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

**Case Number:** T 0072/95 - 3.3.5

**Application Number:** 87902762.1

**Publication Number:** 0267296

**IPC:** C02F 1/48

**Language of the proceedings:** EN

**Title of invention:**  
Method and device for ionizing liquid

**Patentee:**  
Ibbott, Jack Kenneth

**Opponent:**  
Ion Enterprises Ltd  
Ibbott, Jack Kenneth

**Headword:**  
Ionizing liquid/IBBOTT

**Relevant legal provisions:**  
EPC Art. 56

**Keyword:**  
"Inventive step - (no) - non-functional modification"

**Decisions cited:**  
T 0119/82, T 0110/92, T 1027/93

**Catchword:**  
"The Board of Appeal is under the obligation to appreciate the existence of a technical function alleged to be relevant to inventive step. If a known device is modified by adding a feature which has no technical function, this modification cannot contribute to inventive step (point 5.4)."



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Boards of Appeal

Chambres de recours

Case Number: T 0072/95 - 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:**  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 30 November 1994  
revoking European patent No. 0 267 296 pursuant  
to Article 102(1) EPC.

**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 revoking European patent No. 0 267 296.
- II. The decision under appeal was based on two sets of claims 1 to 12 submitted as the main and auxiliary requests during oral proceedings before the Opposition Division. Both requests were rejected on the grounds of lack of novelty (Article 54 EPC). During the opposition proceedings, inter alia, the following documents were considered:

D3: US-A-4 325 798

D5: US-A-3 928 155

D16: Report from the "Rheinisch-Westfälischer Technischer Überwachungsverein e.V." of 22 February 1990

D25: Statutory Declaration of Dr. S. Turgoose dated 30 September 1994.

It was held that D3 anticipated the subject-matter of claim 1 of both the main and auxiliary requests.

- III. During the oral proceedings held on 17 March 1998, the Appellant submitted a new set of 7 claims. Independent claim 6 read as follows:

"A water pipeline with a device for ionising water fitted therein, said device being straight and tubular and defining an enclosed cylindrical space therein and said device comprising: a negative electrode comprising a first electroconductive member (52), the first electroconductive member (52) being tubular;

a positive electrode comprising a second electroconductive member (54), said second electroconductive member (54) being within and extending along a longitudinal axis of the first electroconductive member (52) and having a cross-sectional area that is smaller than the cross-sectional area of the space defined within said tubular first electroconductive member (52), the first and second electroconductive members having a part (58) of said cylindrical space therebetween to provide a straight throughflow path for the water, the axis of said part (58) coinciding with and being parallel to the axis of the pipeline and the direction of the water flow being parallel to the axis of the pipeline;

an inlet (76) for water into the said space; and

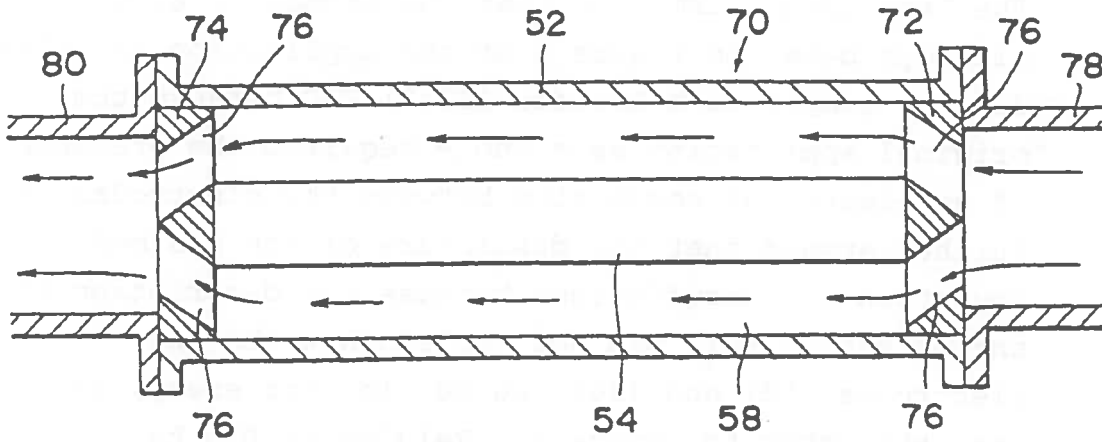
a separate outlet (76') for water from the said space;

