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D E C I S I O N
of 7 May 1996

Case Number: T 0421/93 - 3.3.2

Application Number: 88118028.5

Publication Number: 0314174

IPC: C03C 25/02

Language of the proceedings: EN

Title of invention:

Methods of and apparatus for curing optical fiber coatings

Applicant:

AT&T Corp.

Opponent:

-

Headword:

Curing/ATT

Relevant legal provisions:

EPC Art. 54(2)

Keyword:

"Novelty (no)"

Decisions cited:

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Catchword:

-



Case Number: T 0421/93 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 7 May 1996

Appellant:

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Representative:

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Decision under appeal:

Decision of the Examining Division of the European
Patent Office posted 4 August 1992 refusing
European patent application No. 88 118 028.5
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: P. A. M. Lançon
Members: M. M. Eberhard
J. H. Van Moer

Summary of Facts and Submissions

I. European patent application No. 88 118 028.5 was refused by a decision of the Examining Division. The decision was based upon the amended claims of the main request and of the auxiliary request both filed on 23 December 1991.

II. The grounds for the refusal were that some claims of the main request and of the auxiliary request did not meet the requirement of novelty with respect to the disclosure in US-A-4 636 405 (hereinafter D2).

The Examining Division held that the only difference which could be seen between the process of claim 1 of the main request and the process of D2 was the screening of the IR radiation **in a controlled manner**. However, according to the application, the said control function was merely the possibility of setting the temperature in the coating tube to a desired value by selecting appropriate parameters for the flow rate of the IR-absorbing fluid. As there was no control or feed back loop governing the setting, this feature could not be considered as a distinguishing feature over the process of D2. In the Examining Division's view, D2 disclosed a method for controlling the curing temperature and, as a consequence, allowed a control of the modulus of the coating. The process according to claim 5 of the auxiliary request also lacked novelty for the same reasons.

III. The Appellant lodged an appeal against this decision. In the course of the appeal procedure, two additional sets of amended claims were filed, one of them in reply to a communication of the Board. Oral proceedings were held on 7 May 1995. At these proceedings, after comprehensive

discussion about the allowability of the amendments in the claims on file and in further proposed claims, the Appellant submitted two sets of amended claims as main request and auxiliary request respectively, replacing the previous pending requests. Claim 5 of the main request reads as follows:

"5. A method of making an optical fiber having a layer of coating material thereon, said method including

- drawing an optical fiber (21) from a preform (22),
 - applying a coating material (63) curable by UV radiation to the optical fiber (21)
 - exposing the coated optical fiber to radiant energy of a UV source (27), with the IR radiation component therefrom being screened without diminishing the UV dose, to cure the coating material (63),
 - controlling the temperature of the coated optical fiber while being cured, and
 - taking up the coated fiber,
- said method being characterised in that
- such coating material (63) is applied which, after being cured, has a shear modulus depending upon its temperature during curing, the correlation between shear modulus and temperature being such that the shear modulus is decreasing as the temperature during curing increases,
 - said IR radiation component from the UV source (27) is screened in a controlled manner by modulating the IR radiation component reaching the coating material (63) on the fiber (21) such that it is cured at a predetermined temperature which results, after cure, in a desired value of the modulus of the cured coating material, and

- said modulating of the IR radiation component and said controlling of the temperature are performed by using an IR radiation absorbing fluid of a predetermined composition flowed through a chamber (146) formed by a tube (134) and a jacket (144) disposed concentrically about the tube and spaced therefrom, the tube (134) surrounding the coated fiber (21) which is advanced therethrough."

The independent claim 4 of the auxiliary request differs from the preceding claim only in that it contains the additional feature "and in that the predetermined temperature of the coating is selected to lie between 25°C and 200°C" at the end of the claim.

IV. The Appellant's arguments in connection with the novelty issue of the independent claim 5 of the main request and claim 4 of the auxiliary request can be summarised as follows:

The Appellant argued that the object of the controlled screening of the IR component was to obtain a desired value of the modulus of the cured coating material. The correlation between the shear modulus of the coating material and its temperature during curing stated in claim 5 of the main request, was used to control the modulus of the coating material. D2 was completely silent about such an object and did not disclose any control of the different cooling means used in the said document, i.e. of the chamber absorbing the IR energy and of the nitrogen flowing through the inner space of the chamber. D2 aimed at maintaining the coated optical fiber at a relatively low temperature during the curing operation, the maximum permissible temperature being 80°C. According to D2, the temperature had to be maintained at this low level in order to avoid either evaporation of the surface of the coating material or

defects resulting from variations in diameter of the first applied coating if the fiber entered the second coater with the first coating being at too high a temperature. In D2 the temperature of the coating material was controlled, but this control consisted only of lowering the temperature of the coating to a value below 80°C whereas according to the claimed process the temperature of the coating could be higher than 80°C and up to 200°C.

- V. The Appellant requested that the decision of the Examining Division be set aside and that a patent be granted on the basis of claims 1 to 8 of the main request or alternatively on the basis of claims 1 to 7 of the auxiliary request both submitted during the oral proceedings, with pages 1 to 12 of the description as originally filed and page 2a submitted during the oral proceedings and the figures as originally filed.

