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**Datasheet for the decision
of 17 January 2013**

Case Number: T 2162/10 - 3.2.06

Application Number: 05018672.5

Publication Number: 1629923

IPC: B23K9/02, B23K9/23

Language of the proceedings: EN

Title of invention:

Process for electric arc welding of low and high alloy tempered and untempered steels and of dissimilar metals, for obtaining a certain grain structure without thermal treatment

Applicant:

Guth, Bela

Headword:

Relevant legal provisions:

EPC Art. 84

Keyword:

Claims - clarity (no)



**Beschwerdekammern
Boards of Appeal
Chambres de recours**

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Case Number: T 2162/10 - 3.2.06

D E C I S I O N
of the Technical Board of Appeal 3.2.06
of 17 January 2013

Appellant:
(Applicant)

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Decision under appeal:

**Decision of the Examining Division of the
European Patent Office posted 1 June 2010
refusing European patent application No.
05018672.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: M. Harrison
Members: G. de Crignis
R. Menapace

Summary of Facts and Submissions

- I. The examining division refused European patent application No. 05018672.5 holding that the subject-matter of claim 1 was not novel (Article 54 EPC) and that the application did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by the skilled person (Article 83 EPC).
- II. The appellant (applicant) filed an appeal against this decision and in its statement setting out the grounds of appeal provided arguments concerning the reasons for refusal given by the examining division.
- III. In a communication sent as an annex to a summons to oral proceedings, the Board addressed the issues of sufficiency of disclosure and novelty and indicated that it concurred with the finding of the examining division. Additionally it considered the requirements of Article 84 EPC as not being met.
- IV. With letter of 28 December 2012, the appellant informed the Board that the applicant would neither be present nor represented at the oral proceedings and requested to cancel the oral proceedings and to issue a decision based on the written statement of grounds of appeal.
- V. The oral proceedings were duly cancelled.
- VI. Claim 1 reads:

"PROCESS FOR CAPILLARY ELECTRIC WELDING OF LOW AND HIGH ALLOY STEELS, WHETHER TEMPERED OR NOT, AND BIMETALS, FOR OBTAINING A CERTAIN TEXTURE WITH NO THERMAL TREATMENT, characterized in that it comprises the use of electrodes for capillary electric welding with specific

characteristics for welding all kinds of steels, such as, low and high alloy steels and temperable or tempered steels, high-carbon steel or steel-manganese (Hadfield) or SAE-4140 steel, the parts should be chamfered as per the chamfer standard X, U or V, regardless of its thickness, it is not necessary to know the chemical composition of the material or materials to be welded when working with different parts, for example, bimetals, the following steps being defined: Welding of a properly chamfered part (7) is started by using a type of electrode for the crystallization of the austenitic and ferritic deposited weld, as follows:

In the first layer (1), both sides of the chamfer are coated, including its root, using electrodes for the crystallization of the appropriate deposited weld for obtaining an austenitic plus ferritic-type texture, stippling the parts to fasten them with the same electrode.

In the second layer (2), an electrode for the crystallization of the appropriate deposited weld is used for obtaining a perlite or perlite plus troostite-type texture.

In the third layer (3), an electrode for the crystallization of the appropriate deposited weld is used for obtaining an austenite-type texture. In the fourth layer (4), a crystallization electrode for the appropriate deposited weld is used for obtaining a sorbite plus bainite-type texture.

In the fifth layer (5), an electrode for the crystallization of the appropriate deposited weld is used for obtaining an austenite plus ferrite-type texture. In the sixth layer (6), an electrode for the crystallization of the appropriate deposited weld is used for obtaining a bainite-type texture."

VII. The appellant argued essentially:

The technical problem underlying the weld processes of the application was the occurrence of "martensitic crystallization" which should be avoided.

The solution according to the application was to prevent "martensitic crystallization" due to the application of specific adequate weld crystallization electrodes in the claimed order.

The solution mandatorily required the subsequent application of different types of electrodes such as claimed. Such method resulted in the effect that the weld deposited in the respective base/chamfer caused adhesion but no penetration/infiltration. Traditional welds infiltrated or penetrated the welded piece whereas in the claimed process this was not the case. The capillary action prevented penetration/infiltration of the weld in the base material. The crystallization desired from the applied type of electrode corresponded to the obtained texture and the texture related to the size and purpose of the welded base piece.

The order of the electrode combinations required to obtain the textures indicated and the crystallizations obtained, was not known in the state of the art. The term "capillary electric weld" was used because, in order to obtain the capillary electric weld, the chemical composition of the coating of the electrodes had to be modified in the way claimed. The electrodes had to be specific and to correspond to the texture intended to be obtained in the respective layer. Thus, in each layer, the intended crystalline structure could be obtained by applying the specific electrodes according to the type and purpose of the base material. The intended crystalline structure could be identified

and the electrode had to be the one which corresponded to, and was specific for, the required texture. Accordingly, the combination of electrodes resulted in the intended crystallizations.

In Figures 14 to 29 it was illustrated how the intercalation of the weld fillet segments should be done. These sketches demonstrated that the application in each layer started with intervals of 10 cm and that on reaching the end of the layer, one immediately returned, depositing the same electrodes corresponding to the intended texture in the respective layers, in the intervals, in order to complete the "filling". These intervals created when depositing the weld were required to maintain the temperature of the base material as well as the location where the weld/chamfer was being applied since it allowed ventilation and fast cooling of the location, creating perfect adhesion, thus preventing overheating of the workpiece where the weld was being applied. Thus, the application of the electrodes according to the crystallization obtained by virtue of the texture corresponding to each layer, in the form of fillets, with an interval of 10 cm, allowed (in the part that received the weld, whose spaces were immediately filled using the same type of electrode) this to correspond to the texture of that layer, providing the professional with uniform filling so as to obtain depletion of the respective layer, in the order revealed in claim 1 and according to the size and purpose of the base piece.

