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**Datasheet for the decision  
of 29 April 2022**

**Case Number:** T 0885/19 - 3.2.07

**Application Number:** 11851017.1

**Publication Number:** 2654966

**IPC:** B05B7/18, B05B7/22

**Language of the proceedings:** EN

**Title of invention:**

IMPROVED THERMAL SPRAY METHOD AND APPARATUS USING PLASMA  
TRANSFERRED WIRE ARC

**Patent Proprietor:**

Flame-Spray Industries, Inc.

**Opponent:**

Sturm Maschinen- & Anlagenbau GmbH

**Headword:**

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

Inventive step - main request (yes)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**

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Case Number: T 0885/19 - 3.2.07

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.07**  
**of 29 April 2022**

**Appellant:** Flame-Spray Industries, Inc.  
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**Representative:** Stevens Hewlett & Perkins  
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**Respondent:** Sturm Maschinen- & Anlagenbau GmbH  
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**Representative:** Wunderlich & Heim Patentanwälte  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 24 January 2019  
revoking European patent No. 2654966 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairwoman** A. Beckman  
**Members:** S. Watson  
R. Cramer

## **Summary of Facts and Submissions**

- I. An appeal was filed by the patent proprietor in the prescribed form and within the prescribed time limit against the decision of the opposition division revoking European patent No. 2 654 966.
- II. The opposition division found that the subject-matter of claims 1 and 6 of the patent proprietor's main request was not inventive (Article 56 EPC).
- III. In the present decision reference is made to the following documents:
  - D10: WO 2010/112567;
  - V5: Operating instructions for GTV PTWA burner "GTV Nummer 500.000", February 2009.
- IV. In preparation for oral proceedings, arranged at the request of both parties, the board communicated its preliminary assessment of the case by means of a communication pursuant to Article 15(1) RPBA 2020. The board indicated that the arguments presented by the appellant regarding the incorrectness of the decision under appeal with respect to inventive step appeared to be convincing.
- V. The opponent responded to the communication with submissions dated 28 February 2022. The patent proprietor did not respond.
- VI. Oral proceedings before the board took place on 29 April 2022. At the conclusion of the proceedings the decision was announced. Further details of the proceedings can be found in the minutes.

VII. The final requests of the parties are as follows:

for the patent proprietor (appellant):

that the decision under appeal be set aside and the patent be maintained in amended form on the basis of the claims of the main request, filed on 23 April 2018, or alternatively on the basis of the claims of the auxiliary request, filed with the statement of grounds of appeal;

for the opponent (respondent):

that the appeal be dismissed.

VIII. Independent claim 1 according to the main request reads as follows (features introduced with respect to claim 1 as granted are underlined):

"A method of thermally depositing metal onto a target surface using a plasma transferred wire arc thermal spray apparatus, wherein the apparatus comprises a cathode (59), a nozzle (16) generally surrounding a free end of said cathode in spaced relation having a constricted orifice (17) opposite said cathode free end, a source of plasma gas that is directed into said nozzle (16) surrounding said cathode (59) and exiting said constricted nozzle orifice (17), and a wire feed (42) directing a free end (57) of a consumable wire (23), having a central axis (55), to a position for establishing and maintaining a plasma arc and melting the free end (57) of the consumable wire (23), wherein the consumable wire (23) has an electrical potential opposite of the cathode, the method comprising the steps of:

offsetting the central axis (55) of the consumable wire (23) with respect to an axial centerline (41) of the constricting orifice (17); and  
rotating the plasma transferred wire arc apparatus about a central axis of rotation, wherein the rotation direction is the same as the offset direction of the central axis of the consumable wire (23) with respect to the axial centerline (41);  
establishing and operating a plasma transferred wire arc (45) between the cathode (59) and a free end (57) of the consumable wire (23); and  
melting and atomizing a continually fed free end of the consumable wire into molten metal particles and projecting the particles onto said target surface."

