

Internal distribution code:

- (A) Publication in OJ
(B) To Chairmen and Members
(C) To Chairmen
(D) No distribution

**Datasheet for the decision
of 30 November 2012**

Case Number: T 2054/09 - 3.3.09
Application Number: 01110031.0
Publication Number: 1150175
IPC: G03G 9/097, C09C 3/12,
C09C 1/30, C09C 1/36
Language of the proceedings: EN

Title of invention:

Toner, external additive therefor and image forming method
using the toner

Patent Proprietor:

Ricoh Company, Ltd.

Opponent:

Canon Kabushiki Kaisha

Headword:

-

Relevant legal provisions:

EPC Art. 83

Keyword:

"Sufficiency of disclosure (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 2054/09 - 3.3.09

D E C I S I O N
of the Technical Board of Appeal 3.3.09
of 30 November 2012

Appellant: Canon Kabushiki Kaisha
(Opponent) 30-2 Shimomaruko 3-chome
Ohta-ku
Tokyo 146-8501 (JP)

Representative: TBK
Bavariaring 4-6
D-80336 München (DE)

Respondent: Ricoh Company, Ltd.
(Patent Proprietor) 3-6, Nakamagome 1-chome,
Ohta-ku
Tokyo 143-8555 (JP)

Representative: Schwabe - Sandmair - Marx
Patentanwälte
Stuntzstrasse 16
D-81677 München (DE)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 7 August 2009
rejecting the opposition filed against European
patent No. 1150175 pursuant to Article 101(2)
EPC.

Composition of the Board:

Chairman: W. Sieber
Members: W. Ehrenreich
K. Garnett

Summary of Facts and Submissions

I. Mention of the grant of European patent No. 1 150 175 in respect of European application No. 01 110 031.0, filed on 26 April 2001 in the name of *Ricoh Company, Ltd.*, was announced on 14 June 2006 in Bulletin 2006/24.

The patent was granted with 25 claims, claim 1 reading as follows:

"1. A toner comprising:

a binder resin;

a colorant; and

an external additive for a toner, comprising:

a particulate inorganic material; and

a silicone oil,

wherein the silicone oil is present on the particulate inorganic material in an amount of W_s by weight and present as a free silicone oil in an amount of W_{fs} by weight, wherein a free silicone degree, defined as a ratio $(W_{fs}/W_s) \times 100$, is from 10 to 70%, and wherein the toner has a spherical degree not less than 0.93, wherein the spherical degree of a particle is determined by the following equation:

$$\text{spherical degree} = C_s/C_p$$

wherein C_p represents the circumference of the projected image of a particle and C_s represents the circumference of a circle whose area is the same as that of the projected image of the particle."

Claims 2 to 9 were dependent claims. Claims 10 to 25 were directed to various embodiments including the toner according to claim 1, namely a toner combination (claim 10), a two component developer (claim 11), a toner container (claims 12, 13), an image forming method (claims 14 to 24) and an electrophotographic image forming apparatus.

An opposition against the patent was filed by *Canon Kabushiki Kaisha* on 13 March 2007.

The opponent requested revocation of the patent on the grounds of Articles 100(a) EPC (lack of novelty and lack of inventive step) and 100(b) EPC.

- II. As to the objection of insufficiency of disclosure the opponent, in its notice of appeal, pointed to the discrepancy between the definition of the free silicon degree as defined in claim 1 and the method for its determination via the carbon method defined in the description of the patent specification. In its letter dated 3 June 2009 further insufficiency objections were raised, one being based on the newly filed documents D10 (EP-A 1 204 006, a document according to Article 54(3) EPC), D11 relating to the priority application JP 2000129240) and D12 (relating to the priority application JP 2000133850) and the other relating to the chloroform extraction step disclosed in paragraph [0081] of the patent specification.
- III. With its decision announced orally on 7 July 2009 and issued in writing on 7 August 2009 the opposition division rejected the opposition.

