Said detections of said step ii), and of step v) described in further detail below, are performed by means of an automatic detection system which, for the embodiment shown in Figures 2b and 2c, comprises, for the purpose of performing the detections visually, an automatic image capture and treatment system (not shown) formed, for example, by at least one camera located above the rotating support drum 1, upstream with respect to the direction of movement of the laminar material 2, associated to a corresponding electronic circuitry, directly on the printed laminar material 2 or in a corresponding monitor or display (not shown), said automatic image capture and treatment system being associated to a corresponding electronic system suitable for performing at least said steps vi) to ix), as well as collaborating, if necessary, when performing steps ii) and v), as well as giving the orders by means of the corresponding sending of

suitable control signals to means of actuating the groups and the printing rollers, which allow performing steps i), iii) and iv).

[0041] For one embodiment for which it is not necessary to detect the shape or the color of the marks, and for which it is therefore not necessary to use a camera, such as that mentioned above for which the marks were distinguished from one another by their relative position within the printing, the mentioned automatic detection system comprises one or more photoelectric sensors, also associated to an electronic system like that described in the preceding paragraph.

[0042] In relation to step iii) of the method proposed by the second aspect of the invention, said step comprises moving the transverse and/or longitudinal register of at least all except one of said printing rollers R_1, R_2, R_3... R_n, each in a different direction or in the same direction as another but with a different magnitude different, or withdrawing same from printing status.

[0043] Specifically for the embodiment of Figure 1a, step iii) is performed for moving the printing rollers R_1, R_2, R_3, R_4, R_5 shown therein according to the indicative arrows also shown therein, i.e.:

- moving the longitudinal, or angular, register of a first printing roller R_1 in one direction, and of a second printing roller R_2 in the opposite direction, and
- moving the transverse, or axial, register of a fourth R_4 and a fifth R_5 printing rollers, each in one direction.

[0044] With respect to the third printing roller R_3, the latter is not actuated in said step iii), therefore it does not move in any direction.

[0045] The result of said movements, or the absence thereof as is the case of the third printing roller R_3, can be seen in Figure 1c, and is detectable in step v) of the proposed method.

[0046] Said Figure 1c shows the previous positions of the marks (i.e., those shown in Figure 1a) by means of a number of corresponding "x", which allows performing a comparison with their respective current positions, which allows appreciating how all the marks, except that indicated as M_3, have undergone respective positional discrepancies, determined in step vi) of the method, and different from one another, specifically mark M_5 has been moved to the right mark M_4 to the left, mark M_2 upwards and mark M_1 downwards. In other words, said step vi) has been performed to determine a series of positional discrepancies different for all except one of the marks, i.e., for M_1, M_2, M_4 and M_5.

[0047] Continuing with the embodiment of Figures 1a to 1c, the method proposed by the second aspect of the invention comprises performing said step vii.1) to determine that each of the printing rollers R_1, R_2, R_4 and R_5 actuated in step iii) is associated to one of said marks M_1, M_2, M_4 and M_5 which have undergone respective positional discrepancies, if the transverse and/or longitudinal register of said printing roller R_1, R_2, R_4 and R_5 has been moved in said step iii), with a direction corresponding to that experienced by the printed mark M_2, M_3, M_4 and M_5, i.e., mark M_2 corresponds to roller R_2, M_3 to R_3, M_4 to R_4 and M_5 to R_5.

[0048] The method comprises determining in step vii.2) that the third roller R_3, the register of which has not been moved, is associated to mark M_3 which has not undergone any positional discrepancy.

[0049] The movements to which the registers of the printing rollers have been subjected in step iii) are enough for the embodiment shown in Figures 1a to 1c, but this is not the case for one embodiment which involves using a machine with a larger number of printing rollers, as is the case shown in Figure 2a.

[0050] For the embodiment of Figure 2a, step iii) is performed for moving the printing rollers R_1, R_2, R_3, R_4, R_5, R_6, R_7, shown therein according to the indicative arrows also shown therein, i.e.:

- withdrawing from printing status a first printing roller R_1,
- moving the longitudinal register of a second printing roller R_2 in one direction, and that of a third printing roller R_3 in the opposite direction, and
- moving the transverse register of a sixth printing roller R_6 in one direction, and that of a fifth R_5 and a seventh R_7 printing rollers in one and the same direction, opposite to that of roller R_6, but with a different magnitude, specifically with a magnitude greater than roller R_5 as is sought to be indicated with the longer length of the arrow therein shown.

[0051] Obviously the fact that a certain roller of is moved in one way or another, for example the sixth roller R_6 axially in one direction, must only be interpreted as an example for explaining the rollers shown in Figures 1a and 2a, since the number of the roller which undergoes a certain movement is irrelevant, it can be the first or the second, etc., what is important is that said movements are different from one another (either relating to the type of movement, to the direction, to, if necessary, the magnitude of the movement or to a combination thereof).

[0052] Continuing with the embodiment shown in Figures 2a to 2c, the fourth printing roller R_4 is not actuated in said step iii), therefore it is not moved in any direction.

[0053] The result of said movements, or the absence thereof as in the case of the fourth printing roller R_4, can be seen in Figure 2c, and is detectable in step v) of the proposed method.

[0054] Said Figure 2c also shows how all the marks, except those indicated as M_4 and as M_1, have undergone respective positional discrepancies, determined in step vi) of the method, and different from one another, specifically mark M_5 has been moved to the right, mark M_6 to the left, mark M_3 upwards, mark M_2 downwards and mark M_7 also to the right but with a smaller magnitude than M_5. In other words, said step vi) has been performed to determine a series of positional discrepancies different

for all except two of the marks, i.e., for M_2, M_3, M_5, M_6 and M_7.

[0055] Figure 2c also shows that mark M_1 has not been printed, which has been determined in step vi) as a disappearance of said mark M_1.

[0056] Continuing with the embodiment of Figures 2a to 2c, the method proposed by the second aspect of the invention comprises performing said step vii.1) to determine that each of the printing rollers R_2, R_3, R_5, R_6 and R_7 actuated in step iii) is associated to one of said marks M_2, M_3, M_5, M_6 and M_7 which have undergone respective positional discrepancies, if the transverse and/or longitudinal register of said printing roller R_2, R_3 R_5, R_6 and R_7 has been moved in said step iii), with a direction and a magnitude corresponding to that experienced by the printed mark M_2, M_3, M_5, M_6 and M_7, i.e., mark M_2 corresponds to roller R_2, M_3 to R_3, M_5 to R_5, M_6 to R_6, and M_7 to R_7.

[0057] For one embodiment said magnitudes have pre-determined values.

[0058] Continuing with the embodiment of Figures 2a to 2c, the method proposed by the second aspect of the invention comprises determining in step vii.2) that the fourth roller R_4, which has not been moved, is associated to the mark M_4 which has not undergone any positional discrepancy, as well as performing said step vii.3) to determine that the first printing roller R_1 withdrawn from the printing upon being actuated in said step iii) is associated to the first mark M_1, which has disappeared from the printing.

[0059] For one embodiment the proposed method is performed before a process of register adjustment of said printing rollers R_1, R_2, R_3... R_n.

