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Datasheet for the decision of 19 June 2008

Case Number: T 0761/06 - 3.2.06

Application Number: 98936709.9

Publication Number: 1027951

IPC: B23K 9/095

Language of the proceedings: EN

Title of invention:
Arc welding monitoring device

Patentee:
KABUSHIKI KAISHA YASKAWA DENKI

Opponent:
L'AIR LIQUIDE, S.A. A DIRECTOIRE ET CONSEIL DE

Headword:
-

Relevant legal provisions:
EPC Art. 123(2), 123(3), 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Amendments - added subject-matter (no)"
"Amendments - extension of protection (no)"
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0761/06 - 3.2.06

D E C I S I O N
of the Technical Board of Appeal 3.2.06
of 19 June 2008

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)	KABUSHIKI KASIHA YASKAWA DENKI 2-1, Kurosaki-Shiroishi Yahatanishi-Ku Kitakyushu-Shi Fukuoka 806-0004 (JP)
Representative:	Goddar, Heinz J. FORRESTER & BOEHMERT Pettenkoferstrasse 20-22 D-80336 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted 19 April 2006 concerning maintenance of European patent No. 1027951 in amended form.**

Composition of the Board:

Chairman: P. Alting Van Geusau
Members: G. de Crignis
K. Garnett

Summary of Facts and Submissions

I. With the interlocutory decision posted on 19 April 2006 the opposition division, taking into consideration the amendments filed during the opposition proceedings, maintained the European patent No 1 027 951.

II. The opposition division considered that the amendments made by the proprietor met the requirements of Articles 123(2) and (3) EPC and that the resulting subject-matter of the independent claim and its dependent claims 2 to 4 was novel and inventive over the prior art cited by the opponent.

III. Against this decision the appellant (opponent) filed an appeal, received at the European Patent Office on 17 May 2006. The corresponding fee was paid on the same day. A statement setting out the grounds of appeal was received at the European Patent Office on 19 July 2006.

IV. Of the prior art cited during the opposition procedure, the appellant relied on the following in the appeal proceedings:

D1 : Abstract of JP-A-58053374,
D2 : Advent "Intelligent" Welding Systems, and
D8 : "Real-Time Weld Quality Monitor Controls GMA Welding", Welding Journal, pp. 36-41, March 1991.

V. Oral proceedings were held on 19 June 2008.

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

The respondent (proprietor) requested that the decision under appeal be set aside and the patent be maintained on the basis of claims 1 and 2 filed with its letter dated 18 April 2008.

Claim 1 reads as follows :

"An arc welding monitoring device for an arc welding robot controlling apparatus, comprising :
a means for detecting electric signals, which detects either a welding current or a welding voltage; and
a means for storing trajectories of a robot, wherein it further comprises
a means for storing said detected welding electric signals;
a means for simultaneously displaying graphically by diagrams on a screen display, trajectories of a robot, which are stored by said storing means, and at least a range of corresponding welding current or corresponding welding voltage detected by said detecting means;
means for setting said range to be displayed, wherein setting is carried out by designating the portion of the trajectories of a robot, which is displayed on said screen display; and
a means for setting judgment conditions of a welding abnormality, and a comparator for comparing the conditions established by said setting means with said detected data, and when any abnormality is found to have been generated by monitoring said detected data and judging a welding abnormality, the range of data in which a welding abnormality occurred is displayed on the trajectory with a color different from that of the other remaining range."

At the beginning of the oral proceedings, the chairman pointed out some obviously erroneous passages in the wording of claim 1. The obvious inconsistencies between the wording of the claim on the one hand and the description and the Figures on the other meant, according to the view of the Board, that a discussion of the subject-matter of claim 1 could not be based upon its literal wording. The wording in dispute concerned the application of the term "range" in combination with data, current, voltage and the reference to the trajectories.

VI. The arguments of the appellant may be summarised as follows:

(a) Granted claim 4 was dependent on "*claims 1 through 3*". The term "through" had to be understood as referring to the combination of claims 1, 2 and 3. The amended claim 1 however only comprised the features of claims 1, 2 and 4, omitting those of claim 3. This gave rise to subject-matter which had not originally been disclosed, either in the claims or in the description, and consequently infringed the requirement of Article 123(2) EPC. Since the combination of the granted claims 1, 2 and 4 also constituted a shift in the subject-matter of the patent, it also extended the protection conferred, contrary to Article 123(3) EPC.

