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Datasheet for the decision of 28 February 2008

Case Number: T 0886/05 - 3.4.03

Application Number: 97301671.0

Publication Number: 0798606

IPC: G03G 15/20

Language of the proceedings: EN

Title of invention:
Fluoroelastomer members

Patentee:
Xerox Corporation

Opponent:
Océ-Technologies B.V.

Headword:
-

Relevant legal provisions:
EPC Art. 56, 100(a)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Inventive step (no)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0886/05 - 3.4.03

D E C I S I O N
of the Technical Board of Appeal 3.4.03
of 28 February 2008

Appellant: (Opponent)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 25 May 2005 rejecting the opposition filed against European patent No. 0798606 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: R. G. O'Connell
Members: R. Q. Bekkering
T. Bokor

Summary of Facts and Submissions

I. This is an appeal against the rejection of the opposition against EP 0 798 606.

II. Oral proceedings before the board took place in the forewarned absence of the appellant opponent.

III. The appellant opponent requested in writing that the decision under appeal be set aside and that the patent be revoked.

The respondent proprietor requested as a main request dismissal of the appeal and as auxiliary request maintenance of the patent in amended form based on claims 1 to 7 filed on 15 January 2008.

IV. Claim 1 as granted reads:

"*1. A fuser system member (1) comprising a supporting substrate (4) and an outer surface layer (2) comprising a reaction product obtained by reacting a fluoroelastomer and an amino silane in the absence of a coupling agent, a crosslinking agent and a basic metal oxide.*"

Independent claim 8 as granted is directed to a corresponding method for fusing thermoplastic resin toner images to a document substrate.

V. Claim 1 of the auxiliary request corresponds to claim 1 of the main request with the following additional feature:

"*wherein the amino silane is of the formula* $NH_2(CH_2)_nNH(CH_2)_mSi[(OR)_t[(R')_w]$, *wherein n and m are numbers of from about 1 to 20; t + w = 3 and R and R' are an aromatic group having from 6 to 18 carbon atoms*".

Independent claim 6 is directed to a corresponding method for fusing thermoplastic resin toner images to a document substrate.

VI. The following documents were cited:

D1: US-A-4 770 116

D3: US-A-4 323 603

D4: US-A-5 166 031

VII. The appellant opponent submitted in substance the following:

From Dl a fuser system member was known comprising a supporting substrate and an outer layer made of a silicon or Viton elastomer. However, Dl did not mention specific elastomers for constituting the outer layer. The person skilled in the art, wishing to put the teaching of Dl into practice, would have to seek and find a particular silicon or Viton elastomer in the prior art. From D3 a Viton elastomer was known which was the reaction product of a fluoroelastomer and an amino silane. D3 mentioned that this Viton elastomer had the inherent fluoroelastomer properties and adhered well to various substrates. It was thus obvious to try and use this particular Viton in the fuser system as known from Dl. This would have led the skilled man to

the fuser member as claimed in claim 1 of the main request. The same held true for claim 8.

The additional features of dependent claim 5 as granted, part of which has been included in claims 1 and 6 of the auxiliary request, were considered to be known from D3.

VIII. The respondent proprietor argued in substance as follows:

Document Dl disclosed a fuser system member comprising a supporting substrate and an outer layer. The problem to be solved relative to D1 was to reduce hot offset. Document D3 dealt with improving the adhesion of fluoroelastomer films to a variety of substrates and explicitly referred to the avoidance of metallic oxides. The skilled person would not consider D3 at all as it did not relate to the outer layer of a fuser roll and did not deal with the problem of hot offset. Accordingly, the subject-matter of claim 1, and of independent claim 8 as granted involved an inventive step.

Concerning the auxiliary request, the skilled person would have had no motivation to replace the amino silanes with simple alkyl groups of 1 to 5 carbon atoms disclosed in D3 by amino silanes with aromatic groups as claimed. The subject-matter of claim 1 and of independent claim 6 of the auxiliary request thus involved an inventive step.

