

BESCHWERDEKAMMERN  
DES EUROPÄISCHEN  
PATENTAMTS

BOARDS OF APPEAL OF  
THE EUROPEAN PATENT  
OFFICE

CHAMBRES DE RECOURS  
DE L'OFFICE EUROPEEN  
DES BREVETS

**Internal distribution code:**

- (A)  Publication in OJ  
(B)  To Chairmen and Members  
(C)  To Chairmen  
(D)  No distribution

**Datasheet for the decision  
of 26 April 2007**

**Case Number:** T 0293/06 - 3.2.06

**Application Number:** 99929980.3

**Publication Number:** 1089847

**IPC:** B23K 26/14

**Language of the proceedings:** EN

**Title of invention:**

Method and arrangement for improving quality in fusion welding operations

**Patentee:**

AGA AKTIEBOLAG

**Opponent:**

L'AIR LIQUIDE, S.A. A DIRECTOIRE ET CONSEIL DE SURVEILLANCE  
POUR L'ETUDE ET L'EXPLOITATION DES PROCEDES GEORGES CLAUDE

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step - (yes)"

**Decisions cited:**

T 0229/85

**Catchword:**

-



Case Number: T 0293/06 - 3.2.06

**DECISION**  
of the Technical Board of Appeal 3.2.06  
of 26 April 2007

**Appellant:**  
(Opponent)  
L'AIR LIQUIDE, S.A. A DIRECTOIRE ET CONSEIL DE  
SURVEILLANCE POUR L'ETUDE ET L'EXPLOITATION  
DES PROCEDES GEORGES CLAUDE  
75 Quai d'Orsay  
F-75321 Paris Cedex 07 (FR)

**Representative:**  
Pittis, Olivier  
L'Air Liquide, S.A.,  
Direction de la Propriété Intellectuelle,  
75, Quai d'Orsay  
F-75321 Paris Cedex 07 (FR)

**Respondent:**  
(Patent Proprietor)  
AGA AKTIEBOLAG  
S-181 81 Lidingö (SE)

**Representative:**  
Kasseckert, Rainer  
Linde AG  
Zentrale Patentabteilung  
Dr.-Carl-von-Linde-Strasse 6-14  
D-82049 Höllriegelskreuth (DE)

**Decision under appeal:**  
Decision of the Opposition Division of the  
European Patent Office posted 14 February 2006  
rejecting the opposition filed against European  
patent No. 1089847 pursuant to Article 102(2)  
EPC.

**Composition of the Board:**

**Chairman:** P. Alting Van Geusau  
**Members:** G. Pricolo  
R. Menapace

## Summary of Facts and Submissions

I. The appeal is from the decision of the Opposition Division posted on 14 February 2006 to reject the opposition filed against European patent No. 1 089 847 granted in respect of European patent application No. 99 929 980.3.

Independent claims 1 and 6 as granted read as follows:

"1. Method of improving quality in fusion welding operations where protective gas is supplied to the welding point via a hose line, characterized in that the quantity of impurities brought along by the protective-gas flow from the inside of the protective-gas hose and supplied to the welding point is reduced by virtue of the fact that a small flush-gas flow is made to pass continuously through the protective-gas hose or a considerable part of its length when the normal protective-gas flow is shut off".

"6. A fusion welding equipment comprising a control valve (4) for supplying protective gas to the welding point via a hose line, characterized by means (5,6) permitting a small continuous flush-gas flow to bypass the control valve (4) when the valve is shut off and to pass through the protective-gas hose (3) or a considerable part of its length in order to reduce the quantity of impurities brought along by the protective-gas flow from the inside of the protective-gas hose (3) and supplied to the pool when said control valve is opened."

II. In coming to its decision the Opposition Division held that the claimed subject-matter was novel and inventive over the available prior art including:

D1: DE-A-2 135 545;

D2: Article by Didier Beaudrouet: "CO<sub>2</sub> laser gases: the effects of impurities" published in "Industrial Laser review", pages 11-13, January 1990;

D4: US-A-5 065 794.

D1, which represented the closest prior art, did not disclose that a small flush-gas flow was made to pass through the protective-gas hose or a considerable part of its length when the normal protective-gas flow was shut off. Starting from D1, the technical problem solved consisted in avoiding accumulation of impurities in the inside of a protective gas hose of a welding device. D2 and D4, both of which did not deal with welding, did not give any hint to the claimed solution to the technical problem.

III. The appellant (opponent) lodged an appeal against this decision, received at the EPO on 24 February 2006, and simultaneously paid the appeal fee.

With its statement setting out the grounds of appeal, which was received at the EPO on 6 March 2006, the appellant requested that the decision be set aside and the patent be revoked and auxiliarily oral proceedings.