(b) There was no embodiment disclosed for the subject-matter of amended claim 1, so that the claim was also not supported by the description, contrary to the provisions of Article 84 EPC.

(c) The amended description lacked a statement acknowledging the prior art known from D8. Furthermore, the amendment in column 6, line 13, introduced a sixth embodiment, contrary to the requirement of Article 123(2) EPC.

(d) The subject-matter of claim 1 was obvious in view of the teaching of D1 in combination with D8 and the common knowledge of the skilled person in the field of welding. D1 disclosed an arc welding monitoring device for an arc welding robot controlling apparatus comprising, *inter alia*, a means for displaying graphically by diagrams on a screen display, trajectories of a robot, which were stored by said storing means, and at least a range of corresponding welding current or corresponding welding voltage detected by said detecting means, and means for setting said range to be displayed. The feature "*displaying graphically by diagrams... trajectories*" was disclosed in D1, paragraph headed "Constitution", lines 12-13.

(e) In any case the graphical display of the welding points in the form of a trajectory could not contribute to inventive step since the creation of trajectories from a set of data points was well known to everybody (for example by creation of graphs from the data of an Excel-sheet), was common in the art (e.g. D2) and did not relate to a technical problem.

(f) The problem to be solved could be formulated as allowing an operator to easily identify welding defects on the robot's trajectory.

(g) The solution to this problem according to amended claim 1 was to provide the known device with the following features:

(i) means for setting the judgement conditions for welding defects,
(ii) a comparator for comparing the judgement conditions established by the setting means with the measured data of the welding current or voltage;
(iii) finally displaying all detected defects on the welding trajectory in a different colour.

(h) The device of D8 was adapted to continuously monitor welding parameters, such as voltage and current, to analyse and to display them simultaneously with the robot's trajectory on a control screen as evidenced by Figures 2 and 3. D8 disclosed *inter alia* features i) and ii), as well as feature iii) to the extent that the position of any detected defects was displayed on the trajectory. The skilled person confronted with the above problem was guided by the teaching of D8 to combine this device with the one of D1. Compared to the subject-matter of claim 1, the device resulting from this combination would not be adapted to display the portion of the trajectories comprising the welding defect in a different colour than that of the remaining trajectories. Such a difference could however not be considered

to be inventive since it did not resolve any technical problem, but merely constituted improved presentation of information and, furthermore, was a simple trivial and non-inventive alternative to the representations on the display known from D8.

VII. The arguments of the respondent (proprietor) may be summarised as follows:

(a) The addition of the features of granted claims 2 and 4 introduced a further limitation to the subject-matter of the granted independent claim, so that the amended independent claim 1 could not extend the protection conferred, in conformity with Article 123(3) EPC.

(b) Originally filed and granted claims 2 and 3 were alternative embodiments which mutually excluded each other. The skilled person would have noticed that the dependency on "*claims 1 through 3*" in the originally filed and granted claim 4 was wrong. It would have been clear to the skilled person that the features of claim 4 could be either combined with those of claim 2 or of claim 3. Hence the combination of features of claims 1, 2 and 4 had a basis in the originally filed claims and consequently did not offend against Article 123(2) EPC.

(c) Although the description did not disclose a single embodiment comprising all the features of amended claim 1, the disclosed embodiments provided support and helped to understand the subject-matter claimed. From Figures 3 and 4 in

combination with the passages of the description in column 1, lines 38-57, col. 4, l. 32-52, col. 5, l. 2-12 and 20-24, it was apparent that the term "range" used in the feature "*at least a range of corresponding welding current or corresponding welding voltage detected by said detecting means*" referred to an interval in time and not to an interval in the values of the current or voltage. Similarly, from the passages in col. 2, l. 38-47, col. 2, l. 57 to col. 3, l. 3, col. 4, l. 44-48 and col. 6, l. 13-20, it could be inferred that the expression "the range of data" used in the feature "*the range of data in which a welding abnormality occurred is displayed on the trajectory with a color different from that of the other remaining range*" referred to a portion of the trajectory and not to the course of the welding current or voltage.

