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D E C I S I O N
of 26 March 2004

Case Number: T 0190/00 - 3.4.2
Application Number: 92116395.2
Publication Number: 0534437
IPC: G02G 15/02
Language of the proceedings: EN

Title of invention:
Contact charging method and apparatus

Patentee:
BRIDGESTONE CORPORATION

Opponent:
Canon Kabushiki Kaisha

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 84

Keyword:
"Construction of a claim including a feature defined by way of a mathematical inequality (see point 2.2.1 of the Reasons)"
"Inventive step: no"

Decisions cited:
T 0409/91

Catchword:
-



Case Number: T 0190/00 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 26 March 2004

Appellant:
(Opponent) Canon Kabushiki Kaisha
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Respondent:
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Representative: TER MEER STEINMEISTER & PARTNER GbR
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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
16 December 1999 concerning maintenance of
European patent No. 0534437 in amended form.

Composition of the Board:

Chairman: A. G. Klein
Members: A. G. M. Maaswinkel
C. Rennie-Smith

Summary of Facts and Submissions

- I. The appellant (opponent) lodged an appeal, received on 14 February 2000, against the interlocutory decision of the opposition division, dispatched on 16 December 1999, whereby European patent No. 0 534 437 (based on application No. 92 116 395.2) could be maintained in an amended form. The fee for the appeal was paid on 14 February 2000. The statement setting out the grounds of appeal was received on 26 April 2000.
- II. Opposition had been filed against the patent as a whole on the basis of Article 100(a) EPC in combination with Articles 52(1), 54 and 56 EPC and on the basis of Article 100(b) EPC. To support its objections the opponent referred *inter alia* to the following documents:
- (E1) Electrophotography, R.M. Schaffert, The Focal Press, London/New York, 1966, pages 317 to 331
- (E4) Electrophotography - The Society Journal, Vol. 27, No.4, pages 59 to 63 (1988), N. Tetsutani
"Charging Technologies Without Corona", with English translation.
- III. In its decision the opposition division expressed the view that the subject-matter of Claim 1 of the patent in suit differed from the method in E4 (considered to be the closest prior art document) in that the capacitances of the contact charge member and the photoconductor and the applied voltage meet the conditions of a particular equation defined in this claim, and that E4 did not hint at keeping the voltage

below the limit at which air discharge might occur and ozone was produced.

IV. In addition to the objections already raised in its notice of opposition the appellant, in its letter containing the Grounds of Appeal, raised objections under Article 84 EPC and Article 100(c) EPC against the amendments in the claims. Furthermore in this letter reference was made to document

(E8) JP-A-2 50173 and English translation.

V. On 26 March 2004 oral proceedings were held as requested by both parties.

VI. At the oral proceedings the appellant requested that the decision under appeal be set aside and that the patent be revoked.

VII. The respondent requested that the appeal be dismissed and that the patent be maintained as per the decision under appeal (main request); or that the patent be maintained on the basis of auxiliary requests 1 to 3 filed on 24 March 2004.

VIII. Claim 1 of the main request reads as follows:

"A contact charging method comprising the steps of placing a contact charger member in abutment with a photoconductor to be charged, said contact charger member (1) having one of the following shapes: plate, rectangular block, spherical and roll, and applying voltage between the contact charger member and the photoconductor for electrically charging the photo-

conductor, characterized in that charging is performed at normal conditions of pressure to avoid ozone generation; and in that the capacitance of the contact charger member, the capacitance of the photoconductor to be charged, and the applied voltage meet the following equation:

$$|V_T| < 312 + 6.2 \left(\frac{\epsilon_0}{C_1} + \frac{\epsilon_0}{C_2} \right) + 87.96 \sqrt{\left(\frac{\epsilon_0}{C_1} + \frac{\epsilon_0}{C_2} \right)} \dots (1)$$

wherein

- C₁ is the capacitance of the contact charger member, F/μm²,
- C₂ is the capacitance of the photoconductor, F/μm²,
- V_T is the applied voltage, V, and
- ε₀ is the dielectric constant of vacuum equal to 8.854 x 10⁻¹⁸ F/μm. "

Claim 1 of the first auxiliary request differs from the above in that the characterising portion prior to the equation reads:

"characterised in that charging is performed to avoid ozone generation under the condition that the capacitance of the contact charger member, the capacitance of the photoconductor to be charged, and the applied voltage meet the following equation:".

