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Datasheet for the decision of 30 August 2023

Case Number: T 2403/19 - 3.4.01

Application Number: 09700002.0

Publication Number: 2084947

IPC: H05H1/34

Language of the proceedings: EN

Title of invention:
NOZZLE HEAD WITH INCREASED SHOULDER THICKNESS

Patent Proprietor:
Hypertherm, Inc.

Opponents:
1. Kjellberg Finsterwalde Plasma und Maschinen GmbH
2. B&Bartoni, spol. s r.o.

Headword:
Nozzle for gas-cooled plasma arc torch / Kjellberg Finsterwalde

Relevant legal provisions:
EPC Art. 123(2), 52(1), 54, 56
RPBA 2020 Art. 12(2), 12(3), 13(1), 13(2)

Keyword:
Main Request, Auxiliary Request 4 - not an amendment to case
Amendments - Main Request - added subject-matter (yes)
Amendment to case - Auxiliary Request 1 - amendment admitted (yes)
Novelty - Auxiliary Request 1 (no) - Auxiliary Request 4 (yes)
Inventive step - Auxiliary Request 4 (no)
Amendment after summons - Auxiliary Requests 8, 9, 11, 13, 15 - taken into account (no)

Decisions cited:
T 0524/17, T 0162/09

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Case Number: T 2403/19 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 30 August 2023

Appellant: (Patent Proprietor)	Hypertherm, Inc. Etna Road P.O. Box 5010 Hanover, NH 03755 (US)
Representative:	Barker Brettell LLP 100 Hagley Road Edgbaston Birmingham B16 8QQ (GB)
Appellant: (Opponent 1)	Kjellberg Finsterwalde Plasma und Maschinen GmbH Oscar-Kjellberg-Strasse 20 03238 Finsterwalde (DE)
Representative:	Manasse, Uwe Boehmert & Boehmert Anwaltspartnerschaft mbB Pettenkoferstrasse 22 80336 München (DE)
Party as of right: (Opponent 2)	B&Bartoni, spol. s r.o. Doubravicka 18 294 30 Dolní Cetno (CZ)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 28 June 2019 concerning maintenance of the European Patent No. 2084947 in amended form.**

Composition of the Board:

Chairman	P. Scriven
Members:	T. Petelski
	C. Almberg
	A. Medeiros Gaspar
	D. Rogers

Summary of Facts and Submissions

I. An opposition was filed to the European patent based on the grounds set out in Article 100(a) EPC in conjunction with Articles 52(1), 54, and 56 EPC.

II. An intervention was also filed, which the Opposition Division found admissible. The intervener ("opponent 2", cf. Article 105(2) EPC) did not raise its own grounds or submit its own arguments, but referred to the grounds raised and arguments put forward by opponent 1.

III. The Opposition Division found the proprietor's (then) Main Request unallowable, because the amendments to claim 15, made with respect to the claims of the patent, extended beyond the content of the application as filed. Auxiliary Request 1, which was filed during Oral Proceedings, was found to be occasioned by a ground for opposition and was admitted into proceedings. The claims of Auxiliary Request 1 were found to be clear, and the amendments were found to have a basis in the application as filed. The Opposition Division also found that the claims of Auxiliary Request 1 defined novel and inventive subject-matter with respect to the cited prior art; and, in particular, with respect to a prior use. The prior use concerned, amongst others, nozzles "Afe", "Aee", and "Ade", intended for use in plasma arc torch "PB-S46 W-1", as documented by the testimonies of three witnesses heard during oral proceedings before the Opposition Division, and the following evidence:

E31: drawing of nozzle "Afe";

E33: drawings of torch "PB-S46 W-1/ A" and spare part list;

E35: excerpt from brochure for plasma cutting machine "PA-S45 CNC", including torch "PB-S46 W-1";

E36a-e, E37a-b, E38a-b, E39a-e, E40a-b, E41a-b, E42a-c, E43a-c; E44a-d, E45a-d, E46a-d, E47a-b, E48a-d: evidence of sales, including orders and order confirmations, delivery notes, letters of consignment, and installation reports regarding various customers;

E49: Collection of technical drawings of various nozzles, including nozzles "Ade" and "Aee";

E50: Calculations of heat transfer densities;

E52: drawing of torch "PB-S46 W-1/ A".