the first and second electroconductive members having different electrochemical potentials;

wherein in use the water flows through the annular space (58) between the electroconductive members; and

wherein the only electroconductive connection between the first and second electroconductive members is through the water, whereby electrical energy flows into the water to ionize it."

A device according to this claim is schematically shown in the figure below (Figure 2 of the patent in suit):



IV. In the statement of the grounds of appeal and during the oral proceedings the Appellant argued that the apparatus according to the patent in suit was not only different from the apparatus disclosed in D3 but, more importantly, that its function was based on an entirely different principle. The whole thrust of the invention was that the electrodes should be connected only through the water, in contrast to the prior art wherein the electrodes were always directly and deliberately electrically connected. According to the Appellant it was proved by the TÜV report (D16) that in a water pipeline in which an apparatus called "ION CLEAN SF-50" was located a substantial scale reduction could be achieved. In this device the negative electrode (52) consisted of aluminium and the positive electrode (54) was a carbon rod. The Appellant admitted that it was not excluded that galvanic elements were formed between the aluminium tube and the copper connecting nuts of the device, but argued that the galvanic action at one side due to the Cu/Al connection was compensated by the opposite galvanic action at the other side by the Al/Cu connection. The scale-reducing effect was therefore essentially obtained by the presence of the electrically insulated carbon rod. The commercial success of the device, as documented by an extensive sales list, also indicated that an inventive step was involved.

V. The Respondent submitted that the amended claims, although based on Figure 5 of the application as filed, did not comply with Article 123(2) EPC because the original application as a whole required the presence of an electrical connection between the electrodes. He further argued that the disclosure of the claimed invention was insufficient because the description of the patent in suit did not explain how the two electrodes (52) and (54) caused electric energy to flow into the water to ionize it. Relying on D25 he submitted that, in the absence of an electrical connection between the two electrodes, both act in isolation, and that any observable "ionisation" was no more than the result of a certain corrosion of the aluminium electrode. Such a corrosion, however, was to be expected in view of D3 as well as D5. Therefore the claimed subject-matter was not inventive. The Respondent did not challenge the findings of the TÜV report (D16), but disputed that it supported the Appellant's allegation that the scale reduction was caused by the isolated electrode. Referring to D3 he rejected the Appellant's argument that the effect of a galvanic element at one side of the device could be compensated by a galvanic element at the other side.

VI. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the set of claims 1 to 7 submitted during oral proceedings on 17 March 1998.

The Respondent requested that the appeal be dismissed.

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

## Reasons for the Decision

1. The appeal is admissible.
2. In the Board's judgment, amended claim 1 fulfils the requirements of Article 123(2) and (3) EPC. Although this was contested by the Respondent, there is no need to give reasons for this finding, since, for the reasons given below, the appeal was unsuccessful.
3. The Respondent did not dispute that a skilled person would have been able to manufacture a water pipeline with a device as set out in present claim 6 (see point III above) on the basis of the technical information contained in the patent in suit. He admitted that it followed from D16 that such a device was capable of reducing the formation of scale in the water pipeline. Moreover, it follows from D25, a statutory declaration submitted by the Respondent, that this technical effect can be attributed to the introduction of aluminium ions into the water, which in a broad sense can be regarded as "ionisation" (see D25, chapter headed "The term ionisation"). The Board further considers that the release of ions into the water can be regarded as a "flow of electrical energy into the water" as required by present claim 6. On that basis, the Board is satisfied that the requirement of sufficiency of disclosure is met, even if it might turn out that the explanation given in the patent in suit for the observed technical effect is not correct. Under these circumstances the question of how the observed technical effect is to be explained is not relevant to the outcome of the present appeal proceedings and can thus be left undecided.
4. With respect to the present claims no novelty objection was raised.

