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D E C I S I O N
of 18 March 1998

Case Number: T 0157/97 - 3.3.5

Application Number: 91303888.1

Publication Number: 0498098

IPC: C02F 1/48

Language of the proceedings: EN

Title of invention:

Method and apparatus for ionizing fluids utilizing a capacitive effect

Patentee:

Ibbott, Jack Kenneth

Opponent:

Ion Enterprises Ltd

Headword:

Ionizing fluids/IBBOTT

Relevant legal provisions:

EPC Art. 54(1), 56

Keyword:

"Novelty - interpretation of general technical terms"
"Inventive step"

Decisions cited:

G 0009/91, T 0119/82, T 1027/93, T 1027/93, T 0301/87,
G 0007/91, G 0008/91

Catchword:

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Case Number: T 0157/97 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 18 March 1998

Appellant: Ion Enterprises Ltd.
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Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office posted 16 December
1996 concerning the maintenance of European
patent No. 0 498 098 in amended form.

Composition of the Board:

Chairman: R. K. Spangenberg
Members: G. J. Wassenaar
J. H. van Moer

Summary of Facts and Submissions

I. The appeal is from the decision of the Opposition Division maintaining European patent No. 0 498 098 in amended form with claims 1 and 13 as submitted during oral proceedings on 13 November 1996 and claims 2 to 12 and 14 to 19 as granted.

II. The Opposition Division considered, inter alia, the following documents:

D2: Brochure "ION-CLEAN", 1989, J. K. Industries, Inc.
Tokyo

D5: Declaration by Dr. S. Turgoose, dated 29 June 1995

D6: US-A-3 928 155

With respect to novelty it was held that a coating should have a resistivity of at least 10^{10} Ω .cm in order to be considered as an insulating coating within the meaning of the patent in suit (point 18). In connection therewith reference was made to the textbook:

"Basic Solid State Chemistry", page 282, Table 7.1,

which was said to show a limit of 10^{12} Ω .cm for insulators.

III. In the statement of the grounds of appeal, the Appellant raised objections under Articles 84 and 123 EPC with respect to amended claims 1 and 13. He further maintained that claim 1 lacked novelty with respect to the device JKI-800 sold by the Respondent before the priority date of the patent in suit. He also submitted that the subject-matter of claims 1 and 13 lacked an inventive step over D2 in combination with D6.

IV. The Respondent refuted the Appellant's arguments and filed new sets of claims. During oral proceedings, which were held on 18 March 1998, auxiliary request A, dated 13 February 1998, was maintained as the main request, and three new sets of claims were filed as auxiliary requests. The main claims of the four final requests read as follows:

Main request:

"An apparatus for treating electrically conductive fluid, said apparatus comprising:

self-generating means for producing an electric potential without an external electric power supply, said self-generating means including a positive electrode and a negative electrode;

said positive electrode (1) being of electrically conductive material; and

said negative electrode (2) being of electrically conductive material that is spaced from the electrically conductive material of said positive electrode (1),

at least one of said electrodes (1,2) having a covering (3,4) of electrically insulative material extending around substantially the entirety thereof so as to seal said at least one electrode from direct contact with a body of electrically conductive fluid to be treated in the apparatus, said covering being electrically insulative in use; and

the electrically conductive materials of said electrodes (1,2) having different electrochemical potentials such that when a body of electrically conductive fluid to be treated in the apparatus is

interposed between said electrodes, only said electric potential develops an electroconductive connection between said electrodes through the body of fluid by a capacitive effect whereby the fluid is ionized."

First auxiliary request:

"An apparatus for treating electrically conductive fluid, said apparatus comprising:

self-generating means for producing an electric potential without an external electric power supply, said self-generating means including a positive electrode and a negative electrode;

said positive electrode (1) being of electrically conductive material; and

said negative electrode (2) being of electrically conductive material that is spaced from the electrically conductive material of said positive electrode (1),

at least one of said electrodes (1, 2) having a covering (3,4) of electrically insulative plastics material extending around substantially the entirety thereof so as to seal said at least one electrode from direct contact with a body of electrically conductive fluid to be treated in the apparatus, said covering being electrically insulative in use; and

the electrically conductive materials of said electrodes (1,2) having different electrochemical potentials such that when a body of electrically conductive fluid to be treated in the apparatus is

interposed between said electrodes, only said electric potential develops an electroconductive connection between said electrodes through the body of fluid by a capacitive effect whereby the fluid is ionized."

