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**D E C I S I O N**  
**of 7 May 1999**

**Case Number:** T 1149/97 - 3.4.2  
**Application Number:** 88301957.2  
**Publication Number:** 0282251  
**IPC:** G01N 9/00, G01N 11/16

**Language of the proceedings:** EN

**Title of invention:**  
Fluid transducer

**Patentee:**  
Solartron Group Limited

**Opponent:**  
Endress + Hauser GmbH + Co.

**Headword:**  
Fluid transducer/SOLARTRON

**Relevant legal provisions:**  
EPC Art. 54, 56, 69(1), 84, 123(2), 123(3)  
EPC R. 57a

**Keyword:**  
"Novelty - main request and auxiliary requests 2 & 3 (no)"  
Inventive step - auxiliary request 1 (no) - auxiliary request  
6 (yes)"  
"Amendments - auxiliary requests 4 & 5 (not admissible): "cut-  
off-effect" under Article 123(3) EPC by grant of a patent"

**Decisions cited:**  
G 0001/84, G 0002/88, G 0001/93, G 0007/93, T 0061/85,  
T 0064/85, T 0420/86, T 0673/89, T 0784/89, T 0187/91,

T 0977/94

**Headnote:**

1. Without opposition, issue of a decision to grant a European patent normally constitutes a "cut-off" point for making amendments to the application documents in the European proceedings. If an opposition has been filed, "cut-off" effects due to the grant of a patent may be seen in the restrictions imposed on further amendments to the patent specification by Rules 57a and 87 and Article 123(3) EPC.
2. Although Article 123(3) EPC only addresses the claims of the European patent, amendments to the description and the drawings may also extend the protection conferred in accordance with Article 69(1) EPC.
3. If, in view of Articles 84 and 69 EPC, the application documents have been adapted to amended claims before grant, thereby deleting part of the subject-matter originally disclosed in order to avoid inconsistencies in the patent specification, as a rule subject-matter deleted for this reason can neither be reinserted into the patent specification nor into the claims as granted without infringing Article 123(3) EPC. An analogous finding applies to subject-matter retained in the patent specification during such adaptation for reasons of comprehensibility, but indicated as not relating to the claimed invention (see point 6. of the reasons).



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Chambres de recours

Case Number: T 1149/97 - 3.4.2

**D E C I S I O N**  
**of the Technical Board of Appeal 3.4.2**  
**of 7 May 1999**

**Appellant:** Solartron Group Limited  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 30 September 1997  
revoking European patent No. 0 282 251 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** S. V. Steinbrener  
**Members:** M. A. Rayner  
M. Lewenton

## Summary of Facts and Submissions

- I. The appellant (proprietor of the patent) lodged an appeal against the decision of the Opposition Division revoking European patent No. 0 282 251.

An opposition had been filed by the respondent (opponent) against the patent as a whole and based on Article 100(a) EPC since the subject-matter of the patent in suit allegedly lacked novelty and/or inventive step. The opposition *inter alia* referred to the following documents (using the referencing of the Opposition Division):

- A: DE-C-17 73 815, and  
B: DE-C-33 36 991.

The Opposition Division held that the grounds for opposition mentioned in Article 100(a) EPC prejudiced the maintenance of the contested patent in that the subject-matter of claim 1 as granted was not novel with respect to the prior art disclosed in document B. Claim 1 amended in accordance with an auxiliary request was considered to contravene Article 123(2) EPC and accordingly not to be allowable.

- II. In the communication of 10 February 1999 pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal, the Board pointed out that in its provisional view the subject-matter of claim 1 as granted was anticipated by the fluid transducer disclosed in document B since the meaning of "yoke" seemed to cover the screw-in part of document B, which also included a "cavity". Moreover, the Board had

serious doubts as to whether the amendments to claim 1 according to the respective auxiliary requests submitted by the appellant with the statement of grounds of appeal satisfy the requirements of Article 123(2) EPC. In particular, a configuration having exciting means in only one of two cavities, the other cavity being left empty or containing a sensing element, would not appear to be directly and unambiguously derivable from the application documents as filed.

- III. Oral proceedings requested by the appellant on a subsidiary basis took place on 7 May 1999. During the oral proceedings, the appellant referred to an article in

The Marconi Review, Vol. XLIII, No. 218, 1980, pages 156 to 175

already cited by the Examining Division as document D1 and acknowledged in the patent in suit. At the end of the oral proceedings, the Board's decision was given.

- IV. The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of a main request (patent as granted) or on the basis of auxiliary requests 1 to 6 as submitted during the oral proceedings.

- V. The respondent requested that the appeal be dismissed.

- VI. The wording of claim 1 according to the respective requests on file at the time of the present decision reads as follows:

**Main Request**

"1. A fluid transducer comprising:

a sensing element (10) adapted for immersion in a fluid, said sensing element comprising a pair of tines (834, 835; or 845, 846) which extend in an axial direction from and are coupled together by a common yoke (836 or 842) and which are resonantly vibratable at a common frequency but in antiphase;

piezoelectric means (830; or 840, 841) mounted within the sensing element for exciting such resonant antiphase vibration of the tines; and

further piezoelectric means (20 or 48) mounted within the sensing element for sensing the frequency of the vibration;

characterised in that the exciting means (830; or 840, 841) is mounted under axial compression in a cavity (831; or 850, 851) in the yoke (836 or 842) in a region thereof closely adjacent the point where the inner face (832 or 833; or 843 or 844) of one of the tines (834 or 835; or 845 or 846) joins the yoke."