(d) In addition to the differences acknowledged by the appellant, D1 did not disclose the feature "*means for simultaneously displaying graphically by diagrams on a screen display, trajectories of a robot, ..., and at least a range of corresponding welding current or corresponding welding voltage detected by said detecting means*". D1 only disclosed that the robot's position data, stored welding data and measured welding values were displayed. Also, D1 neither disclosed a "*means for setting said range to be displayed, wherein setting is carried out by designating the portion of the trajectories of a robot, which is displayed on said screen display*", nor a "*means for setting judgement conditions of a welding abnormality*".

(e) According to the effects and advantages mentioned in paragraph [0007], item 3, of the granted patent, the aim of the invention was to facilitate visual defect detection.

(f) In view of this problem, D8 was not relevant for the assessment of inventive step. It was concerned with real-time monitoring of the welding process, so as to enable interruption of the welding process and to allow for automatic modification of the welding parameters on the real-time basis. This contrasted with the aim of the patent, which was that the visual inspection of the final welding work should be facilitated.

(g) Figures 2 and 3 of D8 each showed a screen display of test results representing in a single diagram wirefeed speed and welding current or voltage, respectively, as a function of time. The curves for wirefeed speed as a function of time were not trajectories of a welding robot, and the displays shown in Figures 2 and 3 did not contain more than one diagram, contrary to what was implied by the plural "graphically by diagram**s**" (emphasis added) in claim 1 of the amended patent.

Reasons for the Decision

1. The appeal is admissible.

2. *Interpretation of claim 1*

2.1 The granted as well as the amended claim 1 contain the feature

"*at least a range of corresponding welding current or corresponding welding voltage detected by said detecting means*".

This feature is ambiguous because the term "range" does not appear to bear its usual meaning. A range of a current or voltage would generally be considered to refer to an interval of values within which the current or voltage may vary. However, having regard to the description and the figures of the opposed patent, the meaning of the term "range" has to be construed as referring to the course of the welding current or welding voltage with respect to the elapsed time of welding. This interpretation is in line with the aim of the patent, which is to easily establish how detected data such as welding current/voltage correspond to welding line information (the trajectory of a robot) relating to welding work (par. [0003] and [0005]). It also is supported by the description of embodiments of arc welding monitoring devices, which, although not comprising all the features of the claimed invention, illustrate that the course of the welding current or welding voltage is correlated with a portion of the trajectory of a welding robot (see for example col. 4, l. 44-52 in combination with figure 4, and col. 5, l. 2-12 and 20-24 in combination with figure 5).

Since the above feature was already present in the granted claims it cannot give rise to an objection

under Article 84 EPC. For the purposes of the appeal, the feature will thus have to be interpreted in light of the disclosure of the patent as follows:

"*at least a portion of the course of the corresponding welding current or corresponding welding voltage corresponding to the portion of the trajectories of the robot*".

2.2 Similarly, the last feature in claim 1

"*the range of data in which a welding abnormality occurred is displayed on the trajectory with a color different from that of the other remaining range*"

is ambiguous, since the expression "range of data" could be understood to refer either to a portion of the trajectory or to a portion of the course of the welding current or voltage. The expression "other remaining range" is also ambiguous. From the description of the patent, col. 6, l. 13-19 it may be inferred that the portion of the trajectory judged to be abnormal is displayed in a different colour from the portion of the trajectory judged to be normal.

For the purposes of the appeal, the feature will thus have to be interpreted in light of the disclosure of the patent as follows :

"*the portion of the trajectories in which a welding abnormality occurred is displayed on the trajectory with a color different from that of the remaining trajectories*".

3. *Amendments*

3.1 Claim 1 has been amended by incorporating in granted claim 1 the features of granted dependent claims 2 and 4. Dependent claim 4 was in the granted claims and was dependent on "*claims 1 through 3*". Dependent claim 2 stated that "*setting of the range to be displayed is carried out by designating the portion of the trajectory of a robot which is displayed on said screen display*", whereas according to claim 3, dependant only on claim 1, it is *"carried out by designating said range of a welding current or a welding voltage*".