- (a) As to insufficiency of disclosure, the opposition division refuted the opponent's arguments based on the documents D10, D11 and D12. During the oral proceedings the proprietor had filed an affidavit by Mr. Hideki Sugiura, D14, seeking to overcome what were said to be misinterpretations of experimental results in D12. However, D14 was not taken into account by the opposition division when reaching its conclusion on insufficient disclosure (point 4.7 of the decision).

As regards the opponent's further objection with regard to the reproducibility of the chloroform extraction step disclosed in paragraph [0081] of the patent specification, the opposition division held that the sentence "This procedure is repeated to remove the free silicone oil" was a functional term and gave a sufficient instruction to repeat extraction until no free silicone oil is present in the chloroform extract.

- (b) The opposition division also acknowledged novelty of the claimed subject-matter over D1 (EP-A 0 971 273) and D10.
- (c) In assessing inventive step the opposition division, contrary to the opinion of the proprietor, considered D1 to be the closest prior art and provided arguments why the claimed invention was not obvious from a combination of D1 with D2a (English translation of JP-H09-059533).

IV. Notice of appeal against the decision was filed by the opponent (hereinafter appellant) on 12 October 2009. The appeal fee was paid on the same day. The grounds of appeal were received on 16 December 2009.

The appellant maintained its objections as to lack of sufficiency of disclosure, lack of novelty and lack of inventive step. The appellant also held that the late filing of the affidavit D14 and its admission into the proceedings by the opposition division was a violation of the party's right to be heard which justified the reimbursement of the appeal fee.

V. In its letters dated 14 October 2010 and 17 August 2011 the appellant focused the objection of lack of sufficiency of disclosure on the discrepancy between the definition of the free silicone degree of the particulate inorganic material in claim 1 as a weight ratio of the free silicone oil to the silicone oil present on the particulate inorganic material, $(W_f/W_s) \times 100$, and the way of its determination by the carbon method defined in paragraphs [0082/83] of the description. In addition, a further objection of insufficiency of disclosure was raised with the letter dated 29 October 2012 with respect to the feature in claim 1 relating to the spherical degree of the toner.

VI. Counterarguments were provided by the patent proprietor (hereinafter respondent) by letters dated 15 April 2010, 4 May 2011 and 20 January 2012. With its letter dated 4 May 2011 the respondent filed new sets of claims as bases for first to third auxiliary requests.

VII. Oral proceedings were arranged for 30 November 2012. In preparation of the proceedings the board issued a communication dated 28 September 2012, wherein it expressed its preliminary views on essential issues of the case, in particular in respect of sufficiency of disclosure, novelty, inventive step and the amendments made in the claims of the first to third auxiliary requests.

VIII. During the oral proceedings the discussion focused on the issue of sufficiency of disclosure with reference to the measurement and achievement of the parameters "free silicone degree" and "spherical degree" as defined in the claims of the main and first to third auxiliary requests. Thereafter, the respondent presented a new auxiliary request 1 and renumbered the first to third auxiliary requests filed with the letter dated 4 May 2011 to become second to fourth auxiliary requests.

IX. The only issue relevant to the outcome of this decision is insufficiency of disclosure. In the following, the respective arguments of the parties, as far as they are relevant to this decision, are summarised.

(a) Arguments of the appellant

Claim 1 defines the "free silicone degree" of the external additive by a weight ratio, " $(W_{fs}/W_s) \times 100$ ", relating to the free silicone oil " W_{fs} " and the silicone oil " W_s " present on the particulate inorganic material. In contrast thereto, the description of the patent specification relates in paragraphs [0082/83] to a

method for its determination based on the carbon amount. The carbon method, however, not only determines the carbon content of the silicone oil representing Ws and Wfs in the sense of claim 1, but also any other carbon eventually present in the external additive, i.e. that of silicone coupling agents which, according to paragraph [0078] may be used for a pre-treatment of the inorganic particles, or carbon atoms eventually present in certain inorganic particles themselves, i.e. in silicon carbide or barium carbonate (paragraph [0070]). As a consequence of this discrepancy, the skilled person is not able to reliably determine the claimed Wfs/Ws ratio.