[0060] For another embodiment the method proposed by the second aspect of the invention is performed before a process of pressure adjustment of at least part of the rollers of said printing groups.

[0061] In relation to the method proposed by the first aspect of the invention, it can be observed in Figures 3b to 3d (as well as, although with more difficulty in Figure 3a in its respective printing plates C_1, C_2, C_3, C_4, C_5), how the marks M_1, M_2, M_3, M_4, M_5 shown therein are respective circles (Figures 3b to 3d do not show the laminar material 2 on which the marks have been printed), in this case partially superposed and printed within a determined area Z (shown with a dashed line). Unlike Figures 3b and 3d, Figure 3b shows a hypothetical preliminary printing, for the purpose of clarifying the explanation of the method proposed by the first aspect of the invention, since it is not essential to perform printing of the marks M_1, M_2, M_3, M_4, M_5 before step a).

[0062] Said circles are an exaggerated representation of the real marks, for the sake of clarity, since they are actually microdots generally having a diameter of substantially 0.1 mm to 1 mm or slightly greater.

[0063] For a preferred embodiment said marks M_1, M_2, M_3, M_4, M_5 are auxiliary mounting marks used for positioning and coupling said printing plates C_1, C_2, C_3, C_4 ,C_5 on said printing rollers R_1, R_2, R_3, R_4, R_5.

[0064] Figure 3b shows the marks M_1, M_2, M_3, M_4, M_5 as they would appear printed if a printing before step a) of the method proposed by the first aspect of the invention, for the embodiment in which they are the mentioned microdots, were performed. It can be seen in said Figure 3b that the microdots M_1, M_2, M_3, M_4, M_5 appear partially superposed, a register adjustment of the printing rollers R_1, R_2, R_3, R_4, R_5 not having been yet performed. Said superposition, although partial, initially prevents the determination or discernment of each mark, it not being possible to clearly distinguish each mark separately, which makes it difficult, and even in some cases impossible, to determine which roller each mark belongs to, as well as their pressure adjustment, since the marks are not seen in their entirety, and their register adjustment, since it is not possible to identify which roller each mark belongs to.

[0065] In addition, Figure 3c shows the same marks or microdots M_1, M_2, M_3, M_4, M_5 once they have been printed, the printing rollers R_2, R_3, R_4, R_5 shown in Figure 3a having been moved, for the embodiment shown, according to the indicative arrows also shown therein, i.e.:

- axially moving the transverse register to a second printing roller R_2 in one direction, and to a fifth printing roller R_5 in the opposite direction, and
- angularly moving the longitudinal register of a third R_3 and a fourth R_4 printing rollers, each in one direction.

[0066] In relation to the first printing roller R_1, it is not actuated, therefore it is not moved in any direction.

[0067] The result of said movements, or the absence thereof as is the case of the first printing roller R_1, can be seen in Figure 3c, and can be detected.

[0068] Said Figure 3c depicts the preliminary positions that the marks would have adopted if they had been printed (i.e., those shown in Figure 3a) by means of corresponding "x", which allows performing a comparison with their respective current positions, which allows appreciating how all the marks, except that indicated as M_1, have undergone respective positional discrepancies.

[0069] Actually, it is not necessary to perform printing before moving the printing roller register, i.e., the printing shown by Figure 3b is not performed, therefore the mentioned positional discrepancies are not determined by comparing each printed mark with its preliminary position but rather by means of comparing the relative positions detected with the relative position of said area Z of the material 2, to determine the positional discrepancies for all the marks M_2, M_3, M_4, M_5 except for a first mark indicated as M_1.

[0070] It can be seen in said Figure 3c, where the marks M_1, M_2, M_3, M_4 and M_5 appear printed not superposed in relation to another, how the positional discrepancies with respect to the area Z, are different from one another, specifically the mark M_5 has moved to the right

of said area Z, the mark M_4 downwards, the mark M_2 towards the left and the mark M_3 upwards. In other words, said step has been performed to determine a series of different positional discrepancies for all except one of the marks, i.e., for M_2, M_3, M_4 and M_5.

[0071] Once the marks M_1, M_2, M_3, M_4 and M_5 have been separated as seen in Figure 3c, they can be easily distinguished, which makes it possible to perform the operations of determining or associating marks M_1, M_2, M_3, M_4 and M_5 with respect to printing rollers R_1, R_2, R_3, R_4, R_5 as well as register adjustment and pressure adjustment of the printing rollers R_1, R_2, R_3, R_4, R_5.

[0072] The embodiments described for the second aspect of the invention for which there was a larger number of printing rollers than those shown by Figure 3a and, as a result, identical movements with one and the same direction for two different printing rollers, but with different pre-determined magnitudes, are also applicable in a similar manner, with the difference that steps i) and ii) of the method proposed are not necessary according to the first aspect, whereby the comparisons to determine the positional discrepancies are performed with respect to the area Z shown in Figures 3b to 3c.

[0073] The method proposed comprises performing said pressure adjustment by means of using an automatic image capture (camera or the like) and treatment system associated to an electronic system for, according to one embodiment, detecting the absence or presence of each of said marks M_1, M_2, M_3, M_4, M_5 on said laminar material 2 and acting accordingly by increasing or decreasing the pressure exerted by each printing roller R_1, R_2, R_3, R_4, R_5 on the laminar material 2, as well as the pressure of their associated ink rollers (not shown).

[0074] For a more elaborate embodiment the method proposed by the invention comprises, to perform said pressure adjustment, comparing, by means of said electronic system, the marks M_1, M_2, M_3, M_4, M_5 captured with respective pre-determined reference marks registered in said electronic system and indicative of a good printing quality (due to their color, shape, etc.), and if said comparison offers as a result a discrepancy or deviation indicative of the fact that the quality of any of the marks M_1, M_2, M_3, M_4, M_5 captured is not good, compensating said discrepancy by means of adjusting the pressure of the corresponding printing roller R_1, R_2, R_3, R_4, R_5 which has printed said image and of a corresponding ink roller (not shown) to which it is associated.

[0075] In relation to the mentioned register adjustment, for a preferred embodiment the method proposed comprises taking as a common reference a first mark M_1, the printing roller R_1 of which has not been moved , and adjusting the position of the printing rollers R_2, R_3, R_4, R_5 carrying the remaining marks M_2, M_3, M_4, M_5 until the position of said marks M_2, M_3, M_4, M_5, once they have been printed on the material 2, is identical to that of said first mark M_1, i.e., until all the marks M_1, M_2, M_3, M_4, M_5 overlap as shown in Figure 3d. To that end, the method proposed comprises:

- comparing the relative positions detected for each of the printed marks M_2, M_3, M_4, M_5, except for said first M_1, with respective relative register positions equal to the position of the first mark M_1 detected, or common reference register position, plus the known movement (actuation of the axial or angular roller) of the transverse and/or longitudinal register undergone by each of the marks M_2, M_3, M_4, M_5 in said step a),
- adjusting the transverse and longitudinal register of the printing rollers R_2, R_3, R_4, R_5 the marks M_2, M_3, M_4, M_5 of which have been printed with a relative position different from the relative register position with which it has been compared, until each of them has reached its respective relative register position, and
- moving each of the printing rollers R_2, R_3, R_4, R_5 according to the same movement undergone in said step of moving the printer rollers, identical in magnitude and along the same movement axis, but in an opposite direction, so that all the marks M_1, M_2, M_3, M_4, M_5 are printed completely superposed in relation to one another on the laminar material 2 in said common reference register position or position of the first mark M_1 within said area Z, as shown in Figure 3d.