These two ways of setting could only be understood by the skilled person as being alternatives for selecting a portion of the trajectories to be inspected for possible welding defects. This is confirmed by the description of the respective second and third embodiments of an arc welding monitoring device in paragraphs [0012] and [0013] and Figures 4 and 5 of the patent. The expression for the dependency in granted claim 4, "*claims 1 through 3*", thus covered the combination of features of granted claims 1, 2 and 4 as well as of granted claims 1, 3 and 4.

The granted claims, although amended, were not opposed on the ground of Article 100(c) EPC and the Board has no reason to think that the granted claims would extend the subject-matter of the patent beyond the content of the application as filed.

Since the granted claims 1, 2 and 4 do not extend beyond the content of the application as filed, the subject-matter of amended claim 1 does not extend

beyond the content of the application as filed either and consequently satisfies the requirement of Article 123(2) EPC.

3.2 By adding the features of the former dependent claims to the independent claim, the protection conferred by the independent claim is further restricted. The condition of Article 123(3) EPC is thus also satisfied.

3.3 The appellant's argument that the now-claimed combination of features was not available to the skilled person in the originally filed application and, as a consequence, also leads to a shift in the subject-matter and thereby in the protection conferred, so that the requirements of Article 123(2) and (3) EPC are not met, cannot be accepted by the Board.

The content of the application as filed encompasses the description, the figures and the claims (Case Law of the Boards of Appeal, 5th Edition 2006, III.A.1). As has been stated above, the combination of features according to amended claim 1, although not disclosed as such in the description, was disclosed in the claims as originally filed and as granted, so that the now claimed subject-matter does not extend beyond the content of the application as filed. There is also no shift in the subject-matter, because the subject-matter of the granted claim 1 is still present in the amended claim, but reduced in its scope of protection by the added features of the granted dependent claims.

With respect to the appellant's interpretation of the dependency formulated in claim 4, the resulting subject-matter, including the way of setting according

to claim 2 along with that of claim 3, would for the skilled person be inconsistent. Once the data range to be displayed is set, e.g. in the way specified in claim 2, an additional setting of the same range according to claim 3 would make no sense. Hence the skilled person would not have understood the formulation "*claims 1 through 3*" as relating to the combination of the features of claims 2 and 3. Rather, from the wording of claims 2 and 3, he would have recognised them as alternatives.

3.4 The appellant's objection to the amended claim under Article 84 EPC, relying on the absence of an embodiment of the combination of features according to the amended claim, is not available in the opposition-appeal proceedings, because this alleged defect was already present in the patent as granted.

3.5 With respect to the amendments of the description of the patent in col. 6, l. 13, the appellant considered that the amendment of the statement "*Further, with respect to the trajectories, ...*" to read "*Further and in accordance with the invention, with respect to the trajectories, ...*" resulted in the introduction of an additional embodiment. The Board does not share this view, since the addition of the expression "*and in accordance with the invention*" only emphasises that features which originally were considered to represent preferred embodiments, and as such have been formulated in a dependent claim, now are considered as essential features of the invention defined by the independent claim.

3.6 For the reasons set out under item 5.6 below, the acknowledgement of D8 in the description is not required.

4. *Novelty*

The parties agreed that the subject-matter of claim 1 is novel over the arc welding monitoring devices of D1 and D8.

5. *Inventive step*

5.1 The closest prior art to the subject-matter of claim 1 is D1, which discloses a controller for a welding robot for the purpose of checking welding conditions and improving working efficiency in a welder operated automatically by a robot from stored position data (points) by displaying measured values of the welding voltage and current.

5.2 The subject-matter of claim 1 (literal wording) is distinguishable over the arc welding monitoring device known from D1 by the following features:

(a) a means for simultaneously displaying graphically by diagrams on a screen display trajectories of a robot, which are stored by said storing means, and at least a range of corresponding welding currents or corresponding welding voltages detected by said detecting means;

(b) means for setting said range to be displayed, wherein such setting is carried out by designating the portion of the trajectories of a robot, which is displayed on said screen display; and

(c) a means for setting judgment conditions of a welding abnormality, and a comparator for comparing the conditions established by said setting means with said detected data, and when any abnormality is found to have been generated by monitoring said detected data and judging a welding abnormality, the range of data in which a welding abnormality occurred is displayed on the trajectory with a colour different from that of the other remaining range.

These features (according to the above interpretation of the claim) facilitate the visual identification of the portions of a welding trajectory where the welding is judged abnormal or defective.