Independent claim 6 according to the main request reads as follows (features introduced with respect to claim 7 as granted are underlined):

"A plasma transferred wire arc thermal spray apparatus for thermally depositing molten metal from a continuously fed free end (57) of a consumable wire (23) onto a target surface, the apparatus comprising:  
a cathode (59);  
a nozzle (16) generally surrounding a free end of said cathode (59) in spaced relation, the nozzle (16) having a constricted orifice (17) opposite said cathode free end;  
a source of plasma gas that is directed into said nozzle (16) surrounding said cathode (59) and exiting said constricted nozzle orifice (17) towards the free end (57) of a consumable wire (23),  
a wire feed means (42) directing the free end of the consumable wire (23), having a central axis (55), to a position for establishing and maintaining a plasma arc (45) and melting the free end of the consumable wire,

wherein the central axis (55) of the consumable wire is offset with respect to an axial centerline of the constricting orifice (17), wherein the consumable wire (23) has an electrical potential opposite of the cathode;

means for rotating the plasma transferred wire arc apparatus in a rotation direction about a central axis of rotation, wherein the rotation direction and the offset direction of the central axis of the wire electrode are the same;

means (45) for establishing and operating a plasma transferred wire arc between the cathode (59) and a free end (57) of the consumable wire (23); and

means (45) for melting and atomizing a continually fed free end (57) of the consumable wire (23) into molten metal particles and projecting the particles onto said target surface.

IX. As the auxiliary request does not form part of this decision it is not necessary to reproduce it here.

X. The lines of argument of the parties are dealt with in detail in the reasons for the decision.

## **Reasons for the Decision**

### *Main request - inventive step (Article 56 EPC)*

1. The opposition division found that the subject-matter of claims 1 and 6 of the appellant's main request was obvious with respect to a combination of the teaching of document D10 with that of document V5 (see decision under appeal, Reasons 2.5.3).

2. The appellant argued in its statement of grounds of appeal that this finding was incorrect because
  - (a) document V5 was not publicly available;
  - (b) document V5 did not teach offsetting the central axis of the wire with respect to an axial centerline of the constricting orifice;
  - (c) without the use of hindsight the skilled person would not arrive at the subject-matter of claims 1 and 6 through a combination of the teachings of documents D10 and V5.
  
3. The board finds that the appellant's argumentation with respect to point (c) is convincing, so that it is unnecessary to consider points (a) and (b) in this decision.
  
4. It is common ground that document D10 represents a suitable starting point for the consideration of inventive step and that the differentiating features with respect to claims 1 and 6 are as follows (feature analysis as set out in the decision under appeal, point I.9):
  - *offsetting the central axis (55) of the consumable wire (23) with respect to an axial centerline (41) of the constricting orifice (17) (claim 1, feature 1.8);*
  - *wherein the rotation direction is the same as the offset direction of the central axis of the consumable wire (23) with respect to the axial centerline (41) (claim 1, feature 1.10);*

and

  - *wherein the central axis (55) of the consumable wire is offset with respect to an axial*



*centerline of the constricting orifice (17)  
(claim 6, feature 6.7);*

- wherein the rotation direction and the offset direction of the central axis of the wire electrode are the same (claim 6, feature 6.10).*

5. It is also uncontested that features 1.10 and 6.10 are not disclosed in either document D10 or document V5.

The opposition division however found that "as there are only two possibilities, in or against rotation direction, it is considered a normal not inventive measure for the person skilled in the art to choose the right direction" (see decision under appeal, page 10, third paragraph).

6. The appellant argued that as document V5 provides no guidance relating to the direction of offset and that offset in only one direction gives the required result, it would require hindsight knowledge of the claimed invention to apply the teaching of document V5 to that of document D10 and also choose the correct direction (see statement of grounds of appeal, page 9, third paragraph and page 11, Section C.).

7. The board notes that although a choice from two obvious alternative solutions might not be considered inventive (see Case Law of the Boards of Appeal (CLB), 9th edition, 2019, I.D.9.19.10), in the present case two alternative solutions are not present.

The opposition division formulated the objective technical problem to be solved as "to reduce the occasional poorly atomized particles of melted or unmelted metal".