**Auxiliary Request 1**

"1. A fluid transducer for measuring density and/or viscosity comprising:

a sensing element (10) adapted for immersion in a fluid, said sensing element comprising a pair of tines (834, 835; or 845, 846) which extend in an axial direction from and are coupled together by a common yoke (836 or 842) and which are resonantly vibratable at a common frequency but in antiphase;

piezoelectric means (830; or 840, 841) mounted within the sensing element for exciting such resonant

antiphase vibration of the tines; and

further piezoelectric means (20 or 48) mounted within the sensing element for sensing the frequency of the vibration;

characterised in that the exciting means (830; or 840, 841) is mounted under axial compression in a cavity (831; or 850, 851) in the yoke (836 or 842) in a region thereof closely adjacent the point where the inner face (832 or 833; or 843 or 844) of one of the tines (834 or 835; or 845 or 846) joins the yoke."

#### **Auxiliary Request 2**

"1. A fluid transducer comprising:

a sensing element (10) adapted for immersion in a fluid, said sensing element comprising a pair of tines (834, 835; or 845, 846) which extend in an axial direction from and are coupled together by a common yoke (836 or 842) and which are resonantly vibratable at a common frequency but in antiphase;

piezoelectric means (830; or 840, 841) mounted within the sensing element for exciting such resonant antiphase vibration of the tines; and

further piezoelectric means (20 or 48) mounted within the sensing element for sensing the frequency of the vibration;

characterised in that the common yoke is a yoke mass and the exciting means (830; or 840, 841) is mounted under axial compression in a cavity (831; or 850, 851) in the yoke mass (836 or 842) in a region thereof closely adjacent the point where the inner face (832 or 833; or 843 or 844) of one of the tines (834 or 835; or 845 or 846) joins the yoke."



**Auxiliary Request 3**

"1. A fluid transducer comprising:

a sensing element (10) adapted for immersion in a fluid, said sensing element comprising a pair of tines (834, 835; or 845, 846) which extend in an axial direction from and are coupled together by a common yoke (836 or 842) and which are resonantly vibratable at a common frequency but in antiphase;

piezoelectric means (830; or 840, 841) mounted within the sensing element for exciting such resonant antiphase vibration of the tines; and

further piezoelectric means (20 or 48) mounted within the sensing element for sensing the frequency of the vibration;

characterised in that the exciting means (830; or 840, 841) is mounted under axial compression in an enclosed cavity (831; or 850, 851) in the yoke (836 or 842) in a region thereof closely adjacent the point where the inner face (832 or 833; or 843 or 844) of one of the tines (834 or 835; or 845 or 846) joins the yoke."

**Auxiliary Request 4**

"1. A fluid transducer comprising:

a sensing element (10) adapted for immersion in a fluid, said sensing element comprising a pair of tines (845, 846) which extend in an axial direction from and are coupled together by a common yoke (842) and which are resonantly vibratable at a common frequency but in antiphase;

piezoelectric means (840, 841) mounted within the sensing element for exciting such resonant antiphase

vibration of the tines; and

further piezoelectric means (20 or 48) mounted within the sensing element for sensing the frequency of the vibration;

characterised in that the yoke contains two cavities (850, 851), the exciting means (840, 841) is mounted under axial compression in at least one of the cavities (850, 851) in the yoke (842) in a region thereof closely adjacent the point where the inner face (843 or 844) of one of the tines (845 or 846) joins the yoke."

#### **Auxiliary Request 5**

"1. A fluid transducer comprising:

a sensing element (10) adapted for immersion in a fluid, said sensing element comprising a pair of tines (845, 846) which extend in an axial direction from and are coupled together by a common yoke (836 or 842) and which are resonantly vibratable at a common frequency but in antiphase;

piezoelectric means (840, 841) mounted within the sensing element for exciting such resonant antiphase vibration of the tines; and

further piezoelectric means (20 or 48) mounted within the sensing element for sensing the frequency of the vibration;

characterised in that the yoke contains two cavities, the exciting means (840, 841) and the sensing means being mounted under axial compression in the cavities (850, 851) in the yoke (836 or 842) in a region thereof closely adjacent the point where the inner face (843 or 844) of one of the tines (845 or 846) joins the yoke."

**Auxiliary Request 6**

"1. A fluid transducer comprising:

a sensing element (10) adapted for immersion in a fluid, said sensing element comprising a pair of tines (845, 846) which extend in an axial direction from and are coupled together by a common yoke (842) and which are resonantly vibratable at a common frequency but in antiphase;

piezoelectric means (840, 841) mounted within the sensing element for exciting such resonant antiphase vibration of the tines; and

further piezoelectric means (20 or 48) mounted within the sensing element for sensing the frequency of the vibration;

characterised in that the yoke has two cavities, the piezoelectric exciting means (840, 841) comprises two piezoelectric elements mounted under axial compression in respective cavities (850, 851) in the yoke (842) in a region thereof closely adjacent the point where the inner face (843 or 844) of one of the tines (845 or 846) joins the yoke."

VII. The appellant's argument in support of its requests may be summarised as follows:

**Main request**

The patent in suit relates to a fluid "transducer". As can be seen from technical dictionaries, "transducer" conveys the notion of converting a physical quantity into an electrical signal, either in proportion to quantity or according to a specified formula. Examples include accelerometers, microphones and photocells.

Thus, a transducer is not a switch but a measuring device. In the appellant's view, document D1 comes closest to the subject-matter of claim 1 as granted since this document also relates to the field of measurement.

The present inventors were the first to realise that an accurate and robust sensor can be obtained by carefully choosing the location of the exciting means closely adjacent to the tines. The resonant frequency of a vibrating system is a function of the spring constant which in the prior art is defined by the thin base connecting the tines and forming the spring element. This construction is vulnerable to applied pressures since the spring properties are affected if forces are exerted on the base by external pressure changes. According to the patent in suit, only the tines are oscillated, i.e the spring constant is determined by the tines, whereas the base is a massive yoke so that pressure changes in the fluid do not affect the spring constant.