IV. Accordingly, the Opposition Division found that the patent could be maintained on the basis of (then) Auxiliary Request 1.

V. Appeals were lodged against this decision by opponent 1 and by the proprietor.

VI. Opponent 2 did not appeal and made no submissions during appeal proceedings, but was party as of right.

VII. With their statement of grounds of appeal, and with a later submission, the proprietor filed a number of claim requests. Some were re-filed claim requests from the opposition proceedings, including the (then and now) Main Request and the request found allowable in the appealed decision, others were filed for the first time during appeal.

VIII. In a communication annexed to a summons to oral proceedings, the Board informed the parties of its preliminary opinion. Amongst others issues, the subject-matter of each of claims 1, 3, and 15 of the Main Request seemed to extend beyond the application as filed, claim 15 for two distinct reasons.

IX. In reply, the proprietor re-filed the Main Request and submitted Auxiliary Requests 1 - 16. They also argued that the case should be remitted to the Opposition Division, if the Board maintained the objection under Article 123(2) EPC, raised in its preliminary opinion, against the following feature in claim 1 of the Main Request, and a corresponding feature in claim 15: "region of a minimum cross-sectional thickness between the generally non-cylindrical portion and the second portion".

X. Opponent 1, on the other hand, filed, amongst other things, better quality versions of the drawings E49 and E52, labelled E49a, E49b, and E52a.

XI. Oral proceedings took place in the presence of the proprietor and opponent 1.

XII. At the outset of oral proceedings, the proprietor clarified that the Main Request, and Auxiliary Requests 1 - 16 submitted with its reply to the Board's communication, replaced all previously-filed claim requests. Later in the oral proceedings, the proprietor withdrew Auxiliary Requests 2, 3, 6, 7, 10, 12, 14, and 16, such that their final requests were the following:

(a) that the appealed decision be set aside, and that the patent be maintained based on the claims of the Main Request, subject of the appealed decision, and re-filed twice in appeal proceedings;

(b) in the alternative, that the appealed decision be set aside, and that the patent be maintained based on the claims of Auxiliary Request 1, filed for the first time after notification of the summons to oral proceedings before the Board;

(c) in the further alternative, that opponent 1's appeal be dismissed, i.e. that the patent be maintained based on the claims of Auxiliary Request 4, found allowable in the appealed decision (then labelled "Auxiliary Request 1"), and re-filed twice (under different labels) in appeal proceedings;

(d) in the still further alternative, that the appealed decision be set aside, and that the patent be maintained based on the claims of one of Auxiliary Requests 5, 8, 9, 11, 13, and 15, all filed for the first time after notification of the summons to oral proceedings.

XIII. The proprietor accepted that the conditional request for remittal was not relevant to the final decision.

XIV. Opponent 1's final request was that the appealed decision be set aside and that the patent be revoked. They also argued that all claim requests filed or re-filed after notification of the summons to oral proceedings should be disregarded.

XV. Claim 1 of the Main Request and of Auxiliary Request 1, reads (reference signs removed; additions with respect to claim 1 of the patent underlined):

A nozzle for a gas-cooled plasma arc cutting torch, the nozzle comprising:

a body comprising a hollow interior having a cylindrical portion that defines a central longitudinal axis and an inside diameter; and

a nozzle head defining:

a plasma exit orifice disposed about the central longitudinal axis; and characterized in that there is provided:

a shoulder portion comprising a generally non-cylindrical portion and a second portion that, in combination, define an external contoured surface, the second portion disposed between the generally non-cylindrical portion and the body; and

a region of a minimum cross-sectional thickness between the generally non-cylindrical portion and the second portion, wherein the region of minimum cross-

sectional thickness corresponds to a heat transfer density proportionate to not more than about 2 amperes of torch operating current per square millimeter of nozzle cross-sectional conduction area at the region of minimum cross-sectional thickness.