Claim 1 of the 2nd auxiliary request differs similarly in that the characterising portion prior to the equation reads:

"characterised in that a contact charger member (1) is used at least a portion of which has a less or greater work function than the surface of the photoconductor when the photoconductor is desired to be charge negative or positive, respectively; and the capacitance of the contact charger member, the capacitance of the photoconductor to be charged, and the applied voltage meet the following equation:".

Claim 1 of the third auxiliary request differs from Claim 1 of the 2nd auxiliary request by the addition at the end of the claim of the further expression:

"...for directly injecting electric charges into the photoconductor without air discharge to avoid ozone generation".

The remaining Claims 2 to 4 of the main and 1st auxiliary requests and the remaining Claims 2 and 3 of the 2nd and third auxiliary requests are dependent claims.

IX. The arguments of the appellant may be summarised as follows:

Claim 1 of the main request lacks clarity (Article 84 EPC) because the amendment that the charging is performed "at normal conditions of pressure" is not supported by the application as filed and is open to different interpretations. Whereas the patent proprietor argues that this phrase means the normal or usual atmospheric pressure at which copying machines are operated, and which therefore may be a different

"normal" pressure at different heights above sea level, the opposition division, in allowing this amendment, interpreted it in a strict sense as a pressure of one atmosphere and based this interpretation on the value "6.2" in inequality (1) in Claim 1, see point 2.2 of the Reasons of the Decision.

The expression "...to avoid ozone generation" is ambiguous, because it could allow for some ozone: cf. the patent specification, page 5, lines 31 to 39, according to which "ozone generation is minimized"; line 45 on this page "ozone generation is essentially nil"; and the passage on page 10, lines 24 to 30, stating that "involvement of some air discharge is permissible" together with page 3, lines 4 and 5, where it is stated that ozone is always generated as a by-product due to air discharge. Therefore it must be concluded in the light of the disclosure that the generation of ozone is not *completely* avoided.

The deletion, allowed by the opposition division, of the above-mentioned passage on page 10 in the revised description is contrary to Article 123(2) EPC, since this passage discloses that the generation of some ozone is possible. Its deletion suggests that ozone generation is completely avoided however, according to the description, this is only disclosed in the two Examples 1 and 7, and these Examples are exclusively concerned with a *plate shaped* charger used with a photoconductor drum. There is no teaching in the application as filed that ozone can be completely avoided by using chargers or photoconductors having other shapes, in particular not the shapes defined in Claim 1.

The disclosure of the patent is insufficient in that it does not teach how the charging should be performed at "normal conditions of pressure". On the one hand if, as the opposition division said, this means that the charging process should be carried out at exactly 1 atmosphere, there is no teaching how this pressure is maintained since, in normal operation, there are always pressure variations. On the other hand, if it implies that the process is carried out at normal environmental pressure, there is no consideration how air discharge can be avoided when carrying out the process at different altitudes (for instance, at sea level or in Mexico City at an altitude of 2300m), whereas the inequality (1) has been ascertained at a pressure of 1 atmosphere. Further, the influence of air humidity has not been taken into account.

It is evident from Comparative Example 1 that there is a threshold voltage below which no charge transfer takes place because, for the particular charge member and photoconductor of this Example, no charge transfer is achieved below approximately 700 V. Since Claim 1 specifies a range of voltage values at which charging is enabled but neither the Claim, nor the patent specification, provides a teaching of the minimum threshold for charge transfer, the claim and the teaching of the patent are insufficient for the reasons explained in Decision T 409/91 (OJ EPO 1994, 653).

As regards novelty and inventive step, document E4 discloses a contact charging method using a conductive roller with the very purpose of avoiding a corona discharge and the associated generation of ozone, see

page 1, last 2 lines of the translation, page 2, last paragraph and page 3, top paragraph. According to Section 2.1 a conductive rubber roller is used, which is of the same material as proposed on page 7, line 45 of the patent specification. The contact charging method is carried out at a voltage of 400 V to 1000 V; at 400 V the charging method occurs in the shaded region of Figure 4 of the patent specification where no discharge takes place, irrespective of the values of the capacitances C_1 and C_2 . This is also confirmed by page 5, lines 54 to 57 of the patent specification, which explains that, at a charging threshold of 500 V or lower, charging is bound to take place in the direct charge injection mode and not in the air discharge mode.