IV. The arguments submitted by the appellant in the statement of grounds of appeal can be summarized as follows:

Although the Opposition Division correctly considered D1 to represent the closest prior art, it overlooked the fact that the technical problem, to avoid accumulation of impurities in the inside of a protective gas hose of a welding device, and its solution, to pass a small flush-gas flow through the protective-gas hose or a considerable part of its length when the normal protective-gas flow was shut off, were known from D4 and D2. D4 related to a gas flow distribution system for the distribution of very high purity gas to process equipment in which a gas flow was continuously maintained also when all the valves were closed and no gas flowed to the process equipment, in order to remove impurities that might have accumulated inside the system. The teaching of D4 was not limited to the technical field of semiconductor manufacturing mentioned therein but was applicable to all systems and technical fields in which similar contamination problems arose. D2 related to the technical field of laser welding and was specifically concerned with the problems caused by atmospheric impurities. D2 disclosed that gas-distribution systems were subject to the risk of contamination by air which could result in introduction of moisture. It also disclosed that certain lasers were equipped with devices that automatically filled the laser cavity with nitrogen and maintained it slightly pressurized when the laser was stopped. Accordingly, D2 showed that in the technical field of welding it was generally known that impurities in a gas-distribution system represented a problem

which could be overcome by purging the portion of the system with a gas when the system was not in use. Therefore, the subject-matter of claims 1 and 6 of the patent in suit did not involve an inventive step.

V. With letter dated 3 July 2006 the respondent (patentee) requested that the appeal be dismissed and, subsidiarily, oral proceedings. The respondent did not submit any arguments but merely referred to its written submissions in the opposition proceedings.

VI. In an annex to the summons for oral proceedings pursuant to Article 11(1) Rules of Procedure of the boards of appeal, the Board expressed its preliminary opinion that the technical problem in accordance with the decision under appeal was not valid because it contained pointers to the solution and thus might anticipate it. In the Board's view, a more appropriate formulation of the problem could be "to reduce the quality impairments which occur in fusion welding using protective gas" (see par. [0008] of the patent in suit). In order to solve this problem, the skilled person would have to recognize that a source of quality impairments which occurred in fusion welding using protective gas were the impurities originating from the inside of the protective-gas hose which were supplied to the pool by the gas flow. Since D2 and D4 did not relate to fusion welding using a protective gas and in particular did not disclose that the impurities that accumulated in a protective-gas hose of fusion welding equipment might impair the welding quality, it would appear doubtful that a skilled person would turn to D2 and D4 to solve the above-mentioned problem.

VII. With its letter dated 5 April 2007, the appellant informed the Board that it would not attend the oral proceedings scheduled on 5 June 2007 and withdrew its request for oral proceedings. It also filed submissions in reply to the communication of the Board. These submissions can be summarized as follows:

The claimed subject-matter did not involve an inventive step even if the problem was formulated as proposed by the Board. In fact, it was generally known that atmospheric impurities were the cause of welding defects. Identifying the origin of these impurities in a welding system was a normal task for a skilled person. When performing this task, the skilled person would obviously find that these impurities accumulated inside the welding system when the latter was shut off. This conclusion was moreover suggested by the general teaching of D2 and D4, namely to eliminate impurities penetrating into a gas distribution system when the latter was not in use by continuously purging it during that time.

VIII. With communication dated 25 April 2007 the Board informed the parties that the scheduled oral proceedings were cancelled.

### **Reasons for the Decision**

1. The appeal is admissible.

2. *Novelty*

Since the novelty of the subject-matter of independent claims 1 and 6 is not in dispute, the Board will turn directly to the issue of inventive step.

3. *Inventive step*

3.1 In the judgement of the Board, it is appropriate to regard D1 as the closest prior art since it is the only prior art document on file which refers to a method of, and equipment for, fusing welding operations where protective gas is supplied to the welding point via a hose line (see Fig. 1). This is in line with the view of the Opposition Division and is also accepted by the appellant.

The fusion welding equipment according to D1 comprises a control valve (11) for the protective gas which flows along a protective gas line (15). It additionally comprises a pressurized air line (13) and a line (14) for supplying a mixture of air and a parting agent. According to the teaching of D1, (see page 3, last paragraph, to page 4, first paragraph) when the welding process is terminated and a delay has expired to allow a weld seam to cool, pressurized air is passed through the burner (5) to remove weld spatters deposited onto the burner. Immediately afterwards, the mixture of air and parting agent is passed through the burner. Finally, a shielding gas stream is passed through the burner to displace the air in the burner.