(b) Arguments of the respondent

The seeming discrepancy between the definition of the free silicone degree as a weight ratio in claim 1 and the method of its determination via the carbon-method as disclosed in the description is a matter of clarity rather than of insufficiency of disclosure. Although the more scientific definition of the free silicone degree in claim 1 is not fully congruent with the method of its determination, it should be noted that the claimed invention is directed to a skilled person who can follow the protocol disclosed in paragraphs [0080] to [0083] of the description. The skilled person is therefore able to determine the claimed free silicone degree without undue burden.

- X. The appellant requested that the decision under appeal be set aside, the patent be revoked and the appeal fee be reimbursed. It further requested that the new first auxiliary request filed during the oral proceedings be not admitted into the proceedings.
- XI. The respondent requested that the appeal be dismissed, alternatively that the decision under appeal be set aside and the patent be maintained on the basis of the first auxiliary request filed during the oral proceedings, alternatively on the basis of the first to third auxiliary requests as filed with the letter dated 4 May 2011 (second to fourth auxiliary requests, respectively).

Reasons for the Decision

1. The appeal is admissible.
2. Sufficiency of disclosure - main request (claims as granted)
 - 2.1 A toner according to claim 1 as granted comprises an external additive comprising
 - a particulate inorganic material, and
 - a silicone oil.

Claim 1 also requires that the free silicone degree of the external additive is in the range of from 10 to 70%. The free silicone degree is defined as the ratio $W_{fs}/W_{sx}100$, whereby W_{fs} represents the weight of the free silicone oil and W_s represents the weight of the

silicone oil present on the particulate inorganic material.

2.2 The free silicone oil is indeed the key feature of the present invention as is apparent from the following passages in the patent in suit:

"[0036] By controlling the free silicone degree so as to fall in the range of from 10 to 70 %, good images without omissions can be produced on various receiving materials such as rough or smooth receiving materials. The reason is considered to be as follows.

[0037] When a free silicone oil is present in a toner, the free silicone oil is continuously applied to the image bearing member. The free silicone oil is spread on the entire surface of the image bearing member because of having low surface energy, resulting in decrease of the friction coefficient of the image bearing member.

[0038] In addition, the free silicone oil increases the adhesion of a toner particle, which is surrounded by the additive, to other toner particles, and further decreases the adhesion of the toner particle to the image bearing member. ... "

In this context it is noted that silicone oils in the sense of the invention are disclosed in paragraphs [0068] of the patent specification, including, for example, dimethylsilicone oils. They are distinct from other organic silicon compounds or silane coupling agents, which optionally may be used as hydrophobizing or pre-treatment agents for the particulate inorganic

material (paragraphs [0060] to [0062] and [0078] of the patent specification).

2.3 As set out on page 8 of the patent specification, the free silicon degree is determined as follows:

"(1) Extraction of free silicone oil

[0081] A sample to be measured is added in chloroform, and the mixture is agitated and then allowed to settle. The mixture is centrifuged and then the supernatant is removed to obtain the precipitate. Then chloroform is added to the thus prepared precipitate, and the mixture is agitated and then allowed to settle. This procedure is repeated to remove the free silicone oil.

(2) Determination of carbon amount

[0082] The carbon amount of the sample is determined using a CHN element analyzing instrument (CHN Corder MT-5, manufactured by Yanako Co., Ltd.)

(3) Determination of free silicone degree

[0083] The free silicone degree is determined by the following equation:

$$\text{Free silicon degree} = (C_0 - C_1) / C_0 \times 100 (\%)$$

wherein C_0 represents the carbon amount of the sample before the extraction treatment, and C_1 represents the carbon amount of the sample after the extraction treatment."