Documents A and B relate to switches which are not concerned with any accuracy aspects. In these documents, the problem of external pressure changes is not recognised. As a consequence, flexible bases are provided, the spring constant of which is simply assumed to be invariable in document B. The term "yoke" in the field of coupled vibrations relates to the bit coupling the tines together, which means only membrane 21 in document B has the function of a "yoke" whereas screw-in part 10 is a mounting means. In consequence, there is also no "cavity" in the "yoke", and the location of the exciting means in the prior art only

fortuitously looks similar to that claimed in the patent in suit. In order to guarantee small deformations of the transducer elements, the rod-shaped supports 42, 43 in document B are elastic, thus making the whole vibrational system more flexible. It would not be obvious to act against this teaching by making the rod-shaped supports more massive or by allowing non-central driving.

**Auxiliary request 1**

The meaning of "transducer" has been made explicit in claim 1 of auxiliary request 1 specifying the intended use for measuring density and/or viscosity. The amendment is disclosed in column 8, lines 28 and 41 to 43 and column 9, lines 1 to 12 of the patent specification, and in claims 8 and 9 as granted.

**Auxiliary request 2**

Claim 1 of auxiliary request 2 underlines the fact that the yoke is massive, the term "yoke mass" being derivable from column 3, lines 38 to 42 of the A-publication of the patent in suit. A skilled person would understand by this relative term that the tines are the only parts forming spring elements as can be seen from Figure 9 of the patent in suit.

### **Auxiliary request 3**

The specification "enclosed cavity" in accordance with claim 1 of auxiliary request 3 is based on column 10, lines 1 to 4 of said A-publication and exemplified by Figures 8 and 9 of the patent in suit. It is meant to relate to a configuration where the piezoelectric element is entrapped in the cavity. Even if some passages of the original description have not been retained in the patent specification, a patent proprietor is still entitled to introduce any limiting features originally disclosed into the claims after grant. Since there must be some wiring passing through the claimed enclosure, a skilled person would understand the cavity to be "substantially" enclosed.

### **Auxiliary requests 4 and 5**

Having regard to the admissibility of the subject-matter claimed in accordance with auxiliary requests 4 and 5, reference is made to decision T 187/91 according to which a specific example within a generic disclosure is part of the application as filed if the skilled reader would seriously contemplate such specific example as a possible practical embodiment of the described invention. In the present case, excitation of only one of the tines would seriously be contemplated by a skilled person in view of original claims 1 and 7 disclosing a yoke with one or more cavities and column 2, lines 13 to 17 of the A-publication explicitly referring to single tine excitation and single tine pick-up as possible alternatives. Use of the original disclosure for further restricting the claims must be considered

perfectly admissible. Moreover, such single-tine alternatives form part of the common general knowledge in the technical field concerned. Therefore, the intermediate generalisations in accordance with auxiliary requests 4 and 5 must be considered admissible under Article 123(2) EPC.

**Auxiliary request 6**

Finally, the subject-matter of claim 1 of auxiliary request 6 is restricted to the embodiment of Figure 9 of the patent in suit and should be clearly patentable over the prior art identified.

VIII. The respondent argued as follows:

**Main request**

As the conversion performed by a "transducer" may also be in accordance with a specified formula, a specified frequency change is included within this definition. Therefore, no difference relating to a transducer can be seen between the devices of documents A and B and the subject-matter of claim 1 as granted. Document B expressly refers to a frequency evaluation circuit which determines whether the vibration frequency is above or below an adjustable reference frequency. Hence, there is no doubt that frequency changes are measured in the prior art.

Moreover, the appellant's arguments directed to features not present in the claim must be disregarded. For instance, claim 1 as granted does not specify that the transducer is immersed in the fluid so that the

base region would be subject to pressure variations. Similarly, a definition of "yoke" as now advanced by the appellant is neither derivable from the claims nor from the patent specification as a whole. As can be seen from Figure 8 of the patent in suit, the lower portion of "yoke" 836 is also of diaphragm type so that the tines are excited by bending the diaphragm as is the case in the prior art. Moreover, it is clear to a skilled person that the tines may be excited even if the diaphragm is made more massive. Finally, the expression "closely adjacent to the tines" is vague and cannot be relied upon for justifying patentability.

**Auxiliary request 1**

Having regard to claim 1 of auxiliary request 1, it appears doubtful under Article 123 EPC whether the specific use disclosed in claim 9 as granted may be generalised by deleting the specific design of the tines for said use. Moreover, a transducer measuring density **and** viscosity does not seem to have been originally disclosed. Although there are no objections with respect to novelty over documents A and B, the claimed subject-matter appears to be obvious from general common knowledge.

**Auxiliary request 2**

The introduction of "yoke mass" into claim 1 of auxiliary request 2 is not considered admissible under Article 123 EPC. Firstly, the passage of the A-publication referred to by the appellant in this context cannot be used as a basis for disclosure, since it does not relate to "yoke mass" but to the "centre of



mass" of the whole structure which has nothing to do with a massive or rigid design of the yoke. Secondly, dimensions of the yoke are nowhere disclosed in the original application documents. Moreover, the expression "yoke mass" is unclear since the yoke may consist of a relatively thick part and a relatively thin part (see the original Figures 10 and 11), the latter being neither massive nor rigid but flexible. Finally, it would appear that the addition of "yoke mass" does not lead to a specification capable of distinguishing the claimed subject-matter from the available prior art.

### **Auxiliary request 3**

In the respondent's view, pursuant to Article 123(2) EPC the original disclosure determines the reservoir of possible amendments before grant. However, after grant if the subject-matter of the patent specification has been restricted by deleting passages from the application documents as filed, the reservoir of possible amendments becomes restricted also pursuant to Article 123(3) EPC. The passages of the A-publication referred to by the appellant as a basis for disclosure of the expression "enclosed cavity" cannot be relied upon when attempting to amend the claims after grant. The only available source of disclosure might be the text associated with Figure 9 of the patent in suit where the cavities are closed by plugs. However, generalisation of this concrete embodiment would lead to an extension of the scope of protection beyond the content of the patent specification. Finally, since "enclosed" does not mean "fully enclosed", the piezoelectric elements in transducer column 41 of

document B can also be said to be enclosed by bridging member 44 and rod-shaped supports in cavity 14.

