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# D E C I S I O N
# of 13 May 2004

**Case Number:** T 1088/99 - 3.4.2

**Application Number:** 92309939.4

**Publication Number:** 0540341

**IPC:** G03G 15/24

**Language of the proceedings**: EN

**Title of invention:**
Apparatus for and method of forming image

**Patentee:**
Oki Electric Industry Company, Limited

**Opponent:**
CANON INC.

**Headword:**
-

**Relevant legal provisions:**
EPC Art. 56, 123(2)

**Keyword:**
"Inventive step - main request (no)"
"First auxiliary request - added subject-matter (yes)"
"Inventive step - second auxiliary request (yes)"

**Decisions cited:**
-

**Catchword:**
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Beschwerdekammern | Boards of Appeal | Chambres de recours

**Case Number:** T 1088/99 **-** 3.4.2

# D E C I S I O N
**of the Technical Board of Appeal 3.4.2**
**of 13 May 2004**

| | |
|---|---|
| **Appellant:** (Proprietor of the patent) | Oki Electric Industry Company, Limited<br>7-12, Toranomon 1-chome<br>Minato-ku<br>Tokyo 105 (JP) |
| **Representative:** | Read, Matthew Charles<br>Venner Shipley & Co.<br>20 Little Britain<br>London EC1A 7DH (GB) |
| **Respondent:** (Opponent) | CANON INC.<br>30-2, Shimomaruko 3-chome<br>Ohta-ku, Tokyo 146-8501 (JP) |
| **Representative:** | Chivarov, Georgui, Dr. Dipl.-Ing.<br>Patentanwälte<br>Tiedtke-Bühling-Kinne & Partner<br>Bavariaring 4<br>D-80336 München (DE) |
| **Decision under appeal:** | **Decision of the Opposition Division of the European Patent Office posted 1 October 1999 revoking European patent No. 0540341 pursuant to Article 102(1) EPC.** |

**Composition of the Board:**

**Chairman:** A. G. Klein
**Members:** M. A. Rayner
M. J. Vogel

## Summary of Facts and Submissions

I. The patent proprietor has appealed against the decision of the opposition division revoking European patent 540 341 (application number 92 309 939.4), which concerns an apparatus for and a method of forming an image.

In the decision under appeal, reference was made to, amongst others, the following documents:

D1: JP-A-64 20587 (the English language translation of this document being used in the proceedings); and

D3: GB-A-2 129 372

The division considered that some sets of claims before it included amendments which are inadmissible in the sense of Article 123(2) EPC. Amongst the matters considered in relation to substantive patentability were those relating to a splash free roller and a gradual returning of toner particles to an image carrier. The opposition division considered a roller 74 to be shown in Figure 4 of document D3. Redistribution of toner may be a bit quicker, but the question is open and an optionally applied voltage is mentioned. The division reached the view that the skilled person would provide as the developing unit of document D3 a type such as that shown in document D1. Having regard to the disclosure of claimed features in these documents, the division therefore considered that the subject matter of admissible independent claims before it lacked an inventive step.

II. The appellant and respondent both requested oral proceedings on an auxiliary basis leading to such proceedings being appointed by the board.

III. The case presented by the appellant can be summarised as follows:

(a) *Requests*

Maintenance of the patent on the basis of

- claims 1 to 10, filed on 9 February 2000 (main request);

- on the basis of one of the first and fifth auxiliary requests, filed on 9 February 2000,

- or the second to fourth auxiliary request, filed during the oral proceeding.

(b) *Wording of the independent claims of the requests*

The wording of the independent claims according to the third to fifth auxiliary request is not given as it is not necessary for the decision (see point 6 of the reasons below).

The independent claims upon which the main and first and secondary auxiliary requests of the appellant are based are worded as follows, whereby only the characterising part of the claims is given for the first and second requests as the preamble remains unchanged from the main request:

*(i) Main request*

"1. An image forming apparatus comprising:
an image carrier (1);
a charging unit (2a, 2b) for electrostatically charging the surface of the image carrier (1);
a latent image forming unit (3) for forming an electrostatic latent image on the charged surface of the image carrier;
a developing unit (4) disposed adjacent to the image carrier (1) for developing the electrostatic latent image formed on the surface of the image carrier (1) to form a toner image;
means (5) for transferring and fixing the toner image formed on the surface of the image carrier (1) to a transfer member (6); and
a power source (4b) connected to the developing unit for electrostatically charging toner particles on the developing unit (4) with the same polarity as the charging polarity of the image carrier (1), and operative to set the potential of the developing unit (4) to a value capable of allowing the toner particles to adhere to an image portion of the image carrier (1) and of allowing the toner particles remaining on a non-image portion of the image carrier (1) to be attracted by the developing unit (4) away from the image carrier (1), characterised by a toner holding unit (7a,7b) disposed between the transfer means (5) and the charging unit (2a, 2b) including a roller (7) in contact with the image carrier, a roller power source to electrostatically attract residual toner particles from the image carrier to the roller so that they are held by the roller and gradually returned to the image

carrier (1) so as to be stuck again thereon whilst the roller is rotating.