2.4 According to step (1) described in paragraph [0081], the free silicone oil, i.e. "Wfs" according to claim 1, is extracted with chloroform. Wfs is therefore the extractable portion by weight of the silicone oil. This implies that "Ws" according to claim 1 is the total silicone oil portion by weight present on the inorganic material before extraction. In fact this is confirmed by paragraph [0040] of the patent specification, which explicitly states that "Ws represents the **total** weight of the silicon oil present on the particulate inorganic material" (emphasis added). Thus the Wfs/Ws ratio as defined in claim 1 relates to the weight ratio of the extractable silicone oil (ie the free silicone oil) to the total silicone oil at the surface of the inorganic particles before extraction.

2.5 As regards the determination of the free silicon degree, the description requires in paragraphs [0082] and [0083] that the free silicone degree $(Wfs/Ws) \times 100$ is determined via the carbon amount of the sample before the extraction treatment and the carbon amount of the sample after the extraction treatment using a CHN element analysing instrument and thereafter determining the free silicone degree by the equation:

$$\text{Free silicone degree} = (C_0 - C_1) / C_0 \times 100 (\%);$$

wherein C_0 represents the carbon amount of the sample before the extraction treatment and C_1 represents the carbon amount of the sample after the extraction treatment.

Because the carbon method using a CHN element analysing instrument is a very rigorous method leading to a

pyrolysis of the whole sample and a transformation of all carbon contained in the sample into carbon dioxide (CO₂), not only the amount of carbon originating from the silicone oil is determined but also carbon originating from other sources. Such another carbon source may be the inorganic particulate material itself, for example, when the material is silicon carbide (SiC) or barium carbonate (BaCO₃) as stated in paragraph [0070] of the patent specification. Other carbon sources may be the optional silicon/silane coupling or hydrophobizing agents (see point 2.2 above).

2.5.1 The various carbon sources result in the following possibilities:

- (a) carbon-free inorganic particles (e.g. silica or titanium dioxide) are exclusively treated with the silicone oil, or
- (b) carbon-containing inorganic particles (e.g. silicon carbide, SiC) are exclusively treated with the silicone oil in the sense of (a) or
- (c) carbon-free inorganic particles are pre-treated with silane coupling/hydrophobizing agents and thereafter with the silicone oil, or
- (d) carbon-containing inorganic particles are pre-treated with silane coupling/hydrophobizing agents and thereafter with the silicone oil in the sense of (c).

2.5.2 However, only situation (a) allows the determination of the "true" free silicone oil as explained in paragraphs [0036] to [0038] of the patent specification, because only in that case is the measured amount of carbon directly related to the weight of the free

silicone oil (Wfs) and the weight of the total weight of the silicone oil present on the particulate inorganic material (Ws), ie to the free silicone degree as defined in claim 1. In all the other situations the presence of the other carbon sources prevents any correlation between the determined amount of carbon and the "true" free silicone oil. In situations (b) to (d) the carbon method defines in fact a parameter which has nothing to do with the "true" free silicone oil any more.

2.5.3 The above situations may be illustrated by the following exemplary two scenarios:

Scenario A

Situation as in (a) above, i.e. carbon-free inorganic particles (e.g. silica) are used and exclusively treated with silicone oil (e.g. polydimethyl siloxane exemplified in [0137] of the patent specification and containing the $-(\text{CH}_3)_2\text{Si-O}$ -moieties.

Amounts: 30g silica; treatment with 1g polydimethyl siloxane, corresponding to 0.32g carbon; extractable amount: 0.5g corresponding to 0.16g carbon.

Then

- the carbon amount C_0 before extraction with chloroform is 0.32g;
- the carbon amount C_1 after extraction is 0.16g.