#### **Auxiliary requests 4 and 5**

An analogous argument with respect to admissibility holds for the claimed subject-matter of auxiliary requests 4 and 5, respectively. The passages of the A-publication referred to by the appellant have been replaced or deleted in the patent in suit and are no longer available for any amendments to the claims. Decision T 187/91 relates to a different procedural situation and is not applicable in the present case where room to manoeuvre only exists within the content of the patent in suit. Moreover, as regards admissibility a skilled person's knowledge is entirely irrelevant. Otherwise, all direct equivalents would form part of the original disclosure which, however, is not the case according to the established construction of Article 123(2) EPC.

#### **Auxiliary request 6**

There are no formal objections against claim 1 of auxiliary request 6. However, the description needs careful adaptation to the wording of the claims since the patent has been limited to the embodiment of Figure 9. In particular, deletion of the other embodiments from the patent specification is required. Therefore, the case should be remitted to the first instance if auxiliary request 6 were granted.

### **Reasons for the Decision**

1. *Admissibility of Appeal*

The appeal complies with the provisions mentioned in Rule 65 EPC and is therefore admissible.

2. *Main Request*

2.1 Novelty

In the Board's view, a fluid transducer according to claim 1 as granted is anticipated by the prior art described in document B.

2.1.1 Document B (see in particular Figure 3 and associated text) discloses a device for determining and/or monitoring a predetermined filling level in a container, said device comprising

- a sensing element 10, 20, 40 adapted for immersion in a fluid (see document B, column 8, lines 14 to 22 in combination with column 2, lines 14 to 20 and lines 61 to 64), said sensing element comprising a pair of tines 22, 23, which extend in an axial direction from and are coupled together by common screw-in part 10 and which are resonantly vibratable at a common frequency but in antiphase (see document B, Figures 8 to 10);
- piezoelectric means 65 (see document B, Figure 6) mounted within the sensing element (see document B, Figure 3: transducer column 41) for exciting such resonant antiphase vibration of the tines; and

- further piezoelectric means 66 (see document B, Figure 6) mounted within the sensing element (see document B, Figure 3: transducer column 41) for sensing the frequency of the vibration.

Furthermore, the exciting means 65 is mounted under axial compression (by bridging member 44, rod-shaped supports 42, 43 and adjusting screw 45; see also Figure 8 of document B) in a cavity 14 in screw-in part 10 in a region thereof closely adjacent the point where the inner face of one of the tines 22, 23 joins screw-in part 10 (see document B, Figure 3 and column 6, lines 26 to 39).

2.1.2 In view of these facts, the presence of novelty depends on two issues, i.e. whether or not

- (i) the prior art device for determining and/or monitoring a predetermined filling level in a container falls within the meaning of a "fluid transducer"; and
- (ii) known screw-in part 10 falls within the meaning of "yoke".

The appellant's further arguments do not bear on the wording of the claim and therefore are not relevant to the assessment of novelty of the actually claimed subject-matter.

2.1.3 Having regard to issue (i), the appellant has suggested a definition for "transducer" according to which such a device converts a physical quantity into an electrical signal, either in proportion to quantity or according

to a specified formula. Whereas the first alternative seems to relate to analog conversion, the Board agrees with the respondent on the fact that the second alternative comprises digital conversion, i.e. binary switching or counting in its most simple forms. This is also illustrated by one of the appellant's examples, namely a photo cell which clearly may serve both purposes dependent on subsequent evaluation electronics.

The device according to document B can indicate a filling level by determining whether the natural resonance frequency of the mechanical oscillatory system is above or below an adjustable reference frequency (see document B, column 10, lines 16 to 20), thus performing a conversion of a "binary" density change of a fluid into a corresponding change in the frequency of electro-magnetic oscillations. The known device can also convert more gradual density variations into detectable frequency variations (see document B, column 2, lines 51 to 64).

Therefore, the Board is convinced that the prior art device falls under the appellant's own definition of "fluid transducer".

- 2.1.4 The appellant's argument against equating screw-in part with a "yoke" (issue (ii)) relies in substance on construing the term "yoke" as designating a massive bit of material coupling the tines together, whereas in document B the tines are coupled by flexible diaphragm 21 only.

However, in this context it has to be pointed out that

the patent in suit does not give any explicit definition of "yoke". Construed in a general way, the term appears to relate to a component linking two items. Since diaphragm 21 is part of, and preferably integral with, screw-in part 10 (see document B, column 5, lines 9 to 11), the latter may well be considered to be the overall component linking the tines.

In addition, Figure 8 of the patent in suit shows a configuration similar to that of document B, the "yoke" 836 consisting of a flexible diaphragm-like lower part which directly couples the tines together and a more massive upper part which bridges, and is welded to, a tubular extension of said lower part and mainly serves the purpose of preloading the piezoelectric exciting element in the cavity thus formed (see column 9, lines 19 to 26 of the patent in suit). Hence, in the contested patent the diaphragm directly coupling the tines together is also part of, and connected to, some kind of superstructure, and the whole of it is called a "yoke".

The Board therefore comes to the conclusion that screw-in part 10 is covered by the term "yoke".

2.1.5 In consequence, the subject-matter of claim 1 as granted lacks novelty (Article 54 EPC), and claim 1 is not allowable for this reason.

### 3. *Auxiliary request 1*

#### 3.1 Admissibility of amendments

In view of claims 8 and 9 as granted and column 8, line 24 to column 9, line 12 of the patent in suit, the Board considers the insertion of "for measuring density and/or viscosity" into claim 1 as granted to be admissible under Article 123 EPC. In particular, it is unmistakably derivable from the above-cited passage that the claimed transducer type must be sensitive to both density **and** viscosity in the absence of further measures.