Reasons for the Decision

1. The appeal is admissible.
2. The amended claims of the main request and auxiliary request meet the requirements of Article 123(2) EPC.
3. *Novelty: claim 5 of the main request*

D2 discloses a method of making an optical fibre including all the features recited in the preamble of claim 5. The temperature of the coating material during the curing step is controlled such that it remains relatively low, i.e. not higher than about 80°C for conventional UV curable coating materials (see column 1, lines 6 to 10 and 44 to 46, column 2, lines 23 to 33,

column 2, line 62 to column 3, line 50, figure 1). According to D2 the IR radiation component of the UV source is screened by using an IR-absorbing fluid which is flowed through the chamber of a double-walled jacket (34) surrounding the coated fiber, this jacket comprising concentric glass cylinders (35) and (36) which are transparent to ultraviolet light. This fluid may consist of water or another suitable IR-absorbing material which transmits the desirable ultraviolet wavelengths. The fluid can contain an infrared absorbing material such as CuSO_4 , CoCl_2 or the like (cf. column 2, lines 7 to 11 and 25 to 33, column 3, lines 30 to 53, figures 2 and 3). The IR-absorbing fluid flowing out from the double-walled jacket is recirculated through a cooler (56) and a pump (57) back to the inlet pipe (38) of said jacket (cf. figure 2 and column 4, lines 22 to 25). In the example carried out at a draw speed of 10 m/s the infrared energy is filtered by employing a water cooling jacket in addition to a coolant gas. Water at a temperature of about 10°C is flowed through the double-walled jacket at a flow rate of 3.4 l/min. The chosen IR-absorbing fluid and the selected operating conditions lead to an acceptable coating, which means that the desired aim of maintaining the coated optical fibre at a predetermined, relatively low temperature during the curing step is achieved (cf. column 1, lines 6 to 10 and 44 to 46, column 3, lines 30 to 41, column 4, line 60 to column 5, line 3).

Thus, in D2 the infrared component from the UV source is filtered or screened in a "controlled manner" by using an IR-absorbing fluid of a particular composition (i.e. choosing water or another fluid mentioned in D2) which is flowed at a particular temperature and flow rate through the double-walled jacket in order to maintain the temperature of the coating material during cure at a predetermined, low temperature not exceeding 80°C for

conventional coating materials. It is implicit from the explanation concerning the temperature during cure and the viscosity of the coating at column 2, lines 26 to 47, that the said relatively low temperature depends upon the kind of UV curable coating material used in the process.

It follows from the above that in the claimed process the screening of the IR radiation component and the control of the temperature of the coating during cure are performed in the same way as in D2, using the same means. Taking into account that, on the one hand, the UV curable coating materials used in both the claimed process and the process of D2 may be the conventional ones and that, on the other hand, the process of manufacture of the optical fiber defined in claim 5 comprises the same steps, the same combination of steps and the same operating conditions as the process of D2, it must be assumed that the resulting cured materials exhibit the same properties in both cases, and thus the same shear modulus, when the predetermined temperature of the coating lies within the range of up to 80°C. Therefore, the indication in claim 5 that curing at a predetermined temperature results in a desired value of the modulus does not render the claimed process of manufacture novel. In this context, it should be noted that claim 5 is not directed to the use of a known product in a composition for attaining a new technical effect but to a process of manufacture of a product.

The correlation between the shear modulus of the coating material and its temperature during curing defined in claim 5 is also not disclosed in D2. However, in view of the fact that the UV curable coating materials used in both the process of D2 and the claimed process may be the same ones, the Board comes to the conclusion that this correlation already existed for the coating

materials of D2 even if it had not been recognised. As claim 5 is directed to a **process of manufacture of a product**, involving the same starting materials, the same process steps and the same operating conditions as in D2, the mention of this correlation in this claim cannot render the claimed process novel.

The Appellant's arguments that in D2 control of the coating material temperature during cure is achieved by cooling at a temperature below 80°C whereas according to the claimed process the predetermined temperature of the coating material can be higher than 80°C does not convince the Board that the process of claim 5 is new. As claim 5 contains no limitation regarding the predetermined temperature of the coating material during cure, it encompasses a very broad range of temperatures and the range of up to 80°C indicated in D2 falls in any case within the scope of this claim.

It follows from the above that claim 5 of the main request contains no feature distinguishing the claimed process from that of D2. Therefore, this claim does not meet the requirement of novelty set out in Article 54(2) and the main request must be refused for this reason.

3. *Novelty: claim 4 of the auxiliary request*

Claim 4 of this request differs from claim 5 of the main request only by the additional feature that the predetermined temperature of the coating lies between 25°C and 200°C. This limitation of the temperature range does not render the subject matter of this claim novel since the claimed range overlaps the range disclosed in D2 in the temperature range of 25°C to 80°C. Therefore, the process according to claim 4 of the auxiliary request does not fulfil the requirement of novelty and the said request must also be refused.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

P. Martorana

P. A. M. Lançon