XVI. Claim 1 of Auxiliary Requests 4 and 5 differs from claim 1 of the Main Request in the characterising part, which reads (reference signs removed; additions with respect to claim 1 of the patent underlined):

[... characterized in that there is provided:]

a shoulder portion comprising a generally non-cylindrical portion and a second portion that, in combination, define an external contoured surface, the second portion disposed between the generally non-cylindrical portion and the body;

the generally non-cylindrical portion is conical;

the second portion is conical;

the generally non-cylindrical portion and the second portion are contiguous;

a second angle measured between the longitudinal axis and a second tangent line to a second exterior surface of the second portion is greater than a first angle

measured between the longitudinal axis and a first tangent line to a first exterior surface of the generally non-cylindrical portion; and

a region of a minimum cross-sectional thickness between the generally non-cylindrical portion and the second portion.

XVII. Claim 1 of Auxiliary Request 8 differs from claim 1 of the Main Request in the characterising part, which reads (reference signs removed; additions with respect to claim 1 of the patent underlined):

[... characterized in that there is provided:]

a shoulder portion comprising a generally non-cylindrical portion and a second portion that, in combination, define an external contoured surface, the second portion) disposed between the generally non-cylindrical portion and the body; and

a region of a minimum cross-sectional thickness between the generally non-cylindrical portion and the second portion;

wherein the shoulder portion is between an end face of the nozzle head and the body, and wherein the generally non-cylindrical portion comprises an at least substantially frusto-conical portion and the second portion comprises a flared portion that, in combination, further define the external

contoured surface of the shoulder portion, at least a portion of the frusto-conical portion disposed between the end face of the nozzle head and the flared portion, the flared portion disposed between the nozzle body and the frusto-conical portion; and

wherein the nozzle further comprises a contour line defined by the external contoured surface that correlates to the region of the minimum cross-sectional thickness; and

wherein the contour line is disposed at the intersection of the frusto-conical portion and the flared portion.

XVIII. Claim 1 of Auxiliary Request 9 reads (reference signs removed):

Use of a nozzle for a gas-cooled plasma arc cutting torch for increasing the life of the nozzle,

the nozzle comprising:

a body comprising a hollow interior having a cylindrical portion that defines a central longitudinal axis and an inside diameter; and

a nozzle head defining:

a plasma exit orifice disposed about the central longitudinal axis; and characterized in that there is provided:

a shoulder portion comprising a generally non-cylindrical portion and a second portion that, in combination, define an external contoured surface, the second portion disposed between the generally non-cylindrical portion and the body; and

a region of a minimum cross-sectional thickness between the generally non-cylindrical portion and the second portion; comprising:

providing a nozzle having a body and a nozzle head the nozzle head defining an at least substantially frusto-conical shoulder portion such that a first nozzle wear rate results; and characterized in that the use further comprises:

defining a flared shoulder portion that, in combination with the at least substantially frusto-conical shoulder portion, defines a nozzle shoulder having an external contoured surface, at least a portion of the frusto-conical surface disposed between an end face of a nozzle head and the flared portion, the flared portion disposed between the body and the frusto-conical portion, such that a second nozzle wear rate results, the second nozzle wear rate less than the first nozzle wear rate; and

establishing a contour line on the contoured surface that correlates to a region of a cross-sectional thickness between the generally non-cylindrical portion and the second portion.

XIX. Claim 1 of Auxiliary Request 11 differs from claim 1 of Auxiliary Request 9 only in the specification of its use (addition underlined):

Use of a nozzle for a gas-cooled plasma arc cutting torch <u>in a gas cooled cutting torch</u> for increasing the life of the nozzle, ...

XX. Claim 1 of Auxiliary Request 13 adds a feature at the end of claim 1 of Auxiliary Request 11 (reference sign removed):

...; and
defining the flared portion as substantially conical.

XXI. Claim 1 of Auxiliary Request 15 adds a feature at the end of claim 1 of Auxiliary Request 13 (reference signs removed):

...; and
positioning the contour line to be at the intersection of the frusto-conical portion and the flared portion.