9. A method of forming an image comprising the steps of:
(a) electrostatically charging the surface of an image carrier (1);
(b) forming an electrostatically latent image on the charged surface of the image carrier (1);
(c) developing the electrostatic latent image by sticking toner particles thereto to form a toner image;
(d) transferring the toner image to a transfer member wherein the toner particles remaining on a non-image portion of the image carrier (1) after the transfer process are attracted to the developing unit (4), the toner particles on an image portion of the image carrier (1) remaining thereon, the method being characterised by the steps of attracting the toner particles to a toner holding roller (7) in contact with the image carrier (1), electrostatically holding them on the roller and gradually returning them to the image carrier (1) so as to be stuck again thereon whilst the roller is rotating."

*(ii) First auxiliary request*

"1. … characterised by a toner holding unit (7a,7b) disposed between the transfer means (5) and the charging unit (2a, 2b) including a brushless toner holding roller (7) having a peripheral curved surface positioned in contact with the image carrier (1), a roller power source to electrostatically attract residual toner particles from the image carrier to the peripheral curved surface of the roller so that they

are held on the peripheral curved surface and thereafter gradually returned to the image carrier (1) so as to be stuck again thereon whilst the brushless toner holding roller (7) is rotating.

9. … characterised by the step of electrostatically attracting the toner particles from the image carrier (1) to a brushless toner holding roller (7) having its peripheral curved surface in contact with the image carrier (1), so that they are held on the peripheral curved surface and thereafter gradually returned to the image carrier (1) so as to be stuck again thereon as the brushless toner holding roller (7) is rotating."

*(iii) Second auxiliary request*

"1. … characterised by a toner holding unit (7a,7b) disposed between the transfer means (5) and the charging unit (2a, 2b) including a toner holding roller (7) in contact with the image carrier, a roller power source to electrostatically attract residual toner particles from the image carrier to the toner holding roller so that they are held on the toner holding roller, the roller power source being operable to reverse the charging polarity of the residual toner particles as the toner holding roller rotates such that when the toner holding roller has rotated and the residual toner particles thereon encounter the image carrier again, they are electrostatically attracted back thereto.

9. … characterised by the
step of electrostatically attracting the residual toner particles from the image carrier to a toner holding roller (7) having a power source connected thereto and positioned in contact with the image carrier (1), so that the residual toner particles are held on the toner holding roller, the power source being operable to reverse the charging polarity of the residual toner particles as the roller rotates such that when the toner holding roller has rotated and the residual toner particles thereon encounter the image carrier again, they are electrostatically attracted back thereto."

(c) *Arguments*

The appellant submitted there was no doubt that the skilled person knows that a brush and a roller are different things. This is an important point which can be illustrated by dictionary definitions and if the board does not want to accept this, the proceedings should be continued in writing so that the appellant can provide the definitions concerned. The point is important because neither a reciprocating brush nor a brush moving toner from the outside to the inside like the rotary brush disclosed in Figure 4 of document D3 can even be considered a roller at all.

The problem of a ghost image is solved by the invention, this problem not being adequately resolved by the apparatus of document D1 or document D3 which do not improve thinning by gradually returning toner. Moreover, the problem of toner splash is also solved by the features of the independent claims. Although it is

acknowledged that the skilled person may consider documents D1 and D3 together as they are in the same general technological field, it is submitted that this would not lead to the subject matter of the independent claims.