[0076] For another non-preferred embodiment the common reference position is not the position of the first mark M_1 detected, but another different one, such as a pre-determined position different from the relative positions of the marks M_1, M_2, M_3, M_4, M_5 detected , it being possible for said embodiment, not shown, that the first mark M_1 has also been moved in initial step, since it is not used as reference for the register adjustment of the printing rollers R_2, R_3, R_4, R_5 of the remaining marks M_2, M_3, M_4, M_5.

[0077] Continuing with the embodiment shown, it can be observed in Figure 3d how once all the marks M_1, M_2, M_3, M_4, M_5, particularly mounting microdots, are located in the common reference register position, they are completely superposed, it not being possible to distinguish in said Figure 3d more than a single circle, representative of all the completely superposed microdots M_1, M_2, M_3, M_4, M_5.

[0078] A person skilled in the art could introduce changes and modifications in the described embodiments without departing from the scope of the present improvements as it is defined in the attached claims.

Claims

1. A method for determining printed images with respect to printing groups, comprising the use of a printer with at least one first and one second printing groups including respective first (R_1) and second (R_2) printing rollers having one and the same printing development, each of said printing rollers (R_1, R_2)

with at least one respective characteristic image (M_1; M_2) to be printed on a laminar material (2), said characteristic images (M_1; M_2) being auxiliary marks and said method comprising:

i) actuating at least said printing groups to perform a first printing of said characteristic images (M_1, M_2) on said laminar material (2) to be printed;

and said method being **characterized in that** it comprises determining which roller is associated to each of said characteristic images (M_1, M_2) by means of the automatic and sequential performance, after said step i), of the following steps:

ii) detecting, by means of an automatic detection system, said characteristic images (M_1, M_2) once they have been printed on the material to be printed (2), to at least identify them and know their relative position within said printing development,
iii) moving in a controlled manner the transverse and/or longitudinal register of at least one of said printing rollers (R_2),
iv) actuating at least said printing groups to perform a second printing of said characteristic images (M_1, M_2) on said laminar material (2) to be printed;
v) detecting on the material to be printed (2), by means of said automatic detection system, said characteristic images (M_1, M_2) printed on the material to be printed (2), to at least identify them and know their relative position within said printing development,
vi) comparing the result of the detections of step v) with that of the detections of step ii) to determine a possible positional discrepancy for at least one of the characteristic images (M_1, M_2),
vii.1) determining that one of said printing rollers (R_1, R_2) is associated to a characteristic image (M_1, M_2) which has undergone a positional discrepancy, which is at least one in number, at least if the transverse and/or longitudinal register of said printing roller (R_1, R_2) has been moved in said step iii),
and/or
vii.2) determining that one of said printing rollers (R_1, R_2) is associated to one of said characteristic images (M_1, M_2), which has not undergone a positional discrepancy, if the register of said printing roller (R_1, R_2) has not been moved in said step iii).

2. The method according to claim 1, **characterized in that** said step vii.1) comprises determining that one of said printing rollers (R_1, R_2) is associated to said characteristic image (M_1, M_2) which has undergone a positional discrepancy, which is at least one in number, if the register of said printing roller (R_1, R_2) has been moved in said step iii), at least with a direction corresponding to that experienced by the printed characteristic image (M_1, M_2) which has undergone said positional discrepancy.

3. The method according to claim 1, **characterized in that** the steps of claims 1 are performed before a process of pressure and/or register adjustment of at least part of the printing rollers (R_1, R_2).

4. The method according to claim 1, 2 or 3, **characterized in that** it comprises performing at least said steps vi) to ix) by means of an electronic system associated to said automatic detection system.

5. The method according to claim 1, 2, 3 or 4, **characterized in that** said detections performed on steps ii) and v) are performed by means of an automatic detection system which comprises an automatic image capture and treatment system including one or more photoelectric sensors or at least one camera.

6. The method according to claim 5, **characterized in that** steps i), iii) and iv) are performed by an electronic system sending orders by means of suitable control signals to means of actuating the groups and the printing rollers.

7. The method according to claim 6, **characterized in that** steps ii) and v) are performed with the collaboration of said electronic system being associated to said automatic image capture and treatment system.

8. The method according to claim 4, 5, 6 or 7, **characterized in that** to perform said pressure adjustment it comprises comparing, by means of said electronic system, the characteristic images (M_1, M_2, M_3...M_n) captured with respective pre-determined reference characteristic images registered in said electronic system and indicative of a good printing quality, and if said comparison offers as a result a discrepancy or deviation indicative of the fact that the quality of any of the characteristic images (M_1, M_2, M_3...M_n) captured is not sufficient, compensating said discrepancy by means of adjusting the pressure of the corresponding printing roller (R_1, R_2, R_3... R_n) which has printed said image and of a corresponding ink roller to which it is associated.

9. A method for determining printed images with respect to printing groups, comprising the use of a printer with at least one first and one second printing groups including respective first (R_1) and second (R_2) printing rollers having one and the same printing development, each of said printing rollers (R_1, R_2) with at least one respective characteristic image (M_1,

M_2) to be printed on a laminar material (2), said characteristic images (M_1, M_2) being auxiliary marks and said method comprising:

i) actuating at least said printing groups to perform a first printing of said characteristic images (M_1, M_2) on said laminar material (2) to be printed;

and said method being **characterized in that** it comprises determining which roller is associated to each of said characteristic images (M_1, M_2) by means of the automatic and sequential performance, after said step i), of the following steps:

ii) detecting, by means of an automatic detection system, said characteristic images (M_1, M_2) once they have been printed on the material to be printed (2), to at least identify them and know their relative position within said printing development,
iii) withdrawn the printing status from at least one of said printing rollers (R_2),
iv) actuating at least said printing groups to perform a second printing of said characteristic images (M_1, M_2) on said laminar material (2) to be printed;
v) detecting on the material to be printed (2), by means of said automatic detection system, said characteristic images (M_1, M_2) if they have been printed again on the material to be printed (2), to at least identify them and know their relative position within said printing development, and detect the absence of the characteristic images (M_1, M_2) which have not been printed again on said laminar material (2) in said step iv),
vi) comparing the result of the detections of step v) with that of the detections of step ii) to determine the disappearance of one of said characteristic images (M_1, M_2),
vii.3) determining that one of said printing rollers (R_1, R_2) is associated to one of said characteristic images (M_1, M_2), which has disappeared from the printing, if said printing roller (R_1, R_2) has been withdrawn from the printing status in said step iii).

10. The method according to claim 9, **characterized in that** after performing step vii.3), at least one operation of pressure adjustment of said printing rollers (R1, R2) is performed.

11. The method according to claim 9 or 10, **characterized in that** it comprises performing at least said steps vi) to ix) by means of an electronic system associated to said automatic detection system.