Reasons for the Decision

Introduction

1. The invention lies in the field of gas-cooled plasma arc torches, used for cutting or welding. The exit nozzles of such torches suffer from thermal wear, which is why they are designed as consumable parts that can easily be replaced.

2. The invention proposes a nozzle with an increased minimum wall thickness at its shoulder, which is realized by a particular outer shape of the nozzle shoulder.

3. According to the description, the shoulder of the nozzle has two distinct portions, with different taper angles, instead of a commonly-known shoulder with a uniform taper. It is due to these two portions that a thicker minimum shoulder thickness is realized, resulting in reduced thermal wear. In addition, this shape allows for a more pointed tip, which ensures good visibility of the workpiece.

Main Request - admission

4. Opponent 1 challenged the admission of the Main Request, but without submitting any reasons.

5. This request, however, forms part of the basis of the appealed decision, and it has been maintained throughout appeal proceedings.

6. Therefore, the Main Request is in the appeal proceedings, and will thus be considered (Article 12(1)(a) and (2) RPBA 2020).

Main Request - added subject-matter

7. The claims of the Main Request are the result of an amendment of the claims of the patent, made during opposition. In particular, claim 1 has been restricted by the definition of a limit to the heat transfer density, which has a basis in original claim 12.

8. The dependency of claim 3 on claim 1 (via claim 2) leads to combinations of the limited heat transfer density, with various geometrical properties of the nozzle, which are defined as optional features (a) to (e) in claim 3.

9. The original set of claims provides no basis for such combinations. That is because original claims 3, 4, 16, 17, and 8, which (in that order) form the bases for features (a) to (e) of claim 3, refer neither directly nor indirectly to original claim 12, which forms the basis for the limited heat transfer density in claim 1.

10. For similar reasons, the feature combinations in claim 15 also lack a basis in the original set of claims.

11. The proprietor argued that the application should not be read in an overly-literal manner. Although the original claims might not, formally, disclose the feature combinations of claim 3 and 15 of the Main Request, the description clearly conveyed the teaching, to the skilled person, that the limit to the heat transfer density applied to all geometries of the

nozzle. According to paragraphs [0005] and [0006] of the published application, good heat conduction was at the core of the invention, because it reduced thermal wear. Hence, the heat transfer density mentioned in paragraph [0011] was combinable with all other embodiments, in particular those referred to in paragraphs [0007] to [0010]. The detailed embodiments described in relation to the figures then showed examples of possible combinations. Generally, the skilled person would have understood that all technically compatible features were meant to be combinable. Therefore, the original application disclosed the combinations of features defined in claims 3 and claim 15 of the Main Request. In support of their argument, the proprietor cited decision T 524/17.

12. The Board is not persuaded by the proprietor's arguments. It is true that the reduction of thermal wear is at the heart of the invention as described in the application as filed, and that a sufficiently high heat conduction is important for reducing thermal wear. However, the heat conduction depends not only on the minimum thickness, but also on the thickness of other regions of the nozzle. For example, a nozzle for which the wall thicknesses increases rapidly on both sides of the region of minimum thickness will carry away the heat better than a nozzle for which the walls remain thin. Hence, although a certain value for the heat transfer density at the region of minimum shoulder thickness might apply to certain nozzle geometries, it is not plausible that the same value applies to all nozzle geometries covered by the invention.

13. This understanding is supported in that the particular heat transfer density defined by present claim 1 is

only disclosed together with the detailed embodiments of Figure 2A ([0058]) and Figure 3A ([0062]), but not together with other embodiments.

14. For this reason, the skilled person does not understand the formulation "in some embodiments" in paragraph [0011] of the application, which introduces the particular heat transfer density in question, as clearly and unambiguously referring to a feature that can be combined with all other embodiments. Rather, paragraph [0011] is understood merely to refer to some, but not all, embodiments of the invention. In particular, there is no teaching that the particular heat transfer density belongs with any of the features (a) to (e) of claim 3.

15. The present case is therefore different from the case in decision T 524/17, where the expressions "in one embodiment" refer to preferred features which are intended to be combined (point 1.2 of the reasons).