5.3 The appellant considered D1 to anticipate the graphical display of trajectories of the welding robot. Lines 8 to 13 of the paragraph headed "Constitution" of D1 literally read: "[A titled device...] performs automatic welding by storing the position data in points, and the data on the welding current and voltage and operating the robot 5 from these points to point and displays the data corresponding to these points simultaneously on the display part 15." According to the appellant the set of points displayed corresponds to the display of the trajectory. From this passage it may indeed be inferred that the points constituting the path the welding robot travelled are displayed simultaneously with the corresponding welding currents and voltages. It nevertheless does not unambiguously disclose that trajectories are displayed graphically. The points through which the robot moved might have been displayed in an alphanumeric format, by means of a

single point permanently updated or in the form of a list of several points. Since D1 does not contain any further indication about the type of display or presentation of the data, this argument of the appellant is not convincing.

With respect to the feature "*means for setting the range to be displayed*", which allegedly were anticipated by the feature "input part" of the device known from D1, the only information available from D1 in view of its function is found in line 2 of the paragraph headed "Constitution", reading literally: "A titled device which is provided with the input part which inputs position data of a robot...". This does not constitute a disclosure of a setting means in the sense of the above feature.

5.4 The technical problem to be solved may hence be formulated as how to facilitate the visual identification of portions of welding trajectories with welding abnormalities.

5.5 The solution as defined by the combination of features according to claim 1 is not rendered obvious by the available prior art, since none of the available documents mentions or fairly suggests the simultaneous graphical display by diagrams on a screen of trajectories of a robot and at least a "portion of the course" of the corresponding welding currents or voltages and to display a "portion of the trajectories" in which a welding abnormality occurred in a colour different from that of the "remaining trajectory" (for the terms in quotation marks, see items 2.1 and 2.2).

Consequently, the subject-matter of claim 1, as well as of its dependent claim 2, meets the requirement of Article 56 EPC.

5.6 The Board can not accept the arguments of the appellant advanced to support its objection of lack of inventive step for the following reasons.

Even if the graphical representation of a set of data points in the form of a trajectory, as well as the monitoring of a welding operation and display of parameters and faults, would be considered to belong to the general knowledge or to the common practice in the art (as the opposition division also pointed out), the appellant has failed to show that the skilled person would necessarily and in a straight-forward manner combine a means for displaying simultaneously graphically by diagrams robot trajectories and welding currents or voltages, a means for setting a data range to be displayed, a means for setting judgment conditions, a comparator and to provide for differential colour display of the trajectory with the device known from D1.

The Board agrees with the argument of the respondent that D8 is not directed to the problem of visual defect detection of a final welding work. Rather it addresses the problem of avoiding welding defects by processing welding parameters in a real-time environment (page 36, right col., 2nd paragraph), so that the final welding work should be free of defects. D8 would consequently not be considered by the skilled person looking for a solution to the problem underlying the invention.

Moreover, D8 does not disclose the display of a diagram of trajectories simultaneously with a diagram of welding currents or voltages in Figures 2 and 3. Rather, each of the figures discloses in a single diagram the course of voltage/current and wirefeed speed as a function of the weld length. The course of the wirefeed speed as a function of the weld length however does not represent a trajectory of a robot and is not even an equivalent representation of a trajectory. It provides the operator with a different kind of information.

Similarly, the Board cannot find any indication in D2 to display trajectories of a welding robot simultaneously with welding currents or voltages.

The Board agrees with the view taken by the opposition division that the feature of displaying an abnormality in a different colour on a trajectory has a technical effect in that it helps the operator to readily identify the portion of a trajectory where a problem may have occurred, thus helping him to correct faults (in future welding runs) and save costs.

5.7 The proposed solution to the technical problem underlying the patent in suit defined in independent claim 1 is thus inventive. Taking into account the amendments made by the appellant, the patent and the invention to which it relates meet the requirements of the EPC, and the patent as amended is maintained in this form.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Opposition Division with the order to maintain the patent on the basis of:

   (a) Claims 1 and 2 as filed with the respondent's (patentee's) letter dated 18 April 2008;
   (b) The amended description filed during the oral proceedings;
   (c) Figures 1 to 5 as granted.

The Registrar : The Chairman :

M. Patin P. Alting van Geusau