Reasons for the Decision

1. The appeal is admissible.

2. *Main request of the respondent proprietor - patent as granted*

2.1 *Inventive step*

2.1.1 *Closest prior art*

Document D1 discloses an internally heated fuser roll with an outer surface layer, which is fabricated from eg "Viton" (trademark of E.I. Du Pont de Nemours for a series of fluoroelastomers based on the copolymer of vinylidene fluoride and hexafluoropropylene), for a xerographic copying apparatus. It thus discloses a fuser system member comprising a supporting substrate and an outer surface layer as per claim 1 as granted. No details are given in D1 though about the process used for the forming the outer surface.

Hence, claim 1 as granted differs from D1 by the outer surface layer "*comprising a reaction product obtained by reacting a fluoroelastomer and an amino silane in the absence of a coupling agent, a crosslinking agent and a basic metal oxide.*"

Novelty, which is not in dispute, is thus provided with respect to document D1 by this feature.

2.1.2 *Problem to be solved*

As document D1 is silent about the process to be used to produce the outer surface from the Viton fluoroelastomer material mentioned, the person skilled in the art, wishing to put the teaching of Dl into practice, would have to seek and find such a process solution in the prior art.

Accordingly, in the board's judgement the (more relevant) objective problem to be solved relative to document D1 is to provide a suitable process for producing the outer surface from the Viton fluoroelastomer material.

The respondent proprietor argued that the problem to be solved rather was to reduce hot offset. As disclosed in the opposed patent with reference to the state of the art, "*generally the process for providing the elastomer surface on the fusing system member* [...] *includes forming a solvent solution/dispersion by mixing a fluoroelastomer dissolved in a solvent* [...]*, a dehydrofluorinating agent such as a base, for example the basic metal oxides, MgO and/or Ca(OH)2, and a nucleophilic curing agent such as VC-50* [VITON TM Curative No. 50 available from E.I. Du Pont de Nemours, Inc] *which incorporates an accelerator and a crosslinking agent, and coating the solvent solution/dispersion onto the substrate. The surface is then stepwise heat cured*" (patent specification [0010]). As explained in the patent, "*developer and/or toner resins, especially low melt toner resins, tend to react with the metal oxides present in the cured fluoroelastomer surface causing them to bind to the*

metal oxides. The result is that toner adheres to the surface of the fuser member, resulting in hot offset" (patent specification [0013]).

It follows from the above that the particular hot offset problem arises from the use of basic metal oxides. Document D1 however does not prescribe the use of these metal oxides. Neither can it be inferred that these metal oxides are present as a rule. In fact, some prior art cited in the application as filed (see eg document D4, column 9, lines 1 to 32; column 12, lines 57 to 61) relating to the fluoroelastomer surfaces of fuser system parts at issue, dispenses with these metal oxides.

Accordingly, hot offset due to the presence of basic metal oxides in the outer surface of the fuser system member need not occur, so that the problem suggested by the respondent as the problem to be solved when comparing D1 with the claimed subject-matter is, in the judgement of the board, not the appropriate problem for assessing inventive step in relation to claim 1.

The above identified problem to be solved relative to document D1 of providing a suitable process for producing the outer surface from the Viton fluoroelastomer material, put forward by the appellant opponent, is in the board's judgement fair and realistic and provides a reasonable basis for assessing inventive step.

A defensive argument on the side of the respondent proprietor that other, in particular more specific, or indeed overly specific, problems should be taken as the

technical problem to be solved starting from a given prior art, is not cogent unless the problem relied on in the attack on inventive step is demonstrably inappropriate.

2.1.3 *Document D3*

Document D3 is concerned with a process for producing fluoroelastomer film coatings on a variety of substrates. The fluoroelastomer material used for the film coating involved is the same Viton elastomer used in document D1. Moreover, although not relating specifically to fuser system members, D3 lists a host of possible applications for the disclosed fluoroelastomer coatings including printing blankets (see column 9, lines 51 to 60), typically used in offset printing. Thus to the skilled person D3 would be sufficiently pertinent to the relevant problem to deserve a detailed consideration.

The process disclosed in D3 involves dissolving the Viton fluoroelastomer in a solvent, adding a silane compound to the solution, applying the composition to the substrate and curing the composition in the absence of metallic oxides (column 3, line 57 to column 6, line 21).

The amino silane provides for the curing of the fluoroelastomer and no additional coupling agent or crosslinking agent is required.