There is no disclosure in D1 of a step of continuously passing a small flush-gas flow through the protective-



gas hose (15) or a considerable part of its length when the normal protective-gas flow is shut off. Nor is there a disclosure of means permitting a small continuous flush-gas flow to bypass the control valve (11) when the valve is shut off and to pass through the protective-gas hose (15) or a considerable part of its length.

Therefore, the subject-matter of claims 1 and 6 is distinguished from the method and equipment of D1 by the features defined in the respective characterizing portion.

- 3.2 The Opposition Division considered (see point 4 of the decision under appeal) that the technical problem solved was to avoid accumulation of impurities in the inside of a protective gas hose of a welding device.

Although the Opposition Division concluded in favour of inventive step, this statement of the problem contains pointers to the solution and is therefore not valid (see e.g. T 229/85), as already stated in the annex to the summons for oral proceedings. The statement of the problem does not mention the effect obtained by the distinguishing features but rather recites the cause (accumulation of impurities in the inside of a protective gas hose) of a disadvantage (quality impairments which occur in fusion welding, see par. [0008] of the patent in suit), and thus already points to the solution (removing the cause, i.e. removing the impurities in the inside of the protective gas hose).

In the Board's judgment, a correct formulation of the problem is to reduce the quality impairments which occur in fusion welding using protective gas (see par. [0008] of the patent in suit), or, in other words, to improve the quality of welds made with fusion welding using protective gas.

- 3.3 The solution to this problem in accordance with the method of claim 1 and the equipment of claim 6 of the patent in suit is based on the recognition that a cause of impairment of the quality of welds in fusion welding using protective gas is represented by the impurities which originate from the inside of the protective-gas hose and accumulate therein when the welding equipment is not in use and the protective-gas flow is shut off (see par. [0007] and [0009] of the patent in suit).

The appellant submitted that it would be a routine task for the skilled person to identify this cause of impairment. Although the Board accepts that it is a normal task for a skilled person to look for causes that negatively affect a welding process, it cannot be overlooked that the welding process is a complex physical process which is influenced by several parameters. Certainly the skilled person is aware that impurities in the protective gas represent one such parameter and that, depending on circumstances, gases with high purity must be used. However, in the absence of specific indications in the prior art, there is no reason for a skilled person to directly correlate impairments in the quality of the weld, which a priori might be due to many different factors, with the specific factor represented by the impurities in the gas originating from within the welding equipment.

The appellant submitted that the skilled person would find such specific indications in documents D2 and D4. D4 relates to a gas distribution system for the distribution of very high purity gas to a plurality of outlets from which the very high purity gas can be delivered to processing equipment, e.g. for semiconductor manufacturing (col. 1, first paragraph) or pharmaceutical applications (col. 8, lines 25 to 35). D4 underlines the importance of preventing contamination by impurities in the gas distribution system (col. 2, lines 15 to 21) and discloses, as a technical measure to prevent contamination, the provision of a continuous flow of protective-gas in the gas distribution system (col. 5, lines 39 to 45) when the latter is not in use. However, D4 is not concerned with fusion welding and therefore there would be no reason for a skilled person faced with the above-mentioned problem related to the weld quality to take D4 into consideration. And, even if the skilled person would consider D4, he would not find any indication suggesting that the contaminants which according to D4 should be eliminated from fluid distribution systems intended for semiconductor manufacturing or pharmaceutical applications (see col. 7, lines 14 to 35) might also be present in the protective-gas hose of the fusion welding equipment according to D1 and should likewise be eliminated because they would affect the weld quality.

D2 is concerned with the effects that impurities in the gas used to fill a CO<sub>2</sub> laser resonator have on the laser beam characteristics (see page 11, right column). It discloses, in particular, continuously purging the

laser cavity with nitrogen when the laser is stopped to avoid the presence of moisture. The Board accepts that a well known application of a CO<sub>2</sub> laser is fusion welding. However, D2 is not concerned at all with the supply of protective gas to the welding point, but only with the gas present in the laser cavity. There is no reason for a skilled person faced with the above-mentioned problem related to the weld quality to consider the teaching of D2 which is related exclusively to the laser beam quality. And, even if the skilled person would consider D2, he would not find any indication suggesting that the contaminants which according to D2 should be eliminated from gas distribution systems intended for filling laser cavities (see page 13, right column) might also be present in the protective-gas hose of the fusion welding equipment according to D1 and should likewise be eliminated because they would affect the weld quality.

- 3.4 From the above it follows that the subject-matter of independent claims 1 and 6, and likewise of dependent claims 2 to 5 and 7 to 10, involves an inventive step over the available prior art represented by documents D1, D2 and D4.
4. Therefore, the Opposition Division's decision to reject the opposition must, in effect, be confirmed.

**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:

M. Patin

P. Alting van Geusau