12. The method according to claim 9, 10 or 11, **characterized in that** said detections performed on steps ii) and v) are performed by means of an automatic detection system which comprises an automatic image capture and treatment system including one or more photoelectric sensors or at least one camera.

13. The method according to claim 12, **characterized in that** steps i), iii) and iv) are performed by an electronic system sending orders by means of suitable control signals to means of actuating the groups and the printing rollers.

14. The method according to claim 13, **characterized in that** steps ii) and v) are performed with the collaboration of said electronic system being associated to said automatic image capture and treatment system.

15. The method according to claim 11, 12, 13 or 14, **characterized in that** to perform said pressure adjustment it comprises comparing, by means of said electronic system, the characteristic images (M_1, M_2, M_3...M_n) captured with respective pre-determined reference characteristic images registered in said electronic system and indicative of a good printing quality, and if said comparison offers as a result a discrepancy or deviation indicative of the fact that the quality of any of the characteristic images (M_1, M_2, M_3...M_n) captured is not sufficient, compensating said discrepancy by means of adjusting the pressure of the corresponding printing roller (R_1, R_2, R_3... R_n) which has printed said image and of a corresponding ink roller to which it is associated.

Patentansprüche

1. Verfahren zur Bestimmung von gedruckten Bildern in Bezug auf Druckgruppen, umfassend die Verwendung eines Druckers mit mindestens einer ersten und einer zweiten Druckgruppe beinhaltend jeweiligen erste (R_1) und zweite (R_2) Druckwalzen, welche eine gleiche Druckentwicklung aufweisen, jede der genannten Druckwalzen (R_1, R_2) mit mindestens einem jeweiligen auf einem laminaren Material (2) zu druckenden charakteristischen Bild (M_1, M_2), wobei die genannten charakteristischen Bilder (M_1, M_2) Hilfsmarkierungen sind und wobei das Verfahren Folgendes umfasst:

i) das Betätigen mindestens der genannten Druckgruppen, um ein erstes Drucken der genannten charakteristischen Bilder (M_1, M_2) auf dem genannten zu druckenden laminaren Material (2) durchzuführen;

und wobei das genannte Verfahren **dadurch gekennzeichnet ist, dass** es die Bestimmung um-

fasst, welche Walze mit jedem der genannten charakteristischen Bilder (M_1, M_2) assoziiert ist, mittels des automatischen und sequenziellen Durchführens, nach dem genannten Schritt i), der folgenden Schritte:

ii) das Detektieren, mittels eines automatischen Detektionssystems, der genannten charakteristischen Bilder (M_1, M_2) nachdem sie auf dem zu druckenden Material (2) gedruckt worden sind, um sie mindestens zu identifizieren und deren relative Position innerhalb der genannten Druckentwicklung zu kennen,
iii) das Bewegen in einer gesteuerten Weise des Quer- und/oder Längsregisters mindestens einer der genannten Druckwalzen (R_2),
iv) das Betätigen mindestens der genannten Druckgruppen, um ein zweites Drucken der genannten charakteristischen Bilder (M_1, M_2) auf dem genannten zu druckenden laminaren Material (2) durchzuführen;
v) das Detektieren auf dem zu druckenden Material (2), mittels des genannten automatischen Detektionssystems, der genannten charakteristischen Bilder (M_1, M_2), welche auf dem zu druckenden Material (2) gedruckt sind, um sie mindestens zu identifizieren und deren relative Position innerhalb der genannten Druckentwicklung zu kennen,
vi) das Vergleichen des Ergebnisses der Detektionen aus Schritt v) mit demjenigen der Detektionen aus Schritt ii), um eine mögliche Positionsdiskrepanz für mindestens eines der charakteristischen Bilder (M_1, M_2) zu bestimmen,
vii.1) das Bestimmen, dass eine der genannten Druckwalzen (R_1, R_2) mit einem charakteristischen Bild (M_1, M_2) assoziiert ist, welches einer Positionsdiskrepanz unterzogen worden ist, welche mindestens eins beträgt, mindestens, wenn das Quer- und/oder Längsregister der genannten Druckwalze (R_1, R_2) im genannten Schritt iii) bewegt worden ist, und/oder vii.2) das Bestimmen, dass eine der genannten Druckwalzen (R_1, R_2) mit einem der genannten charakteristischen Bilder (M_1, M_2) assoziiert ist, welches nicht einer Positionsdiskrepanz unterzogen worden ist, wenn das Register der genannten Druckwalze (R_1, R_2) nicht im genannten Schritt iii) bewegt worden ist.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** der genannte Schritt vii.1) die Bestimmung umfasst, dass eine der genannten Druckwalzen (R_1, R_2) mit dem genannten charakteristischen Bild (M_1, M_2) assoziiert ist, welches einer Positionsdiskrepanz unterzogen worden ist, welche mindestens eins beträgt, wenn das Register der genannten Druckwalze (R_1, R_2) im genannten Schritt iii) bewegt worden ist, mindestens mit einer Richtung, welche derjenigen, vom gedruckten charakteristischen Bild (M_1, M_2) erfahrenen entspricht, welches der genannten Positionsdiskrepanz unterzogen worden ist.

3. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die Schritte aus Anspruch 1 vor einem Vorgang des Druck- und/oder Registereinstellens mindestens eines Teils der Druckwalzen (R_1, R_2) durchgeführt werden.

4. Verfahren nach Anspruch 1, 2 oder 3, **dadurch gekennzeichnet, dass** es die Durchführung mindestens der genannten Schritte vi) bis ix) mittels eines elektronischen Systems, welches mit dem genannten automatischen Detektionssystem assoziiert ist, umfasst.

5. Verfahren nach Anspruch 1, 2, 3 oder 4, **dadurch gekennzeichnet, dass** die genannten, in den Schritten ii) und v) durchgeführten Detektionen mittels eines automatischen Detektionssystems durchgeführt werden, welches ein automatisches Bilderfassungs- und -verarbeitungssystem beinhaltend einen oder mehreren photoelektrischen Sensoren oder mindestens eine Kamera, umfasst.

6. Verfahren nach Anspruch 5, **dadurch gekennzeichnet, dass** die Schritte i), iii) und iv) von einem elektronischen System, welches Befehle mittels geeigneter Steuersignale zu Betätigungsmitteln zur Betätigung der Gruppen und der Druckwalzen sendet, durchgeführt werden.

7. Verfahren nach Anspruch 6, **dadurch gekennzeichnet, dass** die Schritte ii) und v) mit der Zusammenarbeit des genannten elektronischen Systems, welches mit dem genannten automatischen Bilderfassungs- und -verarbeitungssystem assoziiert ist, durchgeführt werden.