Upon reading document D1, the skilled person is taught that means for actively diffusing toner causes splashing, so a fixed brush must be used, which is not compatible in an obvious way with the teaching of an oscillating or rotating brush as disclosed in document D3. Moreover, there can be no question in either document of holding and a gradual return as claimed in the independent claims of the main request and explained in the description in column 10 and later as little by little. In the case of document D3, AC voltage application means picking up both positive and negative particles and then, owing to electrostatic forces, flinging them off conductive bristles of the brush moving with high peripheral velocity, this is why there cannot be either holding or gradual deposition. One should also bear in mind that this document implies clogging on insulating bristles as mentioned on page 1 is to be avoided. The splashing warned of in document D1 is likely in this situation. The function claimed in the independent claims implies a suitable potential and it is not necessary to go into more detail to define the invention, the skilled person understands this from the description. Moreover, even though a DC bias on the AC applied to the brush is mentioned in document D3, there is still a zero crossing. The voltage changes many times during one rotation indicating holding is not important.

Accordingly, the subject matter of the independent claims according to the main request involves an inventive step.

In the first auxiliary request, a brushless roller is specified. The specification does not expressly state that a brushless roller can be used. There is however no reason in the application as filed for the skilled person to think a roller should have bristles as this is not the case in the example. The brushless roller returns toner smoothly to the image carrier.

Electrostatic attraction is disclosed in the patent application and it is not necessary to restrict the claims of the second auxiliary request to positive or negative charge. According to this request, because the toner particles remain on the roller as it rotates, they are put back in a completely different location from where they were picked up.

Both of the auxiliary requests therefore include independent claims involving further advantageous feature and thus as a whole are directed to subject matter involving an inventive step.

IV. The case presented by the respondent (opponent) can be summarised as follows:

(a) *Requests*

Dismissal of the appeal.

(b) *Arguments*

According to the respondent, even in a short holding time on a roller, toner particles will be carried further. Claim 1 (main request) does not specify what type of roller is used and the term brushless as used in the first auxiliary request is not admissible in the context of Article 123(2) EPC as it was not disclosed in this generalised way in the original application. In fact, the only mention of a roller is in column 10 of the patent and thus any amendment would have required limitation to this specific configuration. From a technical point of view, it must be pointed out that a brushed roller can have a range of lengths for the bristles, sometimes very short. Even a roller without any bristles at all or with a sponge surface still has surface irregularities which are comparable to short bristles in respect of holding function. Unless otherwise explained in relation to the claimed features, the skilled person thus knows the prior art arrangement fulfils the holding function, as the toner must be retained in bristles for a while, thus meeting the words holding and gradually as used in the claims. In considering what gradual would mean technically, one must also have in mind that it depends on the voltage, which is not even specified in the claims. Thus, the claims of the main request do not contain any concrete features which are really different from the prior art, attracting and repelling there also taking place, particles always being on the brush and the redistributing disclosed meaning holding and gradually returning within the meaning of the claim. Therefore, in summary, the subject matter of the main request

lacks an inventive step and that of the first auxiliary request contains an inadmissible amendment.

In the second auxiliary request, the general formulation "being operable to reverse the charging polarity of the residual toner particles" is not supported by the original disclosure of the application and therefore there is an infringement of Article 123(2) EPC. What is disclosed in the original description is only that the roller power source is operated to reverse the negative charging plurality of the residual toner.

With regard to the assessment of inventive step of the subject matter of the claims of the second auxiliary request, document D1 discloses a voltage applied to the brush of the opposite polarity to the charging polarity of the toner. Furthermore in document Dl it is mentioned that the brush temporarily electrostatically attracts the toners and then naturally discharges the toner to the photosensitive body so as to change the position on the photosensitive body to which the toners adhere. Therefore, the charging polarity of the toner is obviously reversed by using the power supply of the brush. Thus even were the claims according to the second auxiliary request to be considered admissible, their subject matter would not involve an inventive step.

V. At the end of the oral proceedings, the board gave its decision.

## Reasons for the Decision

1. The appeal complies with the provisions mentioned in Rule 65(1) EPC and is therefore admissible.

2. *Pertinent prior art documents*

2.1 Document D1

This document teaches a recording device (see Figure 1) comprising a drum-shaped photosensitive body 2 arranged as an image carrier, around which are arranged in sequence pre-exposure means 8, charging means 3, exposing means 4, developing means 5, transferring means 6 and a memory removing member 7. When a print start signal is received, the drum-shaped photosensitive body 2 is rotated and charged by the charging means 3. The charged photosensitive body 2 is scanned by a laser beam which is modulated by receiving image data to form an electrostatic latent image. The electrostatic latent image is developed by the developing means 5. The electrostatic latent image formed by the exposure is simultaneously cleaned and developed. Since reversal development is performed the transfer charger as the transferring means has a polarity reverse to the charging polarity. Subsequently, the transferring means 6 is used so as to transfer the developed image onto the paper P and fixing unit 15 fixes the developed image.