In this case the carbon before and after the extraction exclusively stems from the silicone oil. The free

silicone degree calculated with the equation of the carbon amount is therefore:

$$(0.32-0.16g)/0.32g \times 100 (\%) = 50\%.$$

This fully corresponds to the W_{fs}/W_s ratio according to claim 1 because $W_{fs} = 0.5g$ (extracted silicone oil) and $W_s = 1g$ (amount of silicone oil before extraction, i.e. present on the particulate inorganic material) because:

$$W_{fs}/W_s \times 100 = 0.5/1 \times 100 = 50\%.$$

Scenario B

Situation as in (b), above, i.e. silicone carbide is used and exclusively treated with polydimethyl siloxane corresponding to scenario A. Here, the assumption is made that the surface of the silicon carbide particles has a similar adsorption capacity for polydimethyl siloxane as silica used in scenario A.

Amounts: 30g SiC corresponding to 9g carbon (atomic weight of Si = 28; atomic weight of C = 12) in the particulate inorganic material; 1g polydimethyl siloxane corresponding to 0.32g carbon; extractable silicone oil: 0.5g corresponding to 0.16g carbon.

Then

- the carbon amount C_0 before extraction is $0.32 + 9 = 9.32$;
- the carbon amount C_1 after extraction is $0.16 + 9 = 9.16$ (because the 9g carbon bound into the SiC crystal lattice are not extractable).

The free silicone degree calculated by the equation of the carbon method is then:

$$[(0.32 + 9) - (0.16 + 9)] / (0.32 + 9) \times 100 = 1.7\%.$$

This is far outside the claimed range for $W_{fs}/W_s \times 100$ (%) although the same amounts of inorganic particles and polydimethyl siloxane oil were used and the amount of the extractable silicone oil is also the same as in scenario A.

- 2.6 Similar model calculations can be made for situations (c) and (d) above. In addition, varying amounts and the kind of the silane/silicone coupling/hydrophobizing agent have to be considered which influence the carbon amount determined by the carbon method. Furthermore, the amount of extractable silicon oil may change owing to a different absorption strength of the silicone oil at the surface of the inorganic particles.
- 2.7 The above considerations show that the value of the free silicone degree determined via the carbon method according to paragraphs [0082/83] of the description is strongly influenced by the total carbon present in the system forming the external additive. This is in considerable contrast to the claimed W_{fs}/W_s ratio, which exclusively takes the silicone oil into consideration. Only in the specific case (a) where a non-carbon containing particulate material is exclusively treated with silicone oil, the carbon method leads to a free silicone degree $W_{fs}/W_s \times 100$ in the sense of claim 1, with the consequence that

exclusively for this embodiment no insufficiency problems occur.

- 2.8 However, there is no teaching in the patent in suit as to how the free silicone degree has to be determined in situations (b) to (d), which is, as explained above, the key feature of the claimed invention.

In this context the respondent argued that the skilled person would ignore the "scientific concept" outlined in claim 1 and in paragraphs [0080] to [0083] of the patent specification, but rather follow the protocol disclosed in paragraphs [0080] to [0083]. If one were to accept this argument, the key parameter of the claimed invention, namely the free silicone degree, would reflect in situations (b) to (d) a completely different characteristic of the external additive as compared to situation (a). On the other hand, if the skilled person wanted to determine the same characteristic in all situations, he would have to find a suitable method of measurement by himself. In the end the skilled person cannot derive any information from the patent specification regarding in which direction he should go. In the end, the skilled person is at a loss when trying to realize embodiments relating to situations (b) to (d). To ask the skilled person to resolve this conflict by himself without any guidance from the patent in suit amounts in the board's view to an undue burden.

Consequently, the patent in suit does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art over the whole scope.

2.9 The main request is therefore not allowable. It is thus not necessary to discuss the other objections raised by the appellant with respect to this request.

3. Sufficiency of disclosure concerning the second to fourth auxiliary requests (first to third auxiliary requests filed with the letter dated 4 May 2011)

3.1 Claim 1 of the second auxiliary request differs from claim 1 of the main request only in that the upper limit of the free silicon degree has been amended from 70% to 50%. Thus the same considerations as in point 2 above also apply to this request.