As set out in the patent in suit, if the wire is offset in the direction contrary to plasma rotation direction, the instabilities in melting apparently become worse and only when the offset direction is the same as the rotation direction are instabilities reduced or eliminated (see patent in suit, column 7, lines 11 to 19 and column 7, line 40 to column 8, line 8).

Therefore the skilled person is not faced with a choice between obvious, equally likely solutions. In the absence of any indication in either D10 or V5 that the direction of an offset is of any importance, nor which direction such an offset must be implemented in, the skilled person, without knowledge of the invention, has no motivation to choose to offset in the rotation direction.

8. The respondent argued that features 1.10 and 6.10 did not provide any substantive technical teaching (see submissions of 28 February 2022, points 3.7 and 3.8) and in any case did not confer inventive activity on the claimed subject-matter as the skilled person, using routine experimentation, would arrive at the claimed invention (see reply to the statement of grounds of appeal, point 3.5 and submissions of 28 February 2022, point 3.9).

8.1 According to the respondent features 1.10 and 6.10 do not teach the skilled person in which direction to offset the wire central axis as no reference framework is given in either claim and over a complete revolution all directions are encompassed (see submissions of 28 February 2022, point 3.7).

The board however agrees with the arguments of the appellant, brought forward at oral proceedings, that

the patent as a whole describes how the feature is to be understood.

The board also notes that the respondent argues that the central axis of the wire and the centre of rotation of the apparatus are the same (submissions of 28 February 2022, page 8, first paragraph). However, from column 7, lines 45 to 46 and 52 to 53 of the patent specification, the skilled person understands that the wire central axis after offsetting is not the same as the centre of rotation.

- 8.2 The respondent argued further that the patent in suit does not contain any teaching which goes beyond the teaching of V5 (see submissions of 28 February 2022, point 3.8). Claims 1 and 6 of the main request give no direction or size of the offset. The patent specification, in column 7, lines 19 to 26, teaches only that the wire should be adjusted with respect to the nozzle central axis based on a number of parameters, including rotational speed. Document V5 (point 3.3) also teaches to adjust the wire feed up to an offset from the central axis of the nozzle of 0.3 mm according to the condition of the components and the rotational speed.

The view of the board is however that claims 1 and 6 do teach that the central axis of the wire should be offset in a specific direction, namely the same direction as the rotation direction of the plasma transferred wire arc apparatus.

- 8.3 The respondent also argued that, even if claims 1 and 6 were understood as including a concrete direction for the offset, the choice of the direction would be obvious to the skilled person (see submissions of

28 February 2022, point 3.9). According to the respondent, document V5 motivates the skilled person to adjust the offset until faulty melting and spitting has been improved. If the skilled person first chooses the incorrect direction they will realise due to the poor results and will then choose the opposite direction, this experimentation would fall within the routine work of the skilled person.

The board however agrees with the appellant, that document V5 does not provide any inducement for research as it is an operating guide for a specific PTWA torch (see statement of grounds of appeal, page 10, last paragraph, final three sentences). There is no indication in document V5 that the direction of offset is of any relevance. If the desired result was not achieved in the first attempt the skilled person is given no information in document V5 to alter the offset direction.

If the skilled person were to use the teaching of V5 in the apparatus and method of document D10, they would not arrive at the subject-matter of claims 1 and 6 of the main request in an obvious manner unless they already had knowledge of the invention, in particular the knowledge that the direction of offset was critical and that it should be in the direction of rotation of the apparatus. It is however well-established case law that an ex post facto approach when assessing inventive step is to be avoided (CLB, *supra*, I.D.6.).

9. Therefore the appellant has convincingly demonstrated that the decision under appeal was incorrect in finding the subject-matter of claims 1 and 6 of the main request obvious with respect to the combination of teachings of documents D10 and V5.

## 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 with claims 1-13 of the main request filed on 23 April 2018 and a description to be adapted thereto.

The Registrar:

The Chairwoman:



G. Nachtigall

A. Beckman

Decision electronically authenticated