Second auxiliary request:

"An apparatus for treating electrically conductive fluid, said apparatus comprising:

self-generating means for producing an electric potential without an external electric power supply, said self-generating means including a positive electrode and a negative electrode;

said positive electrode (1) being of electrically conductive material;

said negative electrode (2) being of electrically conductive material that is spaced from the electrically conductive material of said positive electrode (1),

and said electrodes (1,2) being electrically isolated from one another;

at least one of said electrodes (1,2) having a covering (3,4) of electrically insulative plastics material extending around substantially the entirety thereof so as to seal said at least one electrode from direct contact with a body of electrically conductive fluid to be treated in the apparatus, said covering being insulative in use; and

the electrically conductive materials of said electrodes (1,2) having different electrochemical potentials such that when a body of electrically conductive fluid to be treated in the apparatus is

interposed between said electrodes, only said electrodes and said electric potential develop an electroconductive connection between said electrodes through the body of fluid by a capacitive effect whereby the fluid is ionized, said electroconductive connection being only established through the body of fluid to be treated."

Third auxiliary request:

"An apparatus for treating electrically conductive fluid, said apparatus comprising:
a pipe (14);

self-generating means for producing an electric potential without an external electric power supply, said self-generating means including a positive electrode and a negative electrode;

said positive electrode (1) being of electrically conductive material;

said negative electrode (2) being of electrically conductive material that is spaced from the electrically conductive material of said positive electrode (1),

and said electrodes (1,2) being electrically isolated from one another;

at least one of said electrodes (1,2) having a covering (3,4) of electrically insulative plastics material extending around substantially the entirety thereof so as to seal said at least one electrode from direct contact with a body of electrically conductive fluid to be treated in the apparatus, said covering being insulative in use;

the electrodes (1,2) being provided internally of the pipe (14) and being electrically insulated therefrom; and

the electrically conductive materials of said electrodes (1,2) having different electrochemical potentials such that when a body of electrically conductive fluid to be treated in the apparatus is interposed between said electrodes, only said electrodes and said electric potential develop an electroconductive connection between said electrodes through the body of fluid by a capacitive effect whereby the fluid is ionized, said electroconductive connection being only established through the body of fluid to be treated."

V. The Appellant maintained the objections concerning novelty and inventive step of the subject-matter of the main request and the objection concerning inventive step of the subject-matter of the auxiliary requests insofar as a galvanic connection between the electrodes of the apparatus and the pipe work was not excluded; ie the apparatus according to the first and second auxiliary requests. He declared that he raised no objections against the claims of the third auxiliary request.

VI. The Respondent submitted that the coating in the original "Ion-Clean" device was porous and did not seal very well. Such a coating had a resistive effect but could not be considered as an insulative coating within the meaning of the present claims. Even the resistance as measured by the Appellant was lower than that required for an electrical insulator. He further referred to the second Statutory Declaration of Dr. Parsons filed with a letter dated 11 October 1996, wherein Dr. Parsons as an independent technical expert expressed the opinion that coating the electrodes with

an insulative material would be a very surprising thing to try because such an insulating coating would be expected to negate the effect of the device described in D2.

VII. The Appellant requested that the decision under appeal be set aside and that the patent be revoked.

The Respondent requested that the decision under appeal be set aside and the patent be maintained on the basis of:

Main request:

Claims 1 and 13 filed with a letter of 13 February 1998 and claims 2 to 12 and 14 to 19 as granted.

First auxiliary request:

Claims 1 and 13 as submitted during oral proceedings, and claims 2 to 12 and 14 to 19 as granted.

Second auxiliary request:

Claims 1 to 12 submitted during the oral proceedings.

Third auxiliary request:

Claims 1 to 12 submitted during the oral proceedings and a description to be adapted.

At the end of the oral proceedings the decision was announced.

Reasons for the Decision

1. The appeal is admissible.
2. The amendments made to all the claims of the present requests fulfil the requirements of Article 123(2) and (3) EPC. This is not in dispute.
3. *Main request*
 - 3.1 The first question to be decided in respect of the apparatus according to the main request is whether this apparatus is novel. The Respondent has sold an apparatus for treating water designated as JKI-800. He did not dispute that this device was available to the public before the priority date of the patent in suit, so that it forms state of the art within the meaning of Article 54(2) EPC. There was also no dispute that, apart from the covering of electrically insulative material extending around at least one of the electrodes, it shows all the constructive details required by present claim 1. There was also agreement that the known device comprised an aluminium electrode (negative) and a carbon electrode (positive), and that the aluminium electrode had a coating of aluminium oxide. With respect to novelty, therefore, it has only to be decided whether the material of the coating should be considered to be "electrically insulative" and whether said coating is "electrically insulative in use".
 - 3.2. In this respect, it is at first necessary to establish the proper meaning of these terms in the context of the disclosure of the patent in suit. In the contested decision, "electrically insulative" is considered to mean "having a specific resistance of at least 10^{10} Ω .cm". However, in the Board's judgment, there is no