8. Verfahren nach Anspruch 4, 5, 6 oder 7, **dadurch gekennzeichnet, dass**, um die genannte Druckeinstellung durchzuführen, es das Vergleichen, mittels des genannten elektronischen Systems, der erfassten charakteristischen Bilder (M_1, M_2, M_3...M_n) mit jeweiligen vorbestimmten charakteristischen Bezugsbildern, welche im genannten elektronischen System registriert sind und auf eine gute Druckqualität hindeuten, umfasst, und, wenn das genannte Vergleichen als Ergebnis eine Diskrepanz oder Abweichung bietet, welche auf die Tatsache, dass die Qualität eines der erfassten charakteristischen Bilder (M_1, M_2, M_3...M_n) nicht ausreichend ist, hindeutet, das Ausgleichen der genannten Diskrepanz mittels der Einstellung des Druckes der entsprechenden Druckwalze (R_1, R_2, R_3... R_n), welche das ge-

nannte Bild gedruckt hat, und einer entsprechenden Farbwalze, mit welcher sie assoziiert ist.

9. Verfahren zur Bestimmung von gedruckten Bildern in Bezug auf Druckgruppen, umfassend die Verwendung eines Druckers mit mindestens einer ersten und einer zweiten Druckgruppe beinhaltend jeweiligen ersten (R_1) und zweiten (R_2) Druckwalzen, welche eine gleiche Druckentwicklung aufweisen, jede der genannten Druckwalzen (R_1, R_2) mit mindestens einem jeweiligen auf einem laminaren Material (2) zu druckenden charakteristischen Bild (M_1, M_2), wobei die genannten charakteristischen Bilder (M_1, M_2) Hilfsmarkierungen sind und wobei das Verfahren Folgendes umfasst:

i) das Betätigen mindestens der genannten Druckgruppen, um ein erstes Drucken der genannten charakteristischen Bilder (M_1, M_2) auf dem genannten zu druckenden laminaren Material (2) durchzuführen;

und wobei das genannte Verfahren **dadurch gekennzeichnet ist, dass** es die Bestimmung umfasst, welche Walze mit jedem der genannten charakteristischen Bilder (M_1, M_2) assoziiert ist, mittels des automatischen und sequenziellen Durchführens, nach dem genannten Schritt i), der folgenden Schritte:

ii) das Detektieren, mittels eines automatischen Detektionssystems, der genannten charakteristischen Bilder (M_1, M_2) nachdem sie auf dem zu druckenden Material (2) gedruckt worden sind, um sie mindestens zu identifizieren und deren relative Position innerhalb der genannten Druckentwicklung zu kennen,
iii) das Entnehmen des Druckzustandes aus mindestens einer der genannten Druckwalzen (R_2),
iv) das Betätigen mindestens der genannten Druckgruppen, um ein zweites Drucken der genannten charakteristischen Bilder (M_1, M_2) auf dem genannten zu druckenden laminaren Material (2) durchzuführen;
v) das Detektieren auf dem zu druckenden Material (2), mittels des genannten automatischen Detektionssystems, der genannten charakteristischen Bilder (M_1, M_2), wenn sie erneut auf dem zu druckenden Material (2) gedruckt worden sind, um sie mindestens zu identifizieren und deren relative Position innerhalb der genannten Druckentwicklung zu kennen, und die Abwesenheit der genannten charakteristischen Bilder (M_1, M_2), welche nicht erneut auf dem genannten laminaren Material (2) im genannten Schritt iv) gedruckt worden sind, zu detektieren,
vi) das Vergleichen des Ergebnisses der Detektionen aus Schritt v) mit demjenigen der Detektionen aus Schritt ii), um das Verschwinden eines der genannten charakteristischen Bilder (M_1, M_2) zu bestimmen,
vii.3) das Bestimmen, dass eine der genannten Druckwalzen (R_1, R_2) mit einem der genannten charakteristischen Bilder (M_1, M_2), welches aus dem Drucken verschwunden ist, assoziiert ist, wenn die genannte Druckwalze (R_1, R_2) aus dem Druckzustand im genannten Schritt iii) entnommen worden ist.

10. Verfahren nach Anspruch 9, **dadurch gekennzeichnet, dass** nachdem Schritt vii.3) durchgeführt wird, mindestens ein Vorgang der Druckeinstellung der genannten Druckwalzen (R_1, R_2) durchgeführt wird.

11. Verfahren nach Anspruch 9 oder 10, **dadurch gekennzeichnet, dass** es die Durchführung mindestens der genannten Schritte vi) bis ix) mittels eines elektronischen Systems, welches mit dem genannten automatischen Detektionssystem assoziiert ist, umfasst.

12. Verfahren nach Anspruch 9, 10 oder 11, **dadurch gekennzeichnet, dass** die genannten, in den Schritten ii) und v) durchgeführten Detektionen mittels eines automatischen Detektionssystems durchgeführt werden, welches ein automatisches Bilderfassungs- und -verarbeitungssystem beinhaltend einen oder mehreren photoelektrischen Sensoren oder mindestens eine Kamera umfasst.

13. Verfahren nach Anspruch 12, **dadurch gekennzeichnet, dass** die Schritte i), iii) und iv) von einem elektronischen System, welches Befehle mittels geeigneter Steuersignale zu Betätigungsmitteln zur Betätigung der Gruppen und der Druckwalzen sendet, durchgeführt werden.

14. Verfahren nach Anspruch 13, **dadurch gekennzeichnet, dass** die Schritte ii) und v) mit der Zusammenarbeit des genannten elektronischen Systems, welches mit dem genannten automatischen Bilderfassungs- und -verarbeitungssystem assoziiert ist, durchgeführt werden.

15. Verfahren nach Anspruch 11, 12, 13 oder 14, **dadurch gekennzeichnet, dass**, um die genannte Druckeinstellung durchzuführen, es das Vergleichen, mittels des genannten elektronischen Systems, der erfassten charakteristischen Bilder (M_1, M_2, M_3...M_n) mit jeweiligen vorbestimmten charakteristischen Bezugsbildern, welche im genannten elektronischen System registriert sind und auf eine gute Druckqualität hindeuten, umfasst, und, wenn das genannte Vergleichen als Ergebnis eine Diskre-

panz oder Abweichung bietet, welche auf die Tatsache, dass die Qualität eines der erfassten charakteristischen Bilder (M_1, M_2, M_3...M_n) nicht ausreichend ist, hindeutet, das Ausgleichen der genannten Diskrepanz mittels der Einstellung des Druckes der entsprechenden Druckwalze (R_1, R_2, R_3... R_n), welche das genannte Bild gedruckt hat, und einer entsprechenden Farbwalze, mit welcher sie assoziiert ist.