### 3.2 Novelty

In construing the limitation effected by the addition of the intended use, the Board follows the established practice before the EPO of interpreting expressions like "fluid transducer for measuring density and/or viscosity" to mean "fluid transducer suitable for measuring density and/or viscosity" (see e.g. T 784/89, OJ EPO 1992, 438; point 2.1.8 of the reasons).

The device of document B, which can also be called a "fluid transducer", already detects and indicates a density change as has been pointed out above (see point 2.1.3). As such detection must be considered to constitute a basic type of rough measurement, in the Board's view novelty of the claimed subject-matter seems doubtful.

### 3.3 Inventive step

However, if in accordance with the respondent's argument novelty is accepted, the suitability of the device known from document B for measuring density would, in any case, be obvious to a skilled person. A

clear indication pointing in this direction is already given in document B referring to the detection of small density variations (see column 9, lines 10 to 22). Moreover, the Board shares the respondent's opinion that the suitability of vibratory transducers of the known type for density and/or viscosity measurements forms part of a skilled person's expertise (see e.g. the review article (document D1) referred to by the appellant at the oral proceedings).

Therefore, the claimed subject-matter does, in any case, not involve the inventive step required by Article 56 EPC, and as a consequence claim 1 of auxiliary request 1 cannot be considered allowable.

#### 4. *Auxiliary request 2*

##### 4.1 Admissibility of amendments

In claim 1 of auxiliary request 2, the yoke has been defined to be a "yoke mass".

Insofar as a specific meaning is to be given to this term, e.g. in the sense that the yoke is "massive", its admissibility under Article 123(2) EPC is questionable as the respondent has rightly pointed out.

The passage referred to by the appellant as a basis for disclosure (see column 3, lines 38 to 42 of the A-publication; an identical passage figures in the patent specification at column 3, lines 38 to 43) does not relate to the "yoke mass" but to the "centre of mass" which is a specific abstract point existing for any distribution of masses. No further information in the



sense of a "massive" yoke design is given in the patent in suit. In view of the drawings, an interpretation of "yoke mass" to mean "massive yoke" would also lead to clarity problems (Article 84 EPC), since the yoke may consist of more "massive" and less "massive" parts (see Figure 8 of the patent in suit).

Therefore, the Board holds the view that the term "yoke mass" is only admissible under Article 123(2) EPC if construed in a trivial sense, i.e. that the yoke has a mass.

#### 4.2 Novelty

In the light of the above interpretation, the specification of "yoke" to be a "yoke mass" in accordance with claim 1 of auxiliary request 2 adds nothing to claim 1 as granted but a triviality.

Therefore, the subject-matter of claim 1 of auxiliary request 2 also lacks novelty with respect to document B (Article 54 EPC).

#### 5. *Auxiliary request 3*

##### 5.1 Admissibility of amendments

Claim 1 of auxiliary request 3 differs from claim 1 as granted in that "cavity" has been replaced by "enclosed cavity". It is correct that the passage of the A-publication (column 10, lines 1 to 4) cited by the appellant in this context relates to original Figure 10 which has been deleted before grant.

Nevertheless, the said passage, according to which the piezoelectric element is "entrapped" within the yoke, has been retained in the patent specification (see column 9, lines 23 to 26) for describing Figure 8 of the patent in suit (original Figure 11). In the Board's view, this adaptation of the original application documents to the wording of the claims intended for grant seems to be justified when due account is taken of the fact that the transducer of original Figure 11 is described in the A-publication to be similar to that of Figure 10 with the exception of an annular piezoelectric element (see column 10, lines 18 to 24 of the A-publication). Since the remaining features of both embodiments should therefore be more or less identical, use of the text associated with original Figure 10 in slightly adapted form for supplementing the rather summary description of original Figure 11 (now Figure 8 of the contested patent) is considered admissible under Article 123(2) EPC in the present case.

Moreover, Figures 8 and 9 of the patent in suit, illustrating the only remaining embodiments of the claimed invention, clearly show configurations where the cavity is "enclosed".

Therefore, claim 1 of auxiliary request 3 meets the requirements of Article 123 EPC.

## 5.2 Novelty

The qualification of the "cavity" of claim 1 as granted to be "enclosed", however cannot establish novelty of the claimed subject-matter over document B.

As has been communicated by the Board to the parties during the oral proceedings, document B (see in particular Figure 2) already discloses an electronics head 30 comprising a housing 31 which must also be considered to "enclose" cavity 14 of screw-in part 10 in the broad sense of the term.

Hence, claim 1 of auxiliary request 3 is also not allowable (Article 54 EPC).

6. *Auxiliary requests 4 and 5*

6.1 Admissibility of amendments

6.1.1 In accordance with auxiliary requests 4 and 5, claim 1 as granted has been amended by specifying that the yoke contains two cavities, the exciting means being mounted in at least one of the cavities (claim 1 of auxiliary request 4) or, alternatively, the exciting means and the sensing means being mounted in the cavities (claim 1 of auxiliary request 5).

In the appellant's view, these amendments are based on original claims 1 and 7 disclosing a yoke with at least one cavity, i.e. one or more cavities, and on column 2, lines 13 to 17 of the A-publication disclosing single tine excitation and/or single tine pick-up.

6.1.2 However, in the patent specification original claims 1 and 7 have been replaced by claim 1 as granted and the above passage of the A-publication was deleted when the description was adapted to amended claims before grant.