16. Consequently, claim 3, and for similar reasons also claim 15, define various geometrical properties of the nozzle that were not originally disclosed in combination with the heat transfer density feature of claim 1.

17. It follows that the Main Request is not allowable, because the combination of claims 1 and 3, and claim 15 define subject-matter that extends beyond the content of the application as filed (Article 123(2) EPC).

Auxiliary Request 1 - admission

18. Auxiliary Request 1 was filed, for the first time, after notification of the summons to oral proceedings. Its admission is, therefore, subject to Article 13 RPBA 2020.

19. Up to renumbering, the claims of Auxiliary Request 1 are identical to the claims of the Main Request, except for the deletion of claims 3 and 15.

20. Opponent 1 challenged the admission of this auxiliary request: objections of added subject-matter to claims 3 and 15 of the Main Request had already been raised and discussed during opposition proceedings. Hence, a request without claims 3 and 15 could and should have been filed earlier. Furthermore, Auxiliary Request 1 was one of a large number of new requests filed only six weeks before oral proceedings, which gave opponent 1 little time to prepare. Such late filed claims should not be admitted, as was found in case T 162/09. Also, a word was missing from claim 10 ("... wherein the shoulder portion (640) a first section (647) ..."), which spoke against the admission of this request.

21. The proprietor argued that a request without claim 15 had already been submitted with their statement of grounds of appeal, under the label "Auxiliary Request 2". In its preliminary opinion, the Board referred to the objection to added subject-matter in claim 1, under points 13 and 14. However, the Board changed the argument in such a way that it required a different solution. Hence, the proprietor could not have been expected to recognize the deletion of claim 3 as a solution to an issue of added matter, before reading the Board's preliminary opinion. The replacement of the

previous Auxiliary Request 2 by present Auxiliary Request 1 should therefore be admitted.

22. Other than the objection directed at claim 15, an objection to added subject-matter in claim 1 of the Main Request was, indeed, raised and discussed during opposition proceedings (see point 4.4.1 of the appealed decision) and maintained in appeal (see section I on pages 1 to 3 of opponent 1's statement of grounds of appeal). The objection was that claim 1 of the Main Request was derived from claim 1 of the patent by the addition of the subject-matter of original claim 12 (the limited heat transfer density; feature (c) of claim 3 of the patent), however, without the subject-matter of original claim 2 (unchanged in the patent), although original claim 12 depended on original claim 2 (and claim 3 of the patent depended on unchanged claim 2).

23. This objection could have been overcome by adding the subject-matter of original claim 2 to claim 1 of the patent.

24. In contrast, in its preliminary opinion, the Board rather saw the problem in the fact that the feature added to claim 1 of the patent (defined in original claim 12) had not been originally disclosed in combination with the features (a), (b), and (d) to (f) of claim 3 of the patent (defined in original claims 3, 4, 16, 17, and 8; see above points 8. to 16.). Overcoming this objection required a different amendment, namely the deletion of claim 3.

25. Hence, the proprietor could not have been expected to file a request without claim 3 before receiving the preliminary opinion.

26. The situation in T 162/09 was different, not only in that Article 13 RPBA 2020 had not yet been introduced, but also in that 37 diverging requests, with unforeseeable amendments, were filed even closer to the oral proceedings than in the present case (see Reasons, point 7).

27. The Board recognizes the presence of exceptional circumstances justifying the filing of Auxiliary Request 1 (Article 13(2) RPBA 2020).

28. The amendment with respect to the earlier version of this request (Auxiliary Request 2 as filed with the proprietor's statement of grounds of appeal) consisted merely in the deletion of the problematic dependent claim 3. Hence, it does not give rise to new objections and does not negatively affect procedural economy, which also speaks in favour of admission (Article 13(1) RPBA 2020).

29. Further, in contrast to opponent 1's view, the missing word in claim 10 is an obvious mistake with an obvious correction (adding "has" between "(640)" and "a") that does not stand against the admission of the request. It is noted that this mistake was already present in the previous requests and opponent 1 had not objected to it before.