The physical-chemical characteristics that formed each structure applied in the chamfer, through the layers obtaining different textures which were among themselves harmonious, aiming at adhesion between them and the base piece, through intercalated fillets and

filled to form each corresponding layer, which would generate the crystallization. The structures formed each corresponding layer did not involve austenitic steels but rather were characteristics and property of the crystallization (as e.g. austenite).

Concerning novelty, it should be taken into account that D1 was filed in 1989 at which time there had not been conducted a study on the different characteristics of textures obtained by the application of specific electrodes such as claimed. In D1, electrode AWS 309 and series had been applied. These electrodes were completely different from the claimed electrodes. Moreover, D1 did not disclose combining specific electrodes in a defined subsequent manner, and certainly not in the claimed sequence of process steps. Additionally, D1 did not disclose the microstructure of the resultant weld material. Hence, it was novel to apply the claimed order of steps with regard to the distinct layers which resulted from a combination of specific electrodes that generated the respectively claimed textures.

The electrodes such as claimed had their electric arc modified to obtain the textures revealed in each layer. When simply applying the electrodes indicated in D1, the textures of each layer were different from the ones obtained according to claim 1 and no specific crystallization different from martensitic crystallization could be obtained.

The USPTO granted a patent on the basis of a generally identical main claim. Accordingly, the invention was sufficiently disclosed and the subject-matter of claim 1 was clear as well as novel.

Reasons for the Decision

1. Subject-matter of claim 1 - Article 84 EPC
- 1.1 Claim 1 refers to a welding process. In as far as claim 1 defines process steps involving the use of electrodes, these process steps are all defined with respect to a desired result to be achieved (e.g. "coated ... using electrodes ... for obtaining a ... texture") without however putting any clear limitations on the process steps or the electrodes used in the process which would cause that desired result to be achieved. Claim 1 thus lacks clarity.

Concerning the meaning of the claim, as already explained by the examining division in the appealed decision under point 2.3.5 with regard to the first to sixth layers, that the wording "an electrode is used for obtaining a ... texture" does not imply that such texture is actually obtained but that it merely means that the electrodes have to be "suitable for" obtaining such texture.

- 1.2 The examining division explained further in the appealed decision under point 2.2.2 that at room temperature, different states of carbon steels have microstructures comprising ferrite, iron carbide and possibly retained austenite. Although austenite is stable only above the A3-temperature, it can be stabilized by other alloying elements even below such temperature. The cooling conditions, in particular, influence the transformation of the austenite into ferrite and iron carbide and, hence, the microstructures of martensite (fast cooling), pearlite (slow cooling), troostite, sorbite and bainite (different cooling rates) can be formed/occur.

- 1.3 Claim 1 refers to these different transformation textures in defined layers in the form of a sequence of six layers, but no cooling rates are linked to the different application steps and no other process conditions are defined under which such textures are necessarily obtained. The steps are only linked to the application of electrodes which are suitable to obtain such specific textures. Accordingly, the repeated wording in claim 1 "used for obtaining a ... -type texture" is not enough to render the claim clear because further process conditions which would be necessary for achieving the claimed desired result are not defined.
- 1.4 The appellant's counter-argument to such objection was that "the order of the layers indicated in claim 1 must be respected to allow one layer to receive the other in adhesion quality - sufficient fusion to assure safety of the weld deposited".
- 1.5 However, on the one hand no such requirement (to mandatorily respect the order of the layers) is included in the claim, and on the other hand, no process conditions are specified, for obtaining the desired result. Thus, not all essential features are specified in the claim and accordingly, the claim is not clear as required under one of the conditions of Article 84 EPC.
- 1.6 Additionally, the term "capillary electric welding" is not a term known in the art, nor is it a term which is defined further in the claim. It is noted that the appellant considered the term "capillary electric welding" as referring to the "fusing" of the base material/chamfer but not "penetrating" or

"infiltrating" it (page 3, fifth paragraph of grounds of appeal) and would include the prevention of martensitic crystallisation (see page 5, point 2.3.1 of grounds of appeal). In this respect it has to be taken into account that in order to obtain a defined structure of this type during any welding step, a temperature/time-profile of the welding process (as discussed *supra*) as well as various further process parameters (such as e.g. cooling speed, welding speed, deposition rate, diameter of the electrode, temperature of the base material) would need to be defined. Without such specific definitions in the claim, no difference in the electric welding process compared to any other electric welding process can be acknowledged. Thus, since the meaning of the terminology "capillary electric welding" cannot be ascertained by a skilled person either from his general knowledge or from further details of what such a process involves being defined or described, the claim itself (in which it forms a limiting feature) lacks clarity also for this reason.

- 1.7 For at least the foregoing reasons, claim 1 does not fulfil the clarity requirement of Article 84 EPC. since the sole request fails already for failure to comply with Article 84 EPC, the further objections under the EPC and the appellant's counter-arguments in regard to these, need not be addressed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



M. H. A. Patin

M. Harrison

Decision electronically authenticated