There is another passage in the patent specification

(see column 5, line 56 to column 6, line 20) which might be understood to relate to single-tine excitation and/or single pick-up as well (see in particular column 6, lines 17 to 20 of the patent in suit). However, apart from the fact that in the Board's view the wording of the passage is ambiguous, and could e.g. also be read on the design possibilities for one of two tines, the other tine having an identical configuration, it appears from the patent specification that said passage does not relate to the claimed invention, but to subject-matter which has been expressly retained in the patent specification only for reasons of comprehensibility of the claimed subject-matter as granted (see column 2, line 31 to column 3, line 1 and column 9, lines 13 to 18 of the patent in suit: the former passage distinguishing "examples useful for understanding the invention" from "embodiments of the invention" and devices "of the kind to which the present invention relates" from devices "in accordance with the present invention", the latter passage relates to the modifications of the transducers described thus far "in accordance with the present invention").

Moreover, the only embodiment of the contested patent showing two cavities, i.e. the embodiment of Figure 9 corresponding to Figure 12 of the application documents as filed, has a piezoelectric exciting element in each cavity, the sensing element being positioned in any convenient location of the tines or yoke where it will be flexed by the vibrations of the tines (see column 9, lines 40 to 56 of the patent in suit).

6.1.3 Therefore, having regard to the amendments according to

auxiliary request 4 and 5 and taking account of the parties' arguments, the issue of admissibility under Article 123 EPC seems to focus on two aspects:

- firstly, whether a basis of disclosure for amending claims after grant may be seen in the full extent of the original disclosure even if the passages relied on have been deleted before grant or are presented in the patent specification as not relating to the claimed invention; and
- secondly, whether the embodiment of Figure 9 of the patent in suit might serve as such basis.

6.1.4 In accordance with Article 123 EPC, the rights of a patent proprietor to make amendments after grant are subject to two conditions:

- a European patent may not be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC), and
- the claims of the European patent may not be amended during opposition proceedings in such a way as to extend the protection conferred (Article 123(3) EPC).

The appellant contended that both conditions are met by the amendments according to auxiliary requests 4 and 5 in that further limiting features have been added to claim 1 as granted, and these further features have unmistakably been disclosed in the application documents as filed. Thus, in its view the scope of

protection has not been extended, and no subject-matter beyond the content of the application as filed has been added.

This formal argument does not take account of the fact that in the present case the new limiting features are based on subject-matter which has been deleted from the description or indicated in the description as no longer belonging to the claimed invention before grant, or, in other words, denies any substantive consequences of such pre-grant deletions or indications for the admissibility of amendments after grant.

The appellant's view has been objected to by the respondent who on the contrary considers such deletions or indications to be generally substantive in the sense that they reduce the original disclosure to the subject-matter retained in the patent specification, i.e. a "cut-off point" ("Zäsurwirkung") is effected by the grant of a patent preventing any subsequent reinstatement of subject-matter "abandoned" before grant.

6.1.5 The Board is not aware of any case law explicitly dealing with the present issue although one might think that it does not relate to an extremely rare situation. It therefore considers a closer examination of the existence of any "cut-off effects" associated with the grant of a patent to be appropriate in the present case.

6.1.6 There are few decisions on abandonment of subject-matter with substantive effect (see the examples cited in "Case Law of the Boards of Appeal of the European

Patent Office", Third edition, European Patent Office 1999, Chapter VI, I-3.1.1). It appears to be common ground among these decisions that in general an abandonment takes substantive effect if particular subject-matter has been **expressly** abandoned together with the complete deletion of the original claim and all support therefor in the specification (see e.g. T 61/85, point 11 of the reasons, and T 64/85, points 2.1 to 2.3 of the reasons; both decisions not published in OJ EPO). In that case, reinstatement of the abandoned subject-matter is no longer possible.

Since in the case of an alleged cut-off point generally established by the grant of a patent there need not be such express abandonments of subject-matter before grant, any cut-off effect would not, in the Board's view, directly result from an "abandonment" in the strict meaning of the term, i.e. in that it was expressly declared, but only indirectly due to the procedural situation of the file.

- 6.1.7 Decision T 420/86 (not published in OJ EPO; see point 4 of the reasons) *inter alia* deals briefly with the request of a patent proprietor in *inter partes* proceedings to cancel the deletion of a feature from the original main claim, which deletion had been effected before grant with the approval of the examining division. The board found that such deletion cannot be reversed after grant of the patent since it is tantamount to an abandonment. A readmission of the deleted feature at this stage had therefore to be ruled out. In consequence, the request was considered to fail for merely formal reasons.

From this decision, the conclusion can be drawn that the grant of a patent has, in general, the effect of making pre-grant abandonments substantive.

However, decision T 420/86 does not give any legal reasons for its finding on "quasi-abandonment", and since this decision was issued before decision G 7/93 of the Enlarged Board of Appeal (OJ EPO 1994, 775) it is not clear whether the finding at that time may have been based on the assumption of a binding effect of the applicant's approval of the text notified under Rule 51(4) EPC. In its later decision, the Enlarged Board of Appeal has dismissed such an assumption by stating that "neither approval of the notified text by the applicant, nor issue of a Rule 51(6) EPC communication by the EPO, "binds" either the applicant or the EPO in the true meaning of that word, namely so as to bar subsequent amendment of the application. Contrary to the President's views as set out in his comments to the Enlarged Board, the Examining Division has a discretion to allow amendment **prior to issue of a decision to grant a patent**, either upon request by the applicant or on the Examining Division's own motion" (see point 2.1 of the reasons, emphasis added by the Board).

- 6.1.8 Thus, whereas no general cut-off effect may be invoked from an applicant's normal procedural declarations under Rule 51 EPC before grant, the above-cited passage of G 7/93 points at the existence of a cut-off point for procedural reasons, caused by the issue of a decision to grant a patent as a last step in the European proceedings.