Additionally, in normal use the minimum value of the dielectric constant divided by the respective capacitances in inequality (1) and shown in Figure 4 of the patent specification as the independent variable would always be above ten: this results in a voltage value for discharge of above 650 V. See also document E1, Figure 198 and page 321, lines 6 and 7. From this it follows that the minimum value at which charge transfer via a discharge takes place is 710 V.

Therefore, for an applied voltage value of 400 V, the relationship defined in equation (1) is met and the subject-matter of Claim 1 of the main request is implicitly disclosed in document E4 (Article 54 EPC), because the specific example of the prior art anticipates the generic formula defined in equation (1).

Moreover document E8 discloses a roller contact charging method for avoiding ozone by avoiding discharge through air, see page 7, line 1. For the same

reason as explained in connection with E4, document E8 implicitly anticipates the subject-matter of Claim 1 since, in order to prevent air discharge and thereby ozone generation, the voltage condition in Claim 1 will be satisfied. The charging process in document E8 is a direct charge transfer similar to Example 1 of the patent in suit which also follows from the comparison of the charge efficiency: in figure 2 of E8 and page 4, lines 25 to 28 it is disclosed that application of a bias potential of 0.9 kV to the roller results in a surface potential of the photoconductive member of 0.8 kV, which is a similar high efficiency as in Example 1 of the patent, wherein an applied voltage of 1.2 kV. resulted in a transferred potential of approximately 0.75 kV. This is in contrast to Comparative Example 1, where an applied potential of 1.2 kV resulted in a transfer potential of only 0.45 kV. Therefore the high charge transfer efficiency reported in document E8 is a clear proof that the process is a direct charge injection process, in which no ozone is generated and, therefore, the conditions of equation (1) are necessarily met.

The subject-matter of Claim 1 is also obvious in the light of these prior art documents because it was known that, as a result of air discharge at high voltages, ozone is generated: see E4, page 2, lines 3 to 5, and see document E8, page 2, lines 8 to 15. The patent specification also acknowledges on page 2 lines 22 and 23 that this was a known problem in the art. When applying the charging method disclosed in document E4 - or equally E8- it would be routine practice for the skilled person to vary and reduce the applied voltage in order to prevent the creation of ozone. In any case

he would be aware of the teaching of E1, which is an extract from a well known textbook in the field. On page 329, see equation (127), E1 discloses on the basis of Paschen's law the voltage dependence for the onset of air-breakdown discharge across a gap which is the same dependence and following the same mathematical analysis as in equation (1) in Claim 1. Therefore, in using this textbook knowledge for calculating the maximum voltage in order to stay beyond the onset of a discharge and avoid ozone in the methods of documents E4 and/or E8, the skilled person would necessarily stay below the voltage indicated in equation (1) of Claim 1 without performing an inventive step.

As regards auxiliary requests 1 to 3, these are late filed and not allowable for the reason that the description has not also been amended to take account of the proposed amendments.

With respect to the 1st auxiliary request, the removal of the feature in Claim 1 that the charging is performed "at normal conditions of pressure" does not affect patentability and it is therefore anticipated and/or rendered obvious by documents E4 and/or E8 for the same reasons as set out for the main request.

Claim 1 of the 2nd auxiliary request is objectionable because it includes not only a feature of dependent Claim 2, namely "that a contact charger member is used at least a portion of which has a less or greater work function than the surface of the photoconductor" but also a further feature from the description, namely that this is done "...when the photoconductor is desired to be charge negative or positive, respectively". This

latter added feature relates to a completely different invention than that in Claim 1 as granted, namely the subject-matter of independent Claim 2 of the originally filed patent application. This has been included after 6 years of opposition and appeal procedures and only two days before the oral proceedings. Therefore this request should not be admitted.

Claim 1 of the third auxiliary request also includes these objectionable features and introduces a further feature from the description relating to "directly injecting electric charges", and, for this additional reason as well, this request should also not be admitted.

- X. The arguments of the respondent may be summarised as follows:

Claim 1 of the main request defines the matter for which protection is sought in a clear manner. The term "normal pressure" means the atmospheric pressure in an environment in which copying machines are usually used, which is apparent from page 2, lines 3 to 8 of the patent specification. These normal conditions will usually imply a temperature of around 22°C and a relative humidity of 50%. Even if the factor "6.2" in the equation of Claim 1 has been derived for a standard pressure, the person skilled in the art, when reading the specification, knows how to modify the formula to different altitude or humidity conditions.