It is noted in this respect that claim 1 as granted is to be understood in the sense that no *additional* coupling agent or crosslinking agent is required over

and above the amino silane (see patent specification, page 5, lines 15 to 17), because the amino silane itself serves as a coupling or crosslinking agent.

Accordingly, the person skilled in the art in search of a solution to the problem identified above would refer to D3 and adopt the solution proposed therein, thereby arriving at the subject-matter of claim 1 as granted.

It is furthermore noted that the process disclosed in D3 provides an improved adhesion of the coating to the substrate with respect to prior art processes involving the use of metallic oxides and no amino silanes. As an improved adhesion is clearly advantageous in fuser system parts as well, this would be a further incentive for the skilled person to adopt the process of D3 for producing the outer surface of the fuser system member of D1.

The subject-matter of claim 1 as granted is thus obvious to the person skilled in the art and, therefore, lacks an inventive step in the sense of Article 56 EPC.

2.1.4 The above applies in substance to method claim 8 as granted as well, steps b) and c) of claim 8 being conventional steps for fusing thermoplastic resin toner images to a document substrate known from document D1 (column 1, lines 20 to 56).

2.1.5 The respondent proprietor's main request is therefore not allowable.

3. *Auxiliary claim request of the respondent proprietor*

3.1 Claim 1 of the auxiliary request contains the following additional feature:

"*wherein the amino silane is of the formula* $NH_2(CH_2)_nNH(CH_2)_mSi[(OR)_t[(R')_w]$, *wherein n and m are numbers of from about 1 to 20; t + w = 3 and R and R' are an aromatic group having from 6 to 18 carbon atoms.*"

In document D3, the silane compound is specified to be "*a compound having the formula* $RCH_2CH_2CH_2SiR'_{3-n}(OR")_n$, *where R is an organofunctional group selected from the group consisting of amine and epoxy molecules; R' is a simple alkyl group having about one to five carbon atoms; OR" is a hydrolyzable alkoxy group, R" being an alkyl group having about one to four carbon atoms and n is 1, 2 or 3*" (see D3, claim 1). Although according to the description of D3 "*other silane compounds could also be employed*" (column 10, lines 14, 15), no other specific amino silanes are disclosed.

Accordingly, the subject-matter of claim 1 of the auxiliary request differs from document D3 (and D1) in that "*R and R' are an aromatic group having from 6 to 18 carbon atoms*".

However, the application as originally filed (and the opposed patent) is entirely silent about any particular effect associated with the presence of aromatic groups rather than aliphatic groups.
In fact, throughout the description and claims as originally filed amino silanes with aliphatic groups or

aromatic groups are mentioned in the same breath suggesting that it matters little which group is present for the purposes of the invention. What is more, none of the about twenty specific examples of amino silanes listed on page 5, lines 32 to 41 of the application as published includes an aromatic group as claimed and the sole specific comparative example disclosed of a concrete fuser roll according to the invention involves an amino silane as curing agent with aliphatic groups and not with aromatic groups as per claim 1 (see page 7, example 1 of the application as published).

In the oral proceedings the respondent proprietor was not able to indicate any particular significance or enhanced effect attributable to the specific choice of amino silanes with aromatic groups rather than with aliphatic ones.

On the other hand, as demonstrated by the prior art cited in the application as filed (page 4, line 36), in the specific technical field of fluoroelastomer coatings for fuser systems parts of photocopiers, amino silanes with either aliphatic or aromatic groups were commonly used as additives to the fluoroelastomer (Viton) solution (even in the explicit absence of metallic oxides) (see eg document D4, column 9, lines 1 to 32; column 12, lines 57 to 61).

Accordingly, in the board's judgement it would be obvious to the person skilled in the art to use alternatively in the process of D3 amino silanes with aromatic groups falling under the definition of claim 1 of the auxiliary request.

The subject-matter of claim 1 of the auxiliary request thus lacks an inventive step within the meaning of Article 56 EPC.

3.2 The above applies in substance also to method claim 6 of the auxiliary request, steps b) and c) being conventional steps for fusing thermoplastic resin toner images to a document substrate known from document D1 (column 1, lines 20 to 56), as already held for the main request.

3.3 Hence, the respondent proprietor's auxiliary request is not allowable either.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

Registrar Chair

S. Sánchez Chiquero R. G. O'Connell