This conclusion is in line with the finding of the Enlarged Board of Appeal in its earlier decision G 1/84 (OJ EPO 1985, 299; see point 1 of the reasons) and broadly supported in literature (see M. van Empel: "The Granting of European Patents", A.W. Sijthoff, Leyden 1975, No. 542; R. Schulte: "Patentgesetz", 5th Edition, Carl Heymanns Verlag KG, Köln 1994, §49, No. 16; F. Blumer: "Formulierung und Änderung der Patentansprüche im europäischen Patentrecht", Carl Heymanns Verlag KG, Köln 1998, No. 17.1.1, last paragraph). It is based on the formal aspect that the grant of a patent represents an act of authority which marks the end of an administrative procedure. This act is binding on the authority and the applicant who thereby accepts the consequences, "i.e. he renounces any further claim under the same act of authority" (see M. van Empel, loc. cit.).

Thus, once a decision to grant a patent has been issued the European examination procedure is closed and its results become binding on the applicant and the EPO in that no further amendments (apart from corrections under Rule 89 EPC) are allowable. If no opposition is filed, the European patent will normally enter the national phase as it is.

- 6.1.9 If, however, an opposition is filed with the EPO, further amendments of the patent in suit become possible. Although such amendments are not left to the general discretion of the patent proprietor since opposition proceedings are not a continuation of examining proceedings (see G 1/84, supra; point 9 of the reasons), pursuant to Rule 57a EPC the patent proprietor may react to the opponent's objections by

amending the description, claims and drawings, provided that the amendments are occasioned by the grounds for opposition specified in Article 100 EPC, even if the respective ground has not been invoked by the opponent. In addition, amendments occasioned by national rights of earlier date are admissible pursuant to Rule 87 EPC.

In the Board's view, it is these regulations of the EPC that may be seen to reflect the **formal** aspects of a procedural cut-off effect associated with the grant of a patent in the opposition phase. There, the grant of a patent does not constitute a general cut-off point in that the patent must be defended in unamended form, however only amendments as reactions to actual or possible grounds of opposition or to conflicting earlier national rights are admissible. Compliance with the restrictions imposed by Rules 57a and 87 EPC is thus a pre-requisite for any further considerations having regard to possible **substantive** cut-off effects for amendments after grant during opposition proceedings.

6.1.10 Regarding such **substantive** cut-off effects, the Board holds the view that these could only be based on Article 123(3) EPC.

Article 123(3) EPC expressly addresses the claims of a European patent only, and this choice of wording might be considered to imply that post-grant amendments to the description and the drawings of a European patent are not subject to any restrictions.

However, there seems to be agreement in literature that this provision should be interpreted broadly in view of

its intention and interrelationship with Articles 69 and 138 EPC (see e.g. G. Paterson: "The European Patent System", Sweet and Maxwell, London 1992, paragraph 5-40; R. Schulte: "Patentgesetz", 5th Edition, Carl Heymanns Verlag KG, Köln 1994, §22, Nos. 4 to 9; R. Singer et al.: "The European Patent Convention", Revised English (1995) edition, Sweet & Maxwell, London 1995, Article 123.10D; F. Blumer: "Formulierung und Änderung der Patentansprüche im europäischen Patentrecht", Carl Heymanns Verlag KG, Köln 1998, No. 17.1.5.1).

In accordance with the general intention of Article 123(3) EPC there should be legal certainty for the activities of third parties trusting that the protection conferred by a patent can only be restricted, but not extended. Furthermore, since pursuant to Article 69(1) EPC the extent of protection shall be determined by the terms of the claims with due consideration to the description and the drawings, care must also be taken that any amendments to the latter do not involve an extension of the protection conferred. These principles have been confirmed by the case law of the Enlarged Board of Appeal (see G 2/88, OJ EPO 1990, 93, point 4 of the reasons and G 1/93, OJ EPO 1994, 541, point 11 of the reasons). Moreover, under national law, any extensions of the protection conferred by a European patent may be used as a ground for revocation according to Article 138(1)(d) EPC.

The guiding principle under Article 123(3) EPC may therefore be summarised by the finding that "once a European patent has been granted, an act by a third party which would not infringe the patent as granted

should not be able to become an infringing act as a result of amendment after grant" (see G. Paterson, loc. cit.).

- 6.1.11 Adaptation of the description and the drawings to the wording of amended claims intended for grant is fundamental under Articles 84 and 69 EPC in order to establish consistency between the claimed invention and its description having regard to support and extent of protection (see e.g. decision T 977/94, not published in the OJ EPO; point 6.1 of the reasons).

Deletions in pre-grant proceedings are therefore normally carried out because the deleted passages of the original disclosure relate to subject-matter no longer meeting the wording of the claims to be granted, i.e. because these passages would *inter alia* conflict with the protection sought by the claims. Similarly, protection is not sought for inconsistent subject-matter clearly indicated in the patent specification as not relating to the invention. Adaptation of the description in this way is an alternative to deletions if the comprehensibility of the remaining subject-matter suffered from such deletions.

- 6.1.12 In consequence, it must be concluded that by reinstating features, which in order to avoid inconsistencies in the patent specification have either been deleted from the pre-grant documents or have been clearly indicated as no longer relating to the claimed invention, as a rule the extent of protection of the patent will be affected, whether such features be introduced into the claims or reinstated into the patent specification. This must necessarily be the case

under the above guiding principle since a third party relying on the inconsistent subject-matter not falling under the extent of protection conferred by the granted patent would be confronted with an extension of the protection conferred after reinstatement of said inconsistent subject-matter, thus opening a possibility of a hitherto excluded infringement of the patent.

Therefore, such reinstatement of subject-matter which in view of Articles 84 and 69 EPC has been deleted or indicated as no longer relating to the invention before grant in order to avoid inconsistencies in the patent specification, should as a rule not be admissible under Article 123(3) EPC after grant. In consequence, the Board comes to the conclusion that for such pre-grant deletions and indications a cut-off effect should be expected in that they become substantive under Article 123(3) EPC after grant.

6.1.13 In the present case, the application has been limited before grant to exciting means located in a cavity **in the yoke**, and all inconsistent passages relating to the originally disclosed alternative of exciting means in cavities **in the tines** have been correctly deleted from the documents intended for grant or - where deletion was inexpedient for reasons of comprehensibility - have been indicated in the patent specification as no longer relating to the claimed invention. This finding applies in particular to the passages on which the amendments according to auxiliary requests 4 and 5 are to be based in the appellant's view.