The further phrase "to avoid ozone generation" clearly expresses the intention that the charging method of the invention shall avoid ozone generation as completely as possible.

With respect to the objection that Claim 1 does not define a lower voltage threshold for charging, this is not a reasonable argument, since the application of the claimed method is in the field of copying and printing machines. In that field, it is not a question of the lowest voltage at which charging starts, but rather, what is the most effective and therefore highest voltage which may be applied without generating ozone. For this problem a lower limit is not important. The skilled person will automatically try to reach the highest voltage that can be applied, and this is defined in Claim 1. Therefore the objections of the appellant with regard to Article 84 and 100(b) EPC are not well founded.

The appellant's objection under Article 123(2) EPC was based on the deletion of the passage on page 10, lines 24 to 30 of the patent specification. The appellant has alleged that this passage discloses that the generation of some ozone is permissible and thus that its deletion would change the teaching of the patent. However, this passage is silent about ozone generation. The phrase "involvement of some air discharge is permissible" is not synonymous to "ozone generation", because although air discharge may be accompanied by ozone generation, this only occurs if the energy of the discharge exceeds a certain level. The deletion of this passage does not change the teaching of the patent, that the generation of ozone should be avoided: the amendment was only made

to remove something which might be misleading. Further, it is not correct to assume that the object of the invention, i.e. to obtain an acceptable charged potential while avoiding ozone, was only achieved in Examples 1 and 7 merely because this result was not explicitly mentioned in the other Examples.

With respect to the questions of novelty and inventive step, document E4 is concerned with charging techniques without corona and discloses contact type chargers which have the advantage that, unlike corona type chargers, they do not need a very high voltage and do not for the most part produce hazardous gases such as ozone. Paragraph 2.1 of document E4 points out that conductive rollers can be used for charging a photoconductive drum during which a voltage of 400 V to 1000 V is applied. However, document E4 is completely silent about ozone generation in the context of using conductive rubber rollers. Rather it is stressed that the use of conductive rubber poses a problem of poor contact. It is clear that a poor contact may also result in air discharge and possibly the generation of ozone. Therefore, from the voltage range of 400 V and 1000 V and the poor contact it may be concluded that, compared to corona type chargers, the contact type chargers using a rubber roller may reduce the amount of ozone generated but there is no teaching in document E4 that the generation of ozone can be avoided.

Furthermore, even if it is not completely clear whether or not ozone generation is avoided by the roller type device, there is no indication in this document that the capacitance of the contact charger member, the capacitance of the photoconductor to be charged and the

applied voltage meet the formula (1) specified in Claim 1. In this respect the respondent pointed out that the derivation of this formula results not just from Paschen's law but also uses formula (2) from the patent specification which describes the special differential potential between the charger member and the photoconductor and relates this voltage to the capacitances of the charger member and the photoconductor and the applied voltage. Formula (2) does not rely on the dimensions, typical thicknesses and areas of these members. None of the cited documents discloses or suggests the electrical model used for deriving formula (2) which leads to formula (1) of Claim 1; hence the contact charging method defined in this Claim is not anticipated and is not obvious having regard to the disclosure in document E4.

As for document E8, this teaches only that contact charging by using a roller does not generate ozone as compared with charging by using a corona charging device, but equally it fails to disclose or suggest formula (1) of the present invention. According to this document, see page 4, lines 19 and 20, in the embodiment of Figure 1 the contacting surfaces of the roller and the photosensitive member are held under pressure since they are under contact friction. In the embodiment of Figure 3 it is even disclosed that the surface of the photosensitive member can bite into the circumferential surface of the roller (page 5, 1st two lines). Therefore the contact charging method disclosed in document E8 differs further from the method of Claim 1 in that the charger member is not in abutment with the photoconductor to be charged, which implies that there is a virtual gap between these members.

Therefore neither of documents E4 or E8 teach the contact charging method of the invention according to which voltages up to the value defined in formula (1) can be applied and whereby the generation of ozone is avoided.