basis for that assumption in the patent in suit. No specific resistance is disclosed for the coating in the patent in suit. An "infinite electrical resistance" is mentioned in column 8, lines 3 to 6, but that does not mean that the resistance of the coating according to claim 1 is limited to extremely high values. In fact, the patent in suit also mentions that the passage of electrons through the insulative material is severely limited but not completely stopped (column 11, lines 6 to 23). For low potential differences as induced in the apparatus of the patent in suit (0.9 V, column 8, lines 7 to 23), the passage of electrons is already severely limited by a relatively low resistance. The expression "insulative" is a relative term, whose limits depend on the context in which it is used. Textbook references to resistivity values generally apply to materials for high voltage insulation and are not suitable for limiting the scope of "electrically insulative material" in present claim 1. Therefore, the Board cannot agree to the definition given to that term in the decision under appeal. Moreover, the Board considers that relative terms in patent claims such as "insulative" should be given their broadest technically reasonable meaning. The term "insulative" can be taken as the opposite of "conductive". This means that anything that is not electrically conductive can be considered as "electrically insulative". Apart from rare exceptions such as carbon, almost all non-metallic coatings are non-conductive and can thus be considered as "insulative". According to measurements carried out by the Appellant, the coating of the known device, JKI-800, has in contact with water (ie "in use") a resistance of $3 \cdot 10^5 \Omega$ (point 18 of the contested decision). Although the Respondent contested this result, he has not provided any other value, but has only alleged that the resistivity is several orders of magnitude less (Respondent's letter of 23 September 1997). Even if the Respondent were right in his

assumption, a resistance of about $10^3 \Omega$ would be far in excess of that of a conductive coating and, for the above mentioned reasons, the coating in the known apparatus must be regarded as being "insulative in use" as required by present claim 1. In the Board's opinion, therefore, the apparatus of claim 1 lacks novelty over the known device, JKI-800, so that the main request cannot be allowed.

4. *First auxiliary request*

4.1 Novelty

The devices according to the auxiliary requests all require that at least one electrode bears a plastics coating. In the device JKI-800 the electrodes do not bear a plastics coating. None of the other documents on file discloses in combination all the features of claim 1. The apparatus according to Claim 1 of this request is therefore novel. This has not been contested by the Appellant.

4.2 Inventive step

4.2.1 The Board considers that D2 represents the closest state of the art with respect to the issue of inventive step. This finding was not contested by the parties.

D2 discloses a device for scale and slime control comprising a positive carbon electrode and a negative aluminium electrode, whereby the aluminium electrode has a protective coating. The positive electrode is formed by a carbon rod which is supported longitudinally with the aluminium negative electrode by moulded teflon members. The aluminium electrode and longitudinally supported carbon rod are contained in an outer steel casing with a layer of insulation between

the aluminium and the steel casing (see under FUNDAMENTALS OF ION-CLEAN). According to the patent in suit, the apparatus of the invention prevents the precipitation of dissolved solids even in a fluid having a high dissolved solid content and a high conductivity and prevents the formation of scale in a piping system and removes previously deposited scale therein (column 1, lines 6 to 13). Such properties are, however, also postulated for the apparatus according to D2. The Respondent has, however, not provided evidence that the apparatus according to present claim 1 has any advantages over the apparatus according to D2. Under these circumstances the Board regards the technical problem underlying the invention as being the provision of an alternative apparatus for treating electrically conductive fluid suitable for the reduction and/or prevention of scale.

The patent in suit proposes to solve this problem essentially by coating at least one of the two electrodes with an insulative plastic coating. The Appellant has not questioned the scale removing or preventing properties of the claimed apparatus. The Board therefore accepts that the above mentioned problem is solved by the apparatus according to claim 1.

- 4.2.2 It remains to be decided whether the modifications according to present claim 1 with respect to the known devices disclosed in D2 are obvious to a person skilled in the art. The apparatus according to present claim 1 differs from the device disclosed in D2 in that at least one of the electrodes has a covering of electrically insulative plastics material extending around substantially the entirety thereof so as to seal

such at least one electrode from direct contact with a body of electrically conductive fluid to be treated in the apparatus, said covering being electrically insulative in use.

According to the patent in suit, the introduction of such an insulative plastics covering has the effect of further restricting electrical current flow through the fluid between the electrodes of the apparatus (column 3, lines 4 to 10).

- 4.2.3 In the Board's opinion a reduction of the current can only take place if, without the insulative covering, there is actually a measurable electric current between the two electrodes. The positive electrode, which according to all the examples is a carbon electrode, can be electrically connected to the negative electrode, which according to all the examples is made of aluminium, through a high resistance of 1,000,000 Ω (patent in suit, column 10, lines 17 to 42) or a connection can be completely absent (column 11, line 48 to column 12, line 5 and Figure 6). Since a carbon electrode is substantially inert in water, the only fluid in which scale formation plays a role, no current is likely to exist between the electrodes if they are not connected, as testified by Dr. S. Turgoose (D5). Electrical currents will, however, be generated by the galvanic cells formed through the not excluded electrical contact of the aluminium electrode, which needs not be coated, with other metallic parts of the apparatus or the pipe line in which the apparatus is located. These currents will not be limited by an electrical insulative coating of the carbon electrode.