Revendications

1. Une méthode pour déterminer des images imprimées par rapport à des groupes d'impression, comportant l'usage d'une imprimante ayant au moins un premier et un deuxième groupes d'impression , comprenant des premier (R_1) et deuxième (R_2) cylindres d'impression respectifs ayant une et même mise au point de l'impression, chacun de ces cylindres d'impression (R_1,R_2) ayant au moins une image caractéristique respective (M_1,M_2) à imprimer sur un matériau laminaire (2), ces images caractéristiques (M_1, M_2) étant des marques auxiliaires et cette méthode comportant :

i) actionner au moins ces groupes d'impression pour effectuer une première impression de ces images caractéristiques (M_1, M_2) sur ce matériau laminaire (2) à imprimer ;

et cette méthode étant **caractérisée en ce qu'**elle comprend la détermination de quel cylindre est relié à chacune de ces images caractéristiques (M_1, M_2) au moyen de la réalisation automatique et séquentielle, après cette étape i), des étapes suivantes :

ii) détecter, au moyen d'un système de détection automatique, ces images caractéristiques (M_1, M_2) une fois qu'elles ont été imprimées sur le matériau à imprimer (2), pour au moins les identifier et connaître leur position correspondante dans cette mise au point de l'impression,
iii) déplacer de façon contrôlée l'enregistrement transversal et/ou longitudinal d'au moins un de ces cylindres d'impression (R_2),
iv) actionner au moins ces groupes d'impression pour effectuer une deuxième impression de ces images caractéristiques (M_1, M_2) sur ce matériau laminaire (2) à imprimer ;
v) détecter sur le matériau à imprimer (2), au moyen de ce système de détection automatique, ces images caractéristiques (M_1, M_2) imprimées sur le matériau à imprimer (2), pour au moins les identifier et connaître leur position correspondante dans cette mise au point de l'impression,
vi) comparer le résultat des détections de l'étape v) avec celui des détections de l'étape ii) pour déterminer une possible divergence de position pour au moins une des images caractéristiques (M_1, M_2),
vii.1) déterminer qu'un de ces cylindres d'impression (R_1, R_2) est relié à une image caractéristique (M_1, M_2) qui a subi une divergence de position, qui est au moins une en nombre, au moins si l'enregistrement transversal et/ou longitudinal de ce cylindre d'impression (R_1, R_2) a été déplacé dans cette étape iii),
et/ou
vii.2) déterminer qu'un de ces cylindres d'impression (R_1, R_2) est relié à ces images caractéristiques (M_1, M_2) qui n'a pas subi une divergence de position, si l'enregistrement de ce cylindre d'impression (R_1, R_2) n'a pas été déplacé dans cette étape iii),

2. La méthode conformément à la revendication 1, **caractérisée en ce que** cette étape vii.1) comporte déterminer qu'un de ces cylindres d'impression (R_1, R_2) est relié à cette image caractéristique (M_1, M_2) qui a subi une divergence de position , qui est au moins une en nombre, si l'enregistrement de ce cylindre d'impression (R_1, R_2) a été déplacé dans cette étape iii), au moins dans un sens correspondant à celui expérimenté par l'image imprimée caractéristique (M_1, M_2) qui a subi cette divergence de position.

3. La méthode conformément à la revendication 1, **caractérisée en ce que** les étapes de la revendication 1 sont effectuées avant un processus de pression et/ou un ajustement d'enregistrement d'au moins une partie des cylindres d'impression (R_1, R_2).

4. La méthode conformément à la revendication 1, 2 ou 3, **caractérisée en ce qu'**elle comporte effectuer au moins ces étapes vi) à ix) au moyen d'un système électronique relié à ce système de détection automatique.

5. La méthode conformément à la revendication 1, 2, 3 ou 4, **caractérisée en ce que** ces détections effectuées dans les étapes ii) et v) sont effectuées au moyen d'un système de détection automatique qui comporte une saisie automatique d'images et le système de traitement comprenant un ou plusieurs capteurs photoélectriques ou au moins une caméra.

6. La méthode conformément à la revendication 5, **caractérisée en ce que** les étapes i), iii) et iv) sont effectuées par un système électronique envoyant des ordres au moyen de signaux de contrôle appropriés à des moyens d'actionnement des groupes et des cylindres d'impression.

7. La méthode conformément à la revendication 6, **caractérisée en ce que** les étapes ii) et v) sont effec-

tuées avec la collaboration de ce système électronique étant relié à ce système de saisie et de traitement automatiques d'images.

8. La méthode conformément à la revendication 4, 5, 6 ou 7, **caractérisée en ce que** pour effectuer cet ajustement de pression il comprend la comparaison, au moyen de ce système électronique, des images caractéristiques (M_1, M_2, M_3...M_n) saisies avec des images caractéristiques de référence prédéterminées respectives enregistrées dans ce système électronique et indicatives d'une bonne qualité d'impression, et si cette comparaison offre comme résultat une divergence ou une déviation indicative du fait que la qualité d'une quelconque des images caractéristiques (M_1, M_2, M_3...M_n) saisies n'est pas suffisante, compenser cette divergence au moyen de l'ajustement de la pression du cylindre d'impression correspondant (R_1, R_2, R_3...R_n) qui a imprimé cette image et d'un rouleau encreur correspondant auquel il est associé.

9. Une méthode pour déterminer des images imprimées par rapport aux groupes d'impression, comportant l'usage d'une imprimante ayant au moins un premier et un deuxième groupes d'impression, comprenant des premier (R_1) et deuxième (R_2) cylindres d'impression respectifs ayant une et même mise au point d'impression, chacun de ces cylindres d'impression (R_1, R_2) ayant au moins une image caractéristique (M_1, M_2) respective à imprimer sur un matériau laminaire (2), ces images caractéristiques (M_1, M_2) étant des marques auxiliaires et cette méthode comportant :

i) actionner au moins ces groupes d'impression pour effectuer une première impression de ces images caractéristiques (M_1, M_2) sur ce matériau laminaire (2) à imprimer ;

et cette méthode étant **caractérisée en ce qu'**elle comporte déterminer quel cylindre est associé à chacune de ces images caractéristiques (M_1, M_2) au moyen de la réalisation séquentielle et automatique, après cette étape i), des étapes suivantes :

ii) détecter, au moyen d'un système de détection automatique, ces images caractéristiques (M_1, M_2) une fois qu'elles ont été imprimées sur le matériau à imprimer (2), pour au moins les identifier et connaître leur position relative dans cette mise au point d'impression.
iii) retirer l'état d'impression d'au moins un de ces cylindres d'impression (R_2),
iv) actionner au moins ces groupes d'impression pour effectuer une deuxième impression de ces images caractéristiques (M_1, M_2) sur ce matériau laminaire (2) à imprimer ;
v) détecter sur le matériau à imprimer (2), au moyen de ce système de détection automatique, ces images caractéristiques (M_1, M_2) si elles ont été à nouveau imprimées sur le matériau à imprimer (2), pour au moins les identifier et connaître leur position relative dans cette mise au point d'impression, et détecter l'absence d'images caractéristiques (M_1, M_2) qui n'ont pas été à nouveau imprimées sur ce matériau laminaire (2) dans cette étape iv),
vi) comparer le résultat des détections de l'étape v) avec celui des détections de l'étape ii) pour déterminer la disparition d'une de ces images caractéristiques (M_1, M_2),
vii.3) déterminer qu'un de ces cylindres d'impression (R_1, R_2) est relié à une de ces images caractéristiques (M_1, M_2), qui a disparu de l'impression, si ce cylindre d'impression (R_1, R_2) a été retiré de l'état d'impression dans cette étape iii).

10. La méthode conformément à la revendication 9, **caractérisée en ce que**, après avoir effectué l'étape vii.3), au moins une opération d'ajustement de pression de ces cylindres d'impression (R1, R2) est effectuée.

11. La méthode conformément à la revendication 9 ou 10, **caractérisée en ce qu'**elle comporte effectuer au moins ces étapes vi) à ix) au moyen d'un système électronique relié à ce système de détection automatique.