5. *Inventive step*

5.1 The Board considers D5 to be the closest state of the art. This finding was not contested by the parties.

D5 discloses a device for reducing the accumulation of scale in a water pipeline, including a section of tube of an electrical conducting material different from that of the conduit and fitted with electrically insulating end connectors, the section of tube containing an element of the same material as the tube having a large surface area, and the section of tube being connected in an external electrical circuit bridging one of said end connectors and containing a resistance (column 1, lines 7 to 13, and column 2, lines 1 to 15).

With reference to D16, the Appellant put forward a convincing case that a device as claimed reduces the formation of scale. The Appellant has neither argued, nor provided evidence, that his device is more efficient in scale reduction or has other advantages over the said prior art device. It was merely argued that the device as now claimed is based on a different technical principle, because, unlike the prior art devices, the electrodes were electrically connected through the water only.

Under these circumstances the technical problem underlying the invention with respect to the device claim can be regarded as the provision of an alternative device for the reduction of scale formation in a water pipeline.

The patent in suit proposes to solve this problem by the device according to claim 6 (see point III above).



Taking into consideration the results of the TÜV report (D16), the Board is satisfied that the above-mentioned problem is thereby actually solved.

- 5.2 It remains to be decided whether the modifications according to present claim 6 with respect to the known device disclosed in D5 were obvious to a person skilled in the art.

The device according to present claim 6 differs from the device disclosed in D5 in that the surface increasing filling of the same element as that of the tubular member is replaced with an elongated second electrode of smaller cross section than the tubular member, having an electrochemical potential different from that of the tubular member, wherein the only electro- conductive connection between said second electrode and the tubular member is through the water. The fact that claim 6 does not require the tubular member to be electrically connected to the water piping through a resistor bridging the insulation between the tubular member and the water piping cannot be considered as a difference with respect to D5, because such an arrangement, although not shown in the patent in suit, is not excluded by claim 6.

In D5 the working of the device is explained by the forming of a self-induced electromotive force (EMF) between the metal of the device (in the example: iron) and the metal of the water piping (in the example: copper) by the water flowing through the device as part of the conduit (column 1, lines 62 to 68). Although not explicitly mentioned in D5, such an EMF is only created if the metal of the device releases ions and forms a galvanic cell with the metal of the conduit. This follows from elementary electrochemistry and is more fully explained in D3, which also relates to a self-energizing scale-inhibiting device, with respect to

connected copper and magnesium plates (D3, column 4, lines 25 to 43). The additional requirement in present claim 6 that "electrical energy flows into the water to ionize it" is thus automatically also fulfilled by the device of D5.

5.3 In the example of D5 the galvanic cell is formed by the metal couple Cu/Fe. Such a metal couple has a relatively low EMF because the metals are close to each other on the electrochemical potential scale (galvanic scale). Other metal combinations are also contemplated in D5, but a warning is expressed against the use of metals which are not close in the galvanic scale because of corrosion problems (column 2, line 65 to column 3, line 2). Since, according to D5, scale reduction is related to the induction of an EMF, it would have been evident to a skilled person that increasing the EMF by using a metal pair which is less close in the galvanic scale than Cu/Fe would be beneficial with respect to scale reduction, but would create corrosion problems. The skilled person would also have been aware that corrosion is related to ion release and that ion release is related to the surface area of the metal. Thus a skilled person looking for an alternative for the device according to D5 would already have known from D5 that increasing the induced EMF by taking a less nobler active metal such as aluminium would be a suitable option but one which would have to be compensated by a reduction in the active surface thereof in order to control corrosion. Since the iron fillings within the tubular member of the device according to D5 have the function of increasing the iron surface, it would have been obvious to a skilled person contemplating the use of aluminium instead of iron to leave out the metal fillings. The

use of a less noble metal than iron was an obvious alternative in view of the fact that such metals have been used in other scale-reducing devices in the prior art such as the device disclosed in D3, wherein magnesium is used in combination with copper.