Regarding inventive step, it should be considered whether the skilled person would have arrived at the claimed subject-matter by combining prior art documents in an obvious way. Starting from document E4, the technical problem could be seen in avoiding ozone generation. Using ordinary skill the skilled person could carry out experiments to find out the proper conditions, but it would not have been obvious to find the voltage as expressed in the formula (1) of Claim 1. There is also no suggestion to do this in the prior art document E1, because this document is only concerned with the transfer of a latent electrostatic image to dielectric surfaces and not with a contact charging method for charging a photoconductor; and in any case it does not teach formula (2) of the patent specification which is needed to derive formula (1).

Therefore the subject-matter of Claim 1 according to the main request is novel and involves an inventive step.

As to the auxiliary requests, in Claim 1 of the 1st auxiliary request the expression "normal conditions of pressure" was removed in case the Board would regard this expression as amended by the opposition division to offend Article 123(2) EPC. In the opinion of the patent proprietor, auxiliary requests 2 and 3 should be

admissible because they include the features (already considered by the opponent) of present Claim 2 which align the claims with the type of charging described on page 8, lines 33 to 35 of the patent specification. The independent claims of these requests do not create any legally or technically complex situation. These requests should therefore be considered if they put the patent in an allowable form.

Reasons for the Decision

1. The appeal is admissible.
2. *Main request*
 - 2.1 *Amendments*

As summarised in the Facts and Submissions, objections were raised by the appellant under Articles 84, 100(b) and 123(2) EPC. Since these issues were not relevant for the purposes of this Decision, in particular for the interpretation of the Claims for the question of patentability, these objections need not be addressed in detail.

- 2.2 *Patentability*
 - 2.2.1 *Proper construction of Claim 1*

In assessing novelty, the opposition division stated that "the method of claim 1 differs from that of the document E4 (to E7) at least in that the capacitance of

the contact charger member, the capacitance of the photoconductor to be charged and the applied voltage meet a particular equation, which is indicated in detail in claim 1" (point 3.1 of the *Reasons for the Decision*). Furthermore, in discussing inventive step, it expressed the opinion (point 4.2) that "the subject-matter of claim 1 differs from the method of E4 at least in that the capacitance of the contact charger member, the capacitance of the photoconductor to be charged and the applied voltage meet the conditions of a particular equation, which is indicated in detail in claim 1". From these passages it is apparent that the opposition division based its decision on the patentability of the subject-matter of Claim 1 on the view that, in particular, the inequality (1) in Claim 1 was not anticipated or rendered obvious by the prior art. Similarly, during the appeal proceedings the respondent argued that the prior art did not teach or suggest the relationship between the respective capacitances of the contact charging members which enabled a charging voltage as given in formula (1) to be applied without generating ozone, thus by implication arguing that the formula by itself was a distinguishing feature of the invention.

The Board cannot concur with this construction of Claim 1. As explained in the Official Communication of 27 November 2003, point 2.5, the inequality (1) in this claim actually provides that protection is sought for a contact charging method encompassing any applied voltage below a maximum value as defined by this inequality. In this Communication reference was also made to Figure 4 and page 7, lines 20 to 22 of the patent specification according to which "The shaded

region is a region satisfying formula (1) where no discharge takes place". In respect of the applied voltage, the claim is unambiguous in the sense of Article 84 EPC and the extent of protection conferred by the patent in the sense of Article 69 EPC encompasses the selection of every voltage represented by a point within this shaded region. It therefore follows that, in considering patentability, any voltage having a value below the maximum value indicated in, and thereby fulfilling, the inequality (1), and giving rise to charging the photoconductive member, should be considered to anticipate the corresponding feature, independently of whether the inequality itself could have been derived from the prior art or not.

2.2.2 Novelty

The Board considers document E4 as the closest prior art document because it addresses charging techniques in the field of electrographic technology. In its introduction it mentions that corona charging needs a voltage as high as a few thousand volts which causes danger to users and that the corona discharge creates active molecules such as ozone. According to this section, the technique of contact charging is proposed as a solution of the problems related to corona charging. In Section 2 of this document, different types of contact chargers are discussed which, according to page 3, lines 2 to 5, have the advantage that they do not need a very high voltage and the further advantage that in their use "substantially no hazardous gas such as ozone is produced". In Section 2.1 contact charging using a conductive rubber roller is disclosed. A voltage of 400 V to 1000 V is applied

to the roller shown in Figure 1 of E4. Therefore this charging method includes the steps of the preamble of Claim 1 of the main request. Furthermore, there is no doubt that the charging is performed "under normal conditions of pressure" as that expression is interpreted by the respondent, i.e. at normal environmental conditions.