30. Hence, Auxiliary Request 1 is admitted into the proceedings.

Auxiliary Request 1 - establishment of prior use

31. In their decision, the Opposition Division came to the conclusion that the nozzles "Afe", "Aee", "Ade", "Lde",

"Lee", and "Lle", and the matching plasma arc torch "PB-S46 W-1" were manufactured, offered, and sold without any obligation of confidentiality before the priority date of the patent in suit. They took the forms shown in the drawings E31 - E34 and E49. This conclusion was based on the evidence E31 - E49, including all sub-numbers (e.g., E31a), and the testimony of the witnesses Frank Laurisch, Heike Kinzl, and Michael Richter (see point 4.3 of the appealed decision).

32. The proprietor challenged this finding. In their argumentation, they highlighted the standard of proof that was to be applied ("up to the hilt") and the questions that needed to be answered with regard to the prior use (what was made available; and where, when, how, and by whom it was made available). However, they did not provide concrete arguments as to why this standard of proof had not been met, or which of the questions were not answered satisfactorily. The only specific points identified by the proprietor to the effect that the Opposition Division did not establish the prior use according to the correct criteria were the following.

(a) There was no evidence supporting the view that the nozzles were sold without a duty of confidentiality.

(b) There was neither evidence supporting the prior use of a shield, torch tip, or gas cooled plasma arc torch as defined by claims 11, 12, or 14 of the (then and now) Main Request, nor evidence supporting the prior execution of a method of increasing life of a nozzle, as defined by claim 15.

33. Considering point 4.3 of the appealed decision, the Board sees nothing wrong in how the Opposition Division evaluated the evidence for the prior use. In particular, the Board agrees with the Opposition Division in that the absence of any reference to confidentiality in the sales documentation of wear-parts that were sold over many years in large quantities directly and via dealers to a group of numerous and diverse users, together with the convincing and credible statements of the witnesses, confirms the absence of a duty of confidentiality.

34. The Board also agrees with the Opposition Division in that the evidence is sufficient to establish that the nozzles in question, and the matching water-cooled plasma arc torch, were sold and used in the form in which they are shown in the drawings of documents E31 to E34 and E49.

35. Whether the characteristics of these products anticipate the subject-matter of any of the claims of the patent in suit, and which of them, is a question of patentability. This question has no bearing on whether the products formed part of the state of the art, but only on their relevance for the patentability of the patent, which is examined separately (see below).

36. Hence, the Board has no reason to question the finding of the Opposition Division that the aforementioned nozzles belonged to the state of the art.

Auxiliary Request 1 - novelty in view of nozzle "Ade"

37. According to the proprietor, there was no clear and unambiguous disclosure that the nozzle "Ade" shown on page 3 of E49 had a heat transfer density below two amperes of torch operating current per square millimeter of nozzle cross-sectional conduction area at the region of minimum cross-sectional thickness. Opponent 1's calculations according to E50 were not credible, because it was not clear whether the numbers were taken from the drawing E49 or from an actual nozzle, which might be different from the one shown in E49. Since all evidence was in opponent 1's possession, the proprietor had no way to verify the calculations. Hence, the numbers resulting from the calculation failed on the required standard of proof.

38. In addition, nozzle "Ade" was designed for a water-cooled torch and opponent 1 had not convincingly demonstrated that it was suitable for use in a gas-cooled torch. Typically, water-cooled nozzles were bigger than gas-cooled nozzles and, hence, were not suitable for use in gas-cooled torches without modification.

39. These arguments are not persuasive. It was established by the Opposition Division that nozzle "Ade" was manufactured, sold, and used in the form, and with the dimensions and manufacturing tolerances, shown in the technical drawing in E49, which is drawn to scale. The calculation of the heat transfer density should, therefore, lead to the same result (within certain tolerances), irrespective of whether the measures are taken from the drawing or from an actual nozzle. The calculations themselves are straightforward, and can easily be verified.