- 5.4 The present device further differs from the device according to D5 by the presence of the isolated second electrode, which, according to the examples in the patent in suit, can be a carbon rod (column 3, lines 35 to 37). According to the patent in suit, the scale reducing effect is due to the presence of the isolated carbon rod. According to the Respondent, supported by the findings of Dr. S. Turgoose (D25, page 5), however, the presence of an isolated carbon rod, being substantially chemical inert in water, will have no effect on scale formation or reduction. During the oral proceedings, the Appellant has argued that the ionisation effect due to the presence of the isolated electrode, on which the invention was based, can indeed not be explained by standard textbook science, but is proved by the TÜV report(D16).

In the Board's judgment, D16 does not support the Appellant's submission that the observed scale reduction is caused by the presence of the electrically insulated carbon rod, because that report does not contain evidence proving the Appellant's argument that the galvanic effects at the entrance and exit of the device cancel each other. Rather, in conformity with the Respondent's submission, the Board considers that the EMF of a galvanic cell is independent of the relative position of the metals in the galvanic cell with respect to the water flow. The direction of the electrical current induced by the EMF at one side may be different from the direction of the current induced at the other side of the device. The release of aluminium ions, associated with the induced currents,

is, however, independent of the direction of the currents, and it is contrary to common general knowledge as well as to the teaching of D3 (see Figures 1 and 2 and column 2, lines 15 to 24) to assume that aluminium ions released at one side of the galvanic cell will be eliminated from the water at the other side. The scale-reducing effect indicated in the TÜV report can therefore be entirely attributed to the galvanic cells formed by the electrically connected aluminium and copper parts of the pipeline (see (52), (78) and (80) in the figure reproduced in point III above) in the presence of conducting water, so that there is no proof that the insulated carbon rod has any influence on scale reduction. In the absence of proof of any technically relevant effect associated with the presence of the insulated carbon rod, the Board considers the presence of the insulated carbon rod as a modification which at best has no technical function, and may even be technically disadvantageous.

Technical disadvantages caused by the introduction of the carbon rod can be seen in the more complicated construction and in the obstruction of the water flow. Such disadvantageous modifications do not involve an inventive step, if the skilled person could clearly predict these disadvantages and was right in his assessment thereof, and if, as is the case here, these predictable disadvantages were not compensated by any unexpected technical advantage (see T 119/82, OJ EPO, 1984, 217).

Similar considerations apply to technically non-functional modifications.

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 omission of the metal fillings is regarded as a technically relevant modification, whereas the introduction of the carbon rod into the device according to D5 is considered to be no more than an arbitrary modification of the design of that device which, being arbitrary, cannot involve an inventive step within the meaning of Article 56 EPC.

5.5 The Appellant's submission that the commercial success of the patentee's devices must be considered as convincing and sufficient evidence for the presence of an inventive step cannot be accepted. The Board agrees that the commercial success of a product can have its origin in the inventive character thereof. If, however, as is the case here, the technically relevant examination of the claimed subject-matter leads to the result that no inventive step is involved, the recognition of commercial success cannot lead to a reverse result (see T 110/92 (not published in OJ EPO)).

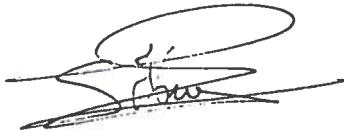
5.6 It follows from the above considerations that the Appellant's request contains at least one claim which lacks inventive step. The appeal must therefore fail.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:



S. Hue

The Chairman:



R. Spangenberg