The memory removing member 7 (see Figures 28, 29 and 30) comprises a conductive brush 200 located in the upstream of the charging means. The memory removing member 7 is in contact with the photosensitive body 2.

The memory removing member 7 is preferably a fixed brush, as when the brush is rotated or moved right and left, toner is splashed while being actively diffused. The brush temporarily electrostatically attracts toner particles and then naturally discharges them to the photosensitive body so as to change the position on the photosensitive body to which the toners adhere.

2.2 Document D3

This document discloses an apparatus for removing residual toner from a photoconductor, including a conductive brush mounted for movement relative to the photoconductor and in contact therewith. It mentions in relation to the prior art that a brush with insulating fibres tends to get clogged up in use. The document itself teaches a voltage applied to the conductive brush to cause alternate attraction and repulsion of toner to the brush bristles such that toner is dislodged and picked up from the photoconductor and deposited on other areas thereof. An DC biased AC voltage is applied to the conductive brush to attract positive toner for picking up by the bristles during the negative half and repelled or dropped back on to the photoconductor on the other half-cycle. Likewise, negative toner is picked up during the positive half cycle and dropped during the negative half cycle. The brush is adapted to be cyclically moved in a direction substantially perpendicular to the direction of movement of the photoconductive belt 10. During operation of the brush structure of the present invention, the toner forming the residual images remaining on the photoconductive belt after the transfer step is redistributed such that it can be

removed by the developer. In Figure 4, a modified conductive brush 74 is employed for disturbing the residual images. The brush 74 comprises a cylindrical base 76 with the brush fibres 78 attached thereto arranged in the shape of a double helix designed to dislodge the residual toner towards the centre of the belt. This arrangement minimizes the build-up of toner on the edge of the belt. A blade is also mentioned in the context of a disadvantageous spacing to the photosensitive body.

3. *Main request*

Substantive patentability

3.1 The board agrees with the assessment of the opposition division, reflected in the two part form of claim presented by the patentee, that the features of the preamble of claim 1 are known from document D1. Since document D1 discloses a memory removing means in the form of a fixed brush or blade, there is no disclosure of a roller in contact with an image carrier. Document D3 does not disclose any power source connected to the developing unit for electrostatically charging toner particles in the fashion claimed in the independent claims.

3.2 The board further agrees with the position of the opposition division that the use of a developing unit like that disclosed in document D1 would have been an obvious implementation possibility for the, in this respect, rather vaguely described apparatus of document D3. The counter argument of the appellant is not very persuasive because it is concerned with the memory

removing member, in particular splashing problems therewith, which member is however a different component to the development station.

3.3 The focus of the case is thus on the question of the residual toner particles being held by the roller of the holding unit and gradually returned to the image carrier so as to be stuck again thereon while the roller is rotating. The approach of the appellant in relation to providing external dictionary definitions pertaining to "roller" and "brush" in an attempt to dismiss document D3 does not touch on understanding the features claimed in the technical context of the patent and functioning of the items concerned in the prior art actually under consideration. Having heard the parties, the board was able to form its own understanding and thus it was not necessary to continue the procedure in writing to permit such dictionaries to be filed. In view of the rotating cylinder as described in document D3, the board considered there to be nothing patentable introduced into the claim simply by recitation of the word "roller". This is all the more so as neither in the patent nor in document D3 is the device freely "rolling", driving at a different speed to the image carrier is possible in both cases. Moreover, as the respondent convincingly explained, the term roller is understood in the art as including cylinders with bristles, which may be of any length, sponges or pitted surfaces. The particular version used in the patent, i.e. an outer surface of rubber sponge (see column 16, lines 16 to 27 of the patent) is not even specified in the claim and so does not provide a difference.

3.4 The term "gradually" as used in the claim is insufficient to provide patentable subject matter, because it is not further defined or quantified. The board has no reason to doubt the teaching of document D3 that insulating fibres become clogged, but does not accept, even in the conductive case, that particles are not held, even for a very short time because document D3 teaches "picking up" and "dropping off". As the respondent pointed out, the period between the picking up and the dropping off, one could say the degree of gradualness, depends on parameters such as applied voltage selectable by the skilled person, but it is unrealistic to believe all the toner particles attracted away from the photoconductor all at once instantaneously then fly back to the photoconductor. Thus the term "gradually" is not precise enough to differ in a patentable way over the teaching of document D3. It follows from this lack of precision of the term "gradually" as employed in the claims, that there is no definition of a solution to any problem in relation to "splashing".