The respondent argued that, in the discussion of contact charging using a conductive roller (Section 2.1 of E4), the document was silent about generation of ozone. The Board does not share this argument, since the entire teaching of document E4 is directed to techniques of avoiding corona discharge and the related problem of generating ozone. In the cited passage of Section 2 on page 3 the advantage of contact charging and avoiding ozone is stressed, from which it follows that this advantage must be present in all the following examples in Section 2.1 (conductive roller), Section 2.2 (conductive brush) and Section 2.3 (contact charging using conductive particles).

With respect to the embodiment of Section 2.1, comprising a conductive roller, it is therefore the question whether, at the applied voltages of between 400 V and 1000 V the inequality (1) of Claim 1 is satisfied, that is, whether the voltages are within the shaded region marked "undischargeable" in Figure 4 of the patent specification. It is noted that the theoretically minimum value of the voltage resulting from inequality (1) would be 312 V, if the capacitances were infinite and the factor between brackets zero. According to the appellant, in all practical cases the minimum value of this factor will not be smaller than

10, which would result in a minimum voltage for discharge of 650 V.

The appellant also made reference to document E1, from which a minimum value of around 710 V for discharge was reported, and to the patent specification, page 5, lines 56 and 57, which discloses that a charging threshold of 500 V or lower ensures that charging takes place in the direct charge injection mode, but not in the air discharge mode. Since, however, document E4 does not disclose any values for the capacitances C_1 and C_2 , it cannot be entirely excluded that the value range of 400 V to 1000 V applied in the embodiment of a conductive roller (Section 2.1) in document E4 does not meet the inequality (1).

Document E8 was also cited by the appellant as an anticipation of the claimed subject-matter. However, from the schematic dependence between the applied bias to the roller and the surface potential of the photosensitive member shown in Figure 2 of E8 and the numerical values on page 4, it is not possible to conclude whether these voltage values meet the inequality (1), because E8 does not disclose the values for the capacitances.

The subject-matter of Claim 1 of the main request is therefore considered novel.

2.2.3 Inventive step

As for the question of inventive step reference is made again to the embodiment of Section 2.1 of document E4, disclosing contact charging using a conductive roller

at a voltage of 400 V to 1000 V. The difference between the subject-matter of Claim 1 of the main request and this embodiment is that Claim 1 specifies that the voltage value is below a threshold value, defined by formula (1), above which a corona discharge may occur giving rise to the generation of ozone. Therefore the technical problem may be seen in the selection of a voltage to be applied in a contact charge method in order not to produce ozone. In the opinion of the Board this problem, the avoidance of generation of ozone, and its solution, to avoid applying too high voltages are both discussed in the context of document E4, see the cited passages on the problem of corona discharge and the high voltages needed in this process. Therefore, should the skilled person, in applying a voltage within the range of 400 V to 1000 V in the embodiment of Section 2.1, find that at a certain voltage a corona discharge would be initiated, he would as a matter of course reduce the applied voltage below this level. At the voltage level at which the corona discharge would extinguish, he would automatically be in the shaded region of Figure 4 of the patent specification, and therefore meet the conditions of inequality (1) of Claim 1.

The argument of the respondent that the skilled person would not consider the application of contact charging by a conductive roller because E4 discloses that the problem of conductive rollers is poor contact which causes nonuniformity of charging, is not persuasive since conductive rollers are included among others as possible contact charger members in Claim 1 and the problem of uniformity is not addressed in the patent in suit and not solved by the claim.

For similar reasons, the skilled person, in contact charging the photosensitive member shown in Figure 1 of document E8 and varying the bias voltage to the elastic roller as shown in Figure 2, would charge the photosensitive member to the surface potential shown in this Figure. Should he, in raising the bias voltage, at a certain voltage value observe that a corona discharge is initiated, he would lower the voltage below this threshold in order to prevent the generation of ozone, which, according to page 2, lines 14 and 15 of this document, is harmful and should be avoided. The respondent's view that, in the device of E8 the charger member is not in abutment with the photoconductor in the sense that there should be a virtual gap between the members, is not shared by the board because, in the patent specification (see for instance page 10, line 38), the term "abutment" is used in its ordinary meaning of "contact", which holds equally for the "contact friction" between the elastic roller and the photosensitive member disclosed on page 4, lines 19 to 21.