12. La méthode conformément à la revendication 9, 10 ou 11, **caractérisée en ce que** ces détections effectuées dans les étapes ii) et v) sont effectuées au moyen d'un système de détection automatique qui comprend un système de saisie d'images et de traitement automatique comprenant un ou plusieurs capteurs photoélectriques ou au moins une caméra.

13. La méthode conformément à la revendication 12, **caractérisée en ce que** les étapes i), iii) et iv) sont effectuées par un système électronique envoyant des ordres au moyen de signaux de contrôle appropriés à des moyens d'actionnement des groupes et les cylindres d'impression.

14. La méthode conformément à la revendication 13, **caractérisée en ce que** les étapes ii) et v) sont effectuées avec la collaboration de ce système électronique étant relié à ce système de saisie d'images et de traitement automatique.

15. La méthode conformément à la revendication 11, 12, 13 ou 14, **caractérisée en ce que** pour effectuer cet ajustement de la pression, il comporte la comparaison, au moyen de ce système électronique, des

images caractéristiques (M_1, M_2, M_3...M_n) saisies avec les images caractéristiques de référence prédéterminées respectives enregistrées dans ce système électronique et indicatives d'une bonne qualité d'impression et si cette comparaison offre comme résultat une divergence ou une déviation indicative du fait que la qualité d'une quelconque des images caractéristiques (M_1, M_2, M_3,...M_n) saisies n'est pas suffisante, compenser cette divergence en ajustant la pression du cylindre d'impression correspondant (R_1, R_2, $R_{3...}R_n$) qui a imprimé cette image et d'un rouleau encreur auquel il est relié.