3.5 The position of the appellant that the skilled person limits what is meant by the above two terms from the description, implies addition of further undefined features generalised from the specific roller and voltage disclosed in the description on the basis of being favourable to the appellant’s case and different to the disclosure of document D3. However, as such further features are not recited in the independent claims of the main requests, they cannot be taken into account.

3.6 The board therefore reached the view that the subject matter of the independent claims according to the main request cannot be considered to involve an inventive step within the meaning of Article 56 EPC.

4. *First auxiliary request*

Article 123(2) EPC

The term "brushless" does not occur in the application documents as filed. In view of (a) this absence, (b) the large number of possibilities explained by the respondent to be included in the term "roller" in the present technical field and (c) there being only one detailed example disclosed in the description, the board was not prepared to permit an intermediate generalisation to "brushless" roller as it considered subject matter would have been added thereby.

Therefore, the subject matter of the independent claims according to this request cannot be considered to satisfy Article 123(2) EPC.

5. *Second auxiliary request*

Article 123 EPC

5.1 The preamble of claim 1 is the same as that of the granted claim. The claim as granted has been amended by restricting the feature "a toner holding unit (7a,7b) disposed between the transfer means (5) and the charging unit (2a, 2b) for attracting the toner particles thereto and for returning them to the image carrier" to the wording given in section III above. The

independent method claim 9 is likewise unchanged from the preamble of the granted method claim 10 and the characterising part has been changed correspondingly to the apparatus claim from "attracting the toner particles to a toner holding unit (7a,7b) and returning them to the image carrier (1)" to the wording given in section III above. Renumbering in the set of claims is consequential to the amendments made.

5.2 Support for this amendment can be found in column 12, line 26 et seq. of the published patent application (see column 10, line 31 et seq. of the published patent). A corresponding situation exists with respect to amended method claim 9.

5.3 The board notes in this respect that the passage in column 12 of the patent application only actually addresses attracting negatively charged particles. However, charging toner particles with the same polarity as the image carrier was mentioned for example in claim 1 as originally filed without limitation to whether this charge is positive or negative. The skilled person knows that electrostatic force is exerted between oppositely charged items, i.e. the roller must be oppositely charged to the image carrier. Therefore, "electrostatic attracting" in the terms of the amended claims was disclosed in the documents as filed without limitation to "negative" for the particles as is mentioned in column 12 of the patent application.

5.4 The amendment therefore does not entail addition of subject matter and the board is thus satisfied that the

requirements of Article 123 EPC are complied with by the amended set of claims according to this request.

Substantive patentability

5.5 It can be concluded from the description of document D3 that both positive and negative toner particles are repelled following the respective zero crossing of the applied AC voltage, which means that their polarity is not changed. Therefore in addition to the novel feature in the preamble relating to the developing unit, document D3 does not disclose reversing the charging polarity of the residual toner particles as the toner holding roller rotates such that when the toner holding roller has rotated and the residual toner particles thereon encounter the image carrier again, they are electrostatically attracted back thereto.

5.6 The problem solved by the novel subject matter of the independent claims compared with document D3 is thus to improve thinning of toner particles on the image carrier by delaying their return onto that carrier. A consequence is mitigation of the problem of ghosting. Since, consequent to polarity change, the toner particles are attracted back to the image carrier, it can also be considered that splashing is reduced.

5.7 The board was not convinced by the respondent that the skilled person would have taken the teaching of temporarily attracting toner particles to the fixed brush according document D1 and applied this to the teaching of document D3 as this would entail a fundamental modification thereof to permit changing of the particle charge for repelling rather than using

applied voltage according to the main thrust of the teaching. For the subject matter claimed in this request, the line of argument advanced by the appellant in relation to teaching of a fixed brush in document D1 and against a moving brush, i.e. contradictory teaching for a corresponding part, also weighs against a combination leading to such modification.

5.8 The board therefore reached the view that the subject matter of the independent claims can be considered to involve an inventive step within the meaning of Article 56 EPC.

6. *Lower order requests*

Since the board found itself in a position to comply with the second auxiliary request of the appellant, it is not necessary to deal with the lower order requests in the present decision.

## Order

**For these reasons it is decided that:**

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of the following documents:

   - claims to 1 to 10, filed as second auxiliary request during the oral proceedings;

   - description, to be adapted;

   - drawings, as granted.

The Registrar: The Chairman:

P. Martorana A. G. Klein