Thus, the Board considers the subject-matter of claim 1 as granted - when read in the light of the patent

specification and the drawings (see Figures 8 and 9 representing the only remaining embodiments of the invention as granted) - to have been restricted before grant to symmetric excitation of both tines by exciting means mounted in the yoke. A skilled person would therefore not expect single tine excitation, which was mentioned as a general possibility in the original application documents in the context of piezoelectric elements located in the tines, to be protected by the patent in suit any longer.

6.1.14 Although the subject-matter of claim 1 in accordance with auxiliary requests 4 and 5 has been formally restricted for reasons of patentability under Article 100(a) EPC by introducing the features relating to two cavities in the yoke, the fact that the respective claims re-include the possibility of single tine excitation simultaneously extends the protection conferred by the contested patent since the patent as granted as a whole no longer covered such a possibility.

The present case has therefore to be distinguished from the situation considered in decision T 673/89 (not published in OJ EPO; see point 3.1.2 of the reasons), where no indication was derivable from the file that a further possibility still figuring in the patent specification was to be excluded from the extent of protection.

Hence, taking account of the legal effects of the grant of a European patent under Article 123(3) EPC, the Board does not consider the original subject-matter "abandoned" in the present case before grant either by deletion from, or express declaration in, the original application documents to form a basis for admissible amendments after grant.

6.1.15 Nor could, contrary to the appellant's view, such basis be found in the application documents as filed under Article 123(2) EPC. The only embodiment disclosing two cavities in the yoke is that illustrated by Figure 12 of the A-publication, corresponding to Figure 9 of the patent in suit. In each of the cavities, a piezoelectric exciting element 840, 841 is provided. In the Board's opinion, there is no unmistakable indication in the original disclosure that one cavity of this specific embodiment might be empty or contain a piezoelectric sensing element, nor would the claimed generalisations be implicit from said figure and its associated description.

This was even not alleged by the appellant who in this context referred to design alternatives being obvious to a skilled person from common general knowledge. However, according to established practice of the boards of appeal obviousness of a feature is not a replacement for the original disclosure.

Finally, decision T 187/91 (OJ EPO 1994, 572) referred to by the appellant is not applicable to the present situation since it deals with the admissibility of a specific example within a generic disclosure whereas the present case relates to the admissibility of a

generalisation of the specific disclosure of Figures 12 and 9, respectively.

6.1.16 In consequence, auxiliary requests 4 and 5 cannot be allowed (Article 123 EPC).

7. *Auxiliary request 6*

7.1 Admissibility and clarity of amendments

The subject-matter of claim 1 according to auxiliary request 6 has been further restricted with respect to the subject-matter of claim 1 as granted in that the yoke has two cavities, and the piezoelectric exciting means comprises two piezoelectric elements mounted in respective cavities.

As has been pointed out above (see point 6.1.2), a fluid transducer of this type is disclosed in Figure 9 and column 9, lines 40 to 51 of the patent in suit, corresponding to Figure 12 and column 10, lines 32 to 43 of the application documents as filed.

Therefore, the Board does not see any objections under Articles 123 and 84 EPC against claim 1 of auxiliary request 6, nor have such objections been raised by the respondent.

7.2 Patentability

7.2.1 The subject-matter of claim 1 of auxiliary request 6 differs from the most relevant document, i.e. document B, by the newly introduced features: in the closest prior art, there is only one "cavity" 14 in "yoke" 10



(see document B, Figure 3) in which the piezoelectric exciting means 65 is mounted (see document B, Figure 6). Although the exciting means may consist of two piezoelectric elements 59, 61, these are connected in parallel electrically and in series mechanically in order to increase the mechanical deformation of the free portion of diaphragm 21 which is situated between the end faces of tines 22 and 23.

Neither do the remaining prior art documents, which are less relevant, disclose the above features. Therefore, the claimed subject-matter meets the requirement of novelty (Article 54 EPC).

7.2.2 As can be seen from Figure 9 of the patent in suit and in accordance with the appellant's arguments, the provision of two cavities in the yoke close to the tines allows an entirely different construction of the vibrating system: each tine is excited separately, and a flexible diaphragm prone to be affected by external pressure changes can be avoided. Therefore, the technical problem solved by the claimed subject-matter with respect to the closest prior art may be seen in removing external pressure effects on the transducer's measuring accuracy (in this context, see also column 7, lines 21 to 30 of the patent in suit).

7.2.3 Since the available prior art is silent on this problem and does not give any hint of its solution, the Board is convinced that the claimed subject-matter involves the inventive step required by Article 56 EPC.

7.2.4 In consequence, claim 1 as amended in accordance with auxiliary request 6 must be considered allowable.

Dependent claims 2 to 8 which have been adapted to the wording of claim 1 and relate to preferred embodiments of the claimed subject-matter are also allowable.

### 7.3 Description and drawings

Although the appellant has submitted amendments to the description as well at the oral proceedings, under the present circumstances the Board considers it expedient to remit the case to the department of first instance for further prosecution in accordance with the discretion given to the Board pursuant to Article 111(1) EPC. In view of the findings in point 6. above, adaptation of the description and the drawings to the more restricted subject-matter now claimed needs careful consideration so that full consistency with amended claim 1 is guaranteed.

In this context, the department of first instance should in particular deal with the issue of whether the embodiment of Figure 8 of the contested patent, which is no longer covered by amended claim 1, is to be deleted from the patent specification or retained in modified form as not belonging to the invention.

## 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 the following claims, and description and drawings to be adapted:

Claims 1 to 8 according to the sixth auxiliary request submitted during the oral proceedings.

The Registrar:

The Chairman:

P. Martorana

S. Steinbrener