Claim 1 of the main request is therefore not allowable because its subject-matter lacks an inventive step (Articles 52(1) and 56 EPC).

3. *Auxiliary requests - admissibility*

As discussed in Section VII.D.14 of the Case Law of the Boards of Appeal of the European Patent Office, 4th edition, 2001, it is a principle that EPO proceedings must be conducted expeditiously. The matter under

debate, i.e. the set of claims allowed by the opposition division, and the documents (*E1 to E7 of the opposition proceedings and document E8 filed with the Grounds of Appeal*), have been available to the parties throughout the appeal proceedings. In its Communication dated 27 November 2003, the Board made reference to documents E4 and E8 as possibly relevant prior art for the discussion of the patentability of the claimed subject-matter. The Communication also set a time limit of one month before the scheduled date of the oral proceedings for the filing of documents or requests (*i.e. up to 26 February 2004*). The auxiliary requests were not filed until two days before the oral proceedings.

3.1 *First auxiliary request*

3.1.1 Claim 1 of this request is identical with Claim 1 allowed by the opposition division but without the expression that charging is performed "*at normal conditions of pressure to avoid ozone generation*". Since the appellant had raised objections against the introduction of this expression in the Grounds of Appeal, the amendment may be seen as being occasioned by grounds of opposition as defined in Rule 57a EPC.

3.1.2 Since, in the opinion of the Board this expression does not provide a technical contribution to the claimed subject-matter, its presence or absence in the claim is irrelevant for the question of patentability. Therefore the request is not allowable for the same reasons as the main request.

3.2 *Second auxiliary request*

3.2.1 The subject-matter of Claim 1 of this request is a combination of Claim 1 as maintained by the opposition division (*but without the expression that the charging is performed "at normal conditions of pressure to avoid ozone generation"*), Claim 2 of that request and the passage on page 8, lines 33 to 35 of the patent specification (*corresponding to page 8, lines 56 to 58 of the published patent application*).

3.2.2 In the application as originally filed the features of this Claim 2 were defined in independent Claim 2. According to the published application, page 8, lines 44 to 46, this claim addressed the technical problem of optimising the work function of the charger member in accordance with the work function of an object to be charged. This idea is not necessarily related to the idea of contact charging while avoiding the generation of ozone addressed in Claim 1 as originally filed and Claim 1 as maintained by the opposition division.

3.2.3 Rather it appears that these ideas solve two independent technical problems, which can also be seen from the fact that in neither of Examples 1 or 7 (the only two examples in the patent wherein it is explicitly disclosed that no ozone is generated), the optimisation of the work functions of the charger member versus the photoconductor is mentioned. Therefore the introduction of the new features in Claim 1 of the auxiliary request 2 does not pose a further limiting condition on the idea of contact charging while avoiding the generation of ozone, but rather adds a limiting condition for a different aim. Hence, in order to address the contribution of these further features for the question of patentability, that is,

the problem/solution approach, it would be allowable to combine any further prior art documents disclosing these features in the same or related field of technology with the already present documents (E4, E8, E1).

3.2.4 Since in the Claim not only the features of former Claim 2 have been included, but also the teaching that the relation of the work function of both the contact charger member and the photoconductor has been brought into relation with the type of charging, i.e. negative or positive, a feature which so far had not been defined in any claim, it would have been appropriate to give the appellant the opportunity to search for and produce possibly relevant prior art, and to give both parties the right to have the case considered at two instances. Therefore the admission of this request, filed only two days before the oral proceedings, would have caused a considerable delay in the proceedings.

3.2.5 For these reasons the 2nd auxiliary request is not admissible.

3.3 *Third Auxiliary request*

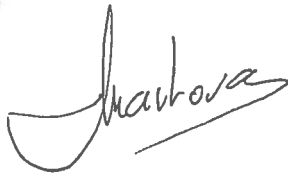
Claim 1 of this request includes the same features as Claim 1 of the 2nd auxiliary request, and is therefore not admissible for the same reasons.

Order

For these reasons it is decided that:

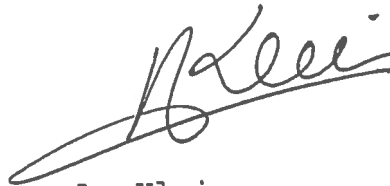
1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:



P. Martorana

The Chairman:



A. Klein

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me