40. Further, the Board agrees with opponent 1 in that the nozzle "Ade" is suitable not only for the water-cooled torches for which it was designed (for example, torch "PB-S46 W-1"), but also for gas-cooled torches, provided that they have an appropriate attachment for the nozzle. The size of the "Ade" nozzle does not make it unsuitable for gas-cooling: both gas- and water-cooled torches exist in large and small variants, and the claim does not define any particular dimensions for the nozzle. There is no reason why it should not be possible to dissipate the heat generated by the comparatively low operating current of 80 Amperes, for which the nozzle "Ade" is designed, by gas-cooling. Hence, there is nothing that would make the nozzle "Ade" unsuitable for use in an appropriately-designed gas-cooled plasma arc cutting torch.

41. Consequently, the prior use of nozzle "Ade" anticipates the subject-matter of claim 1, and Auxiliary Request 1 is not allowable for lack of novelty (Articles 52(1) and 54(1) and (2) EPC).

Auxiliary Request 4 - admission

42. Opponent 1 opposed the admission of Auxiliary Request 4, without submitting any reasons.

43. This request, however, forms part of the basis of the appealed decision, and has been maintained throughout the appeal proceedings.

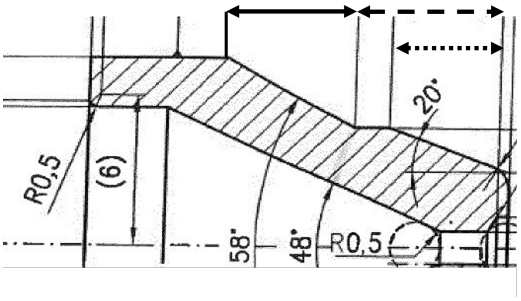
44. Therefore, Auxiliary Request 4 is in the appeal proceedings, and will thus be considered (Article 12(1)(a) and (2) RPBA 2020).

Auxiliary Request 4 - novelty over nozzle "Ade"

45. In contrast to claim 1 of the Main Request (and of Auxiliary Request 1), claim 1 of Auxiliary Request 4 no longer defines a heat transfer density, but instead defines the generally non-cylindrical portion and the second portion as being conical and contiguous, having exterior surfaces with tangents that make different angles with the longitudinal axis of the nozzle.

46. Opponent 1 presented two alternative lines of argument as to why nozzle "Ade" disclosed the additional features of claim 1 of this request.

47. To illustrate opponent 1's arguments, reference is made to part of the drawing of "Ade", taken from E49 and shown below. In both lines of argument, the extension of the second, conical portion is illustrated by the solid double arrow on the left-hand side of the nozzle shoulder.



(a) According to a first interpretation, the non-cylindrical portion extended over the right-hand side angled section and the adjacent cylindrical section of the exterior surface of the nozzle shoulder, as illustrated by the dashed (upper) double arrow. In this case, the non-cylindrical

portion met the second portion (solid double arrow) at the left-hand side of the cylindrical section (flat section in the cross-sectional dawing), which is why both portions were contiguous. Although the non-cylindrical portion included an angled (conical) section and a cylindrical section, it was, as a whole, conical in the sense of the patent. The term "conical" applied not only to linearly angled surfaces, but had to be understood more broadly, as was already implied by the necessity of defining a tangent to a conical surface in claim 1, which would be superfluous for linear surfaces. A broad interpretation was, further, supported by the description, according to which non-linear and irregular surfaces, like the one illustrated by Figure 4E, were also designated as (frusto-)conical.

(b) According to a second interpretation, the non-cylindrical portion extended over the angled, conical section on the right-hand side of the nozzle as illustrated by the (lower) dotted double arrow. The cylindrical section was merely a transitional section between the two conical portions. It was apparent from Figure 4D of the patent in suit that a transitional section between two conical portions did not preclude the portions from being contiguous within the meaning of the patent. Hence, also the two conical portions of the nozzle "Ade" had to be considered as contiguous despite the flat transitional section between them.

48. In the Board's view, however, the skilled person would only understand the tapered portions of the nozzle "Ade" (solid and dotted arrows) as being conical. The cylindrical section between the two tapered portions

would not be understood as part of either of the two conical portions. Such an understanding would go against the normal meaning of the term "conical".