3.2 Claim 1 of the third auxiliary request is based on claim 1 of the main request ??? but with a further limitation of the particulate inorganic material as follows: "... particulate inorganic materials including silica and titanium oxide".

Claim 1 of the fourth auxiliary request is essentially identical to claim 1 of the third auxiliary request except that the further limitation regarding the particulate inorganic material is expressed in slightly different terms: "... wherein the particulate inorganic material comprises both, silica and titanium oxide".

In both requests the presence of carbon-containing inorganic particles and/or silane/silicon coupling/hydrophobizing agents is not excluded. The considerations in point 2 thus also apply for the third and fourth auxiliary requests.

4. Admissibility of the first auxiliary request filed during the oral proceedings

The first auxiliary request presented in the oral proceedings seeks to overcome the discrepancy between the definition of the free silicone degree in claim 1 and the method of its determination via the carbon method according to the description, in particular by incorporation of the following amendments:

- definition of the particulate inorganic material according to paragraph [0070] of the patent specification under deletion of the carbon-containing particles barium carbonate and silicone carbide;
- incorporation of the passage in paragraph [0060] of the patent specification stating that the "inorganic powder is treated with an organic silicon compound which can react with the inorganic powder" as a "negative feature" in the sense of a disclosed disclaimer;
- incorporation of the method for the determination of the free silicone degree according to paragraphs [0080] to [0083] of the patent specification.

The board, however, notes that objections of insufficiency of disclosure owing to the discrepancy between the definition of the free silicone degree in claim 1 and its determination via the carbon method according to the description had been raised by the appellant in its notice of opposition dated 13 March 2007 (pages 3/22, 4/22). It was pointed out therein that the co-presence of numerous silane coupling agents having different carbon numbers would make it

impossible to determine the claimed free silicone degree in a suitable way. This objection was in principle repeated in the appeal proceedings in the appellant's letter dated 14 October 2010 (page 3/13, first and second full paragraphs). Moreover, the board, in its communication dated 28 September 2012, also pointed to the fact that the carbon content in the particulate inorganic material itself prevents a reliable determination of the claimed free silicone degree via the carbon method (point 3, page 3).

It is therefore apparent that the respondent could have reacted much earlier by filing new claims dealing with this critical issue. The late submission of the new first auxiliary request taking account of the discrepancy between the free silicone degree defined in claim 1 and its determination disclosed in the description was therefore not caused by new and surprising circumstances coming up for the first time in the oral proceedings before the board.

Moreover, doubts exist whether the above amendment by incorporating a passage of paragraph [0060] of the description as a disclaimer safely excludes the co-presence of any additional silane/silicon agents, because the physically adsorbed silicon compounds according to paragraph [0060], line 46, appear to be not excluded and, according to paragraph [0062], an additional facultative use of nitrogen-containing silane coupling agents is foreseen. Thus, the amendments in the first auxiliary request submitted during the oral proceedings raised issues, at least under Article 84 EPC, which the board and the appellant

could not reasonably be expected to deal with without adjournment of the oral proceedings.

The new first auxiliary request was therefore not admitted into the proceedings, in accordance with Article 13(3) of the Rules of Procedure of the Boards of Appeal.

5. Request of the appellant for reimbursement of the appeal fee

The board notes that late-filed affidavit D14 submitted by the respondent in the oral proceedings before the opposition division was not taken into account for the consideration of sufficiency of disclosure. This is clearly stated in point 4.7 of the appealed decision. Therefore, the appeal of the opponent was not caused by the admission of D14 into the opposition proceedings by the opposition division, and it is not necessary to consider the allegation of procedural violation any further. The request for reimbursement of the appeal fee, pursuant to Rule 103(1) (a) EPC must therefore be refused.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.
3. The request for reimbursement of the appeal fee is refused.

The Registrar

The Chairman

M. Cañueto Carbajo

W. Sieber