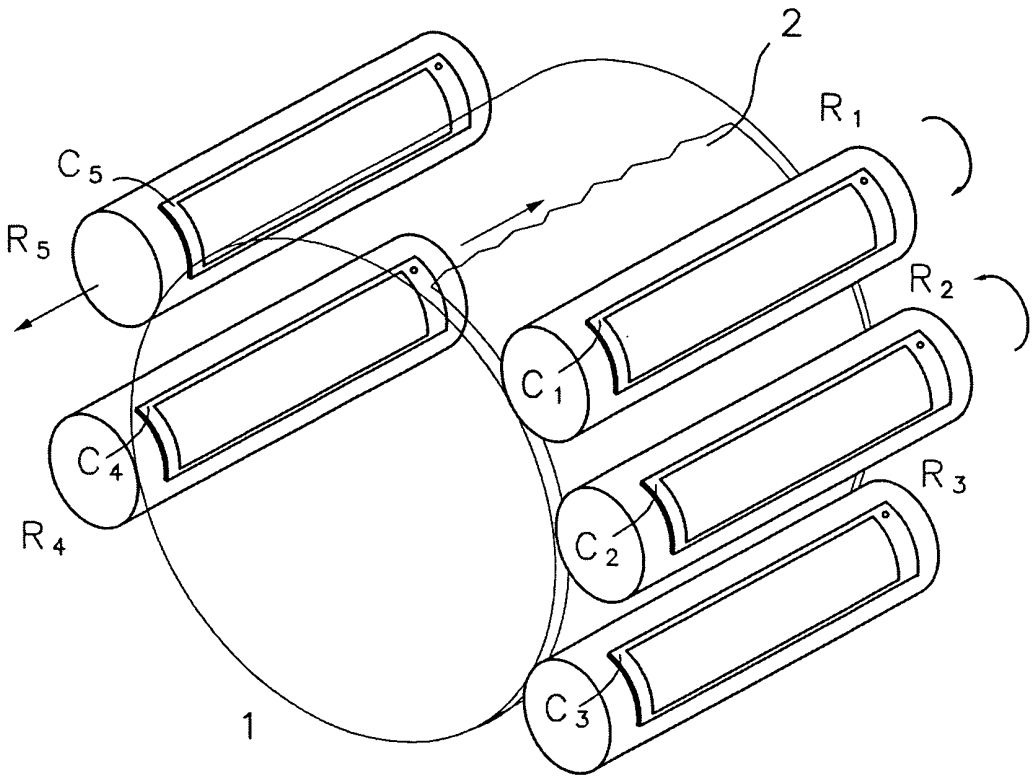


Fig. 1a

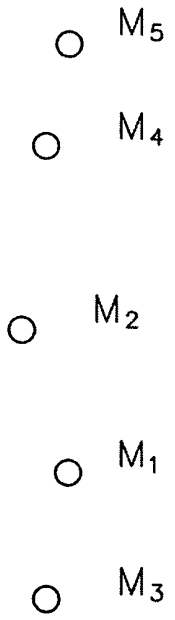


Fig. 1b

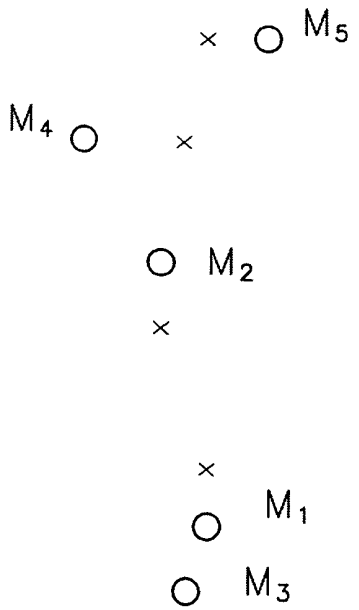


Fig. 1c

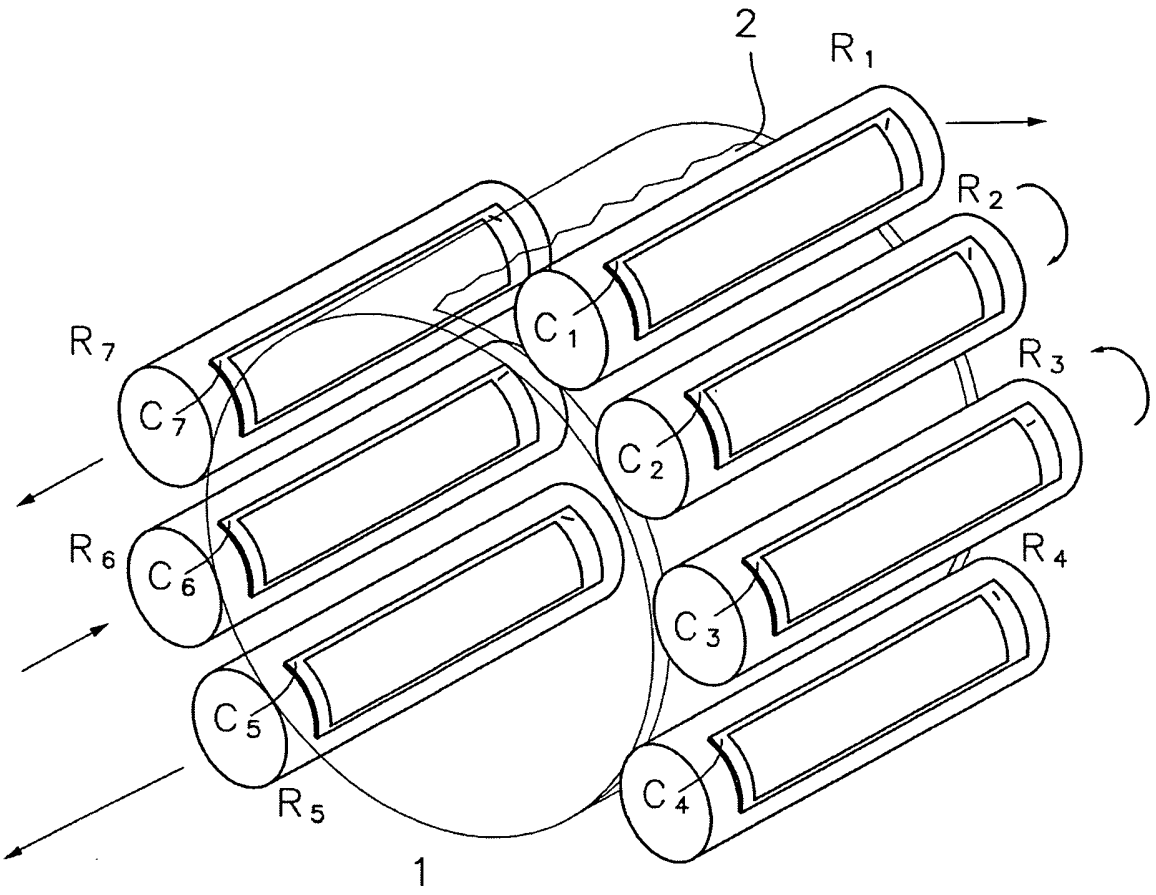


Fig.2a

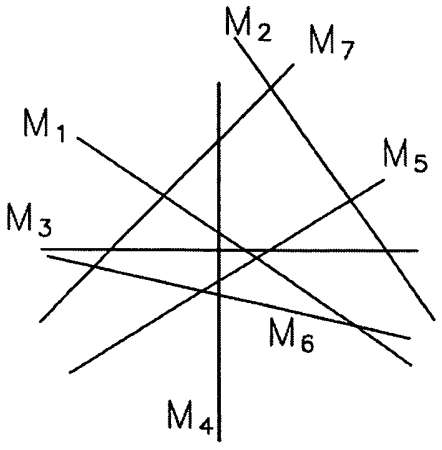


Fig.2b

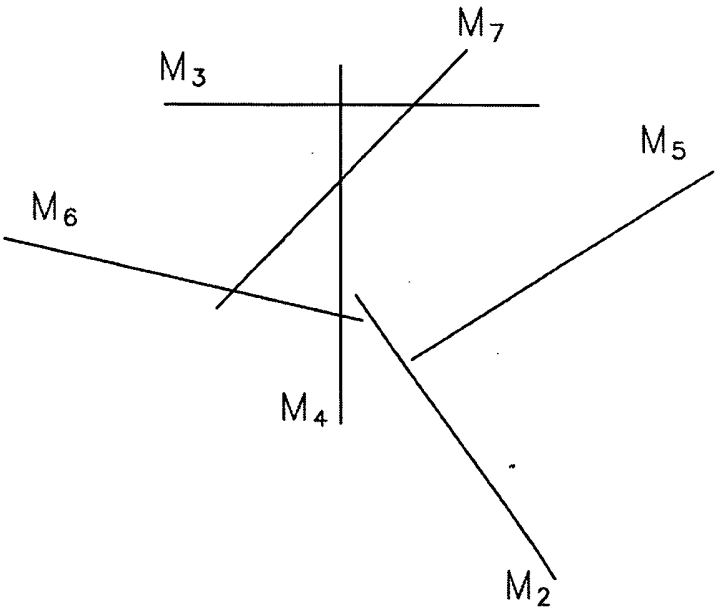


Fig.2c

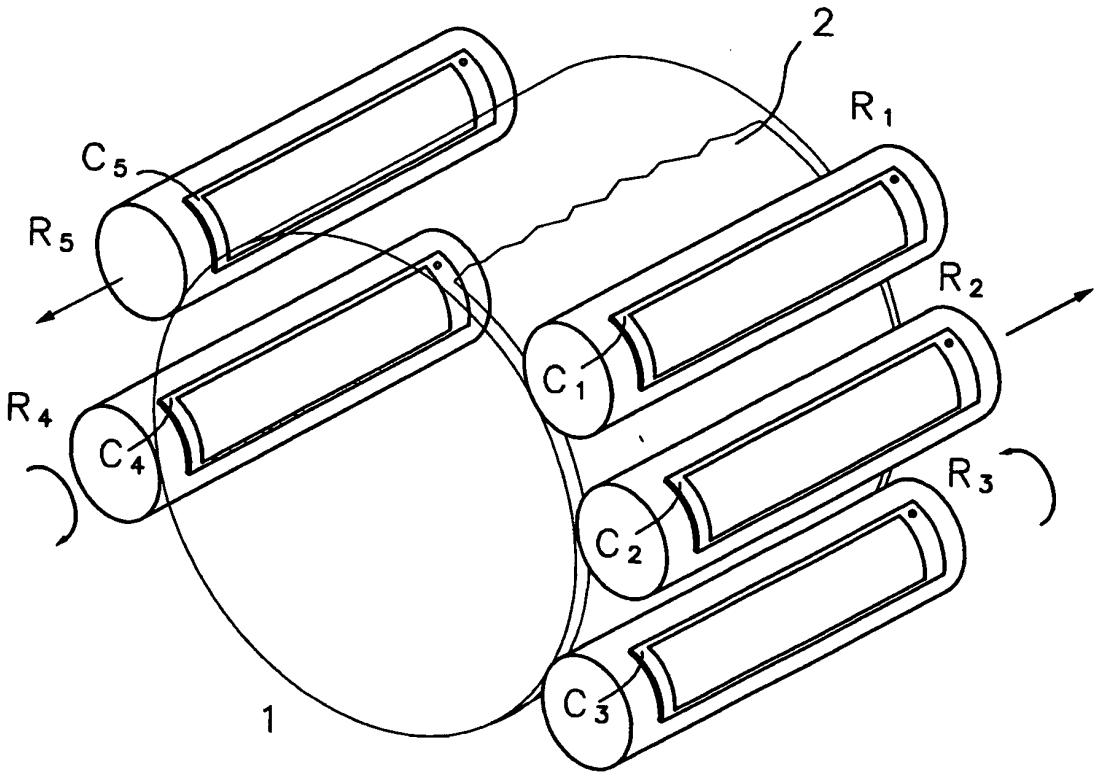
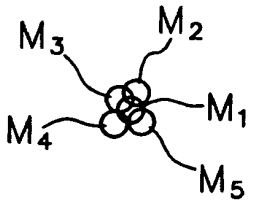
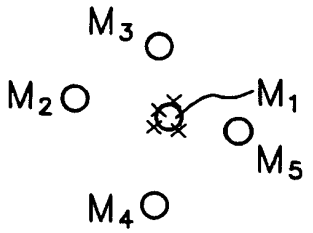


Figura 1a





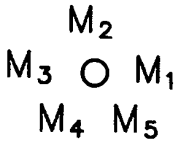


Figura 1b Figura 1c Figura 1d

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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