4.2.4 It follows from the above considerations that in the absence of any proof of the alleged influence of the said electrical insulative coating on scale reduction or on any other technically relevant property of the device, the Board can only consider the addition of the said coating to the device according to D2 as a modification which at best has no technical function, and may even be technically disadvantageous.

A technical disadvantage caused by the introduction of the coating can be seen in the need for an additional step in the construction of the device. Such a disadvantageous modification does not involve an inventive step, if the skilled person could clearly predict this disadvantage and was right in his assessment thereof, and if, as is the case here, this predictable disadvantage was not compensated by any unexpected technical advantage (see T 119/82, OJ EPO, 1984, 217). In this situation the Respondent's submission that a skilled person would have had no incentive to consider the modification is no indication of an inventive step.

Similar considerations apply to a technically non-functional modification.

The Board is aware of decision T 1027/93 of 11 November 1994 (not published in OJ EPO), in which another Board observed (obiter) that the EPC does not require that an invention, to be patentable, must entail any useful effect, and that the apparent futility of a given modus operandi could rather be said to render it completely non-obvious.

In this respect, the Board wants to emphasize that the notion of "non-obviousness" is related to the concept of "invention". The concept of "invention" implies a technical character. This follows directly from the

wording of Article 56 EPC, wherein the expressions "invention" and "obvious" are linked with "state of the art" and "a person skilled in the art" (see also Schulte, Patentgesetz mit EPÜ, 5th edition, pages 12 to 13). In the Board's judgment, technically non-functional modifications are therefore irrelevant to inventive step, even if the skilled person would never think of such a modification. A parallel can be drawn here with a new design based on a known technical concept. That new design might be a surprise and thus "not obvious" for professional designers. Nevertheless if the modifications have no technical relevance and are, from a technical point of view, arbitrary, the new design is not patentable and does not involve an inventive step within the meaning of Article 56 EPC. In the present case the device according to claim 1 is considered to be no more than an arbitrary modification of the design of the device according to D2 which does not involve an inventive step within the meaning of Article 56 EPC.

This finding is not in conflict with Mr. Parsons' expert opinion that coating the aluminium electrode in the ION-CLEAN devices according to D2 would be a very surprising thing to try, because present claim 1 is not limited to the devices of D2 and does not require that the aluminium electrode is coated. In addition, contrary to D2, present claim 1 does not require that the aluminium is electrically insulated from the metallic (steel) housing.

5. *Second auxiliary request*

Claim 1 of the second auxiliary request differs from claim 1 of the first auxiliary request in that the electrodes are only electrically connected through the fluid. Since this feature is also present in the ION-

CLEAN devices according to D2, the inventive step objection set out under point 4.2 with respect to claim 1 of the first auxiliary request equally applies for claim 1 of the second auxiliary request.

6. *Third auxiliary request*

The Respondent did not raise any objection against the patentability of the subject-matter of the claims according to this request. Moreover, he expressly stated during the oral proceedings that in respect of this subject-matter he accepts the correctness of the second Statutory Declaration made by Dr. Parsons (see point VI above).

According to the Enlarged Board of Appeal's decision G 9/91 (OJ EPO, 1993, 408), post-grant opposition and corresponding appeal proceedings under the EPC are in principle to be considered as contentious proceedings between parties normally representing opposite interests (reasons, 2). It was further held in this decision that the purpose of the inter partes appeal procedure is mainly to give the losing party the possibility of challenging the decision of the Opposition Division on its merits, and that in contrast to the merely administrative character of the opposition procedure, the appeal procedure is to be considered as a judicial procedure (see also G 7/91 (OJ 1993, 356) and G 8/91 (OJ EPO 1991, 1993, 346), which justify applying Article 114(1) EPC in a more restrictive manner than in the opposition procedure).

In the present case, the Appellant does not challenge the decision under appeal in respect of the present amended claims. Therefore, in view of the above-mentioned findings of the Enlarged Board of Appeal, the Board considers that it is not appropriate to examine the patentability of the subject-matter of these claims

on its own motion pursuant to Article 114(1) EPC. The Board did, however, examine, pursuant to Article 102(3) EPC, whether the amendments introduced during the appeal proceedings are objectionable (see T 0301/87, OJ EPO 1990, 335). As in this case they were not, the Board accepts the claims of the third auxiliary request as a basis for the maintenance of the patent.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent with claims 1 to 12 as submitted during the oral proceedings as the third auxiliary request, and a description to be adapted.

The Registrar:

The Chairman:

S. Hue

R. Spangenberg