49. Figure 4E of the patent shows a stepped surface of portion 245, which is designated, in paragraph [0057], as "generally frusto-conical". In contrast, claim 1 does not include the term "generally". Therefore, the description does not support the opponent's view that the combined cylindrical and tapered portion of nozzle "Ade" (dashed arrow) should be considered "conical". At most, it might be considered "generally conical".

50. Further, the definition of the inclination of a conical surface by the angle of its tangent in claim 1, although cumbersome, cannot broaden the normal meaning of the term "conical". In addition, the skilled person would understand, from the description, that the tangents were introduced to include the general inclinations of non-linear and irregular surfaces such as the one in Figure 4E.

51. The skilled person would not understand the concept of "contiguity" differently from its normal meaning of being in direct contact, i.e., without any intermediate portion. Hence, the two conical portions in nozzle "Ade" are not contiguous due to the cylindrical intermediate portion. This understanding is not changed by Figure 4D of the patent. This figure is not a technical drawing and does not allow the inference of an intermediate portion from the barely-discernible intersection region of the two conical portions 145 and 150.

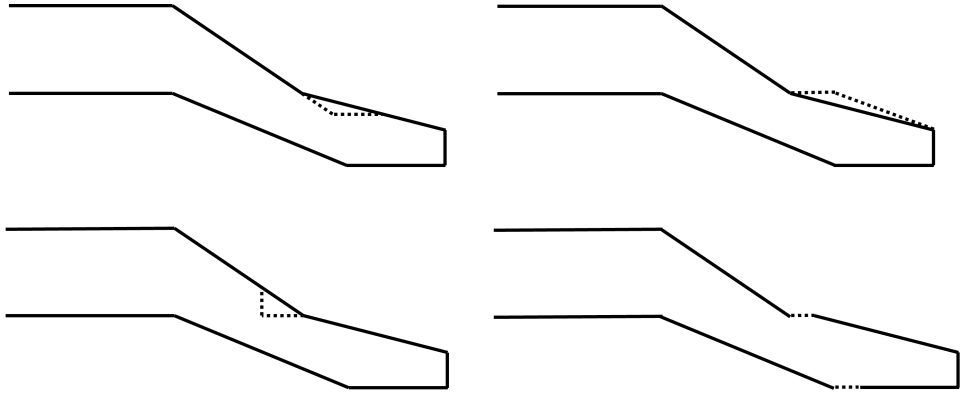
52. It follows that nozzle "Ade" differs from the subject-matter of claim 1 in that it does not have two

contiguous conical shoulder portions. Hence, the subject-matter of claim 1 is novel over nozzle "Ade" (Article 54(1) and (2) EPC).

Auxiliary Request 4 - inventive step over nozzle "Ade"

53. An inventive step presupposes a technical effect due to the feature by which the subject-matter of claim 1 differs from the nozzle "Ade", as drawn in E49, namely the contiguity of the two conical nozzle portions.

54. The proprietor argued that the absence of the cylindrical intermediate section made the nozzle more suitable for use in a gas-cooled torch. Two contiguous conical shoulder portions led to a thicker wall and improved the conical, non-turbulent flow of the shielding gas. The latter led to a faster rejection of molten metal, which in turn contributed to a longer lifetime for the nozzle, without negatively affecting the visibility of the workpiece or the functioning of the torch. Referring to the example of Figure 4D of the patent, the proprietor explained why the presence of a cylindrical outer section led to a thinner nozzle wall for a nozzle with the same angles and size. The left-hand side examples in the following drawing illustrate the proprietor's argument. The dotted lines show a section through a nozzle wall with a cylindrical intermediate portion, whereas the solid lines illustrate the same nozzle with two adjacent conical portions. Here, the additional presence of a cylindrical portion reduced the thickness of the nozzle wall.



55. In contrast to the proprietor's view, the presence of a cylindrical intermediate portion in the nozzle "Ade" does not necessarily lead to a thinner wall than in the nozzles defined by claim 1. Claim 1 leaves the nozzle's dimensions and angles completely open, with the exception that the two angles must be different. As shown in the right-hand side examples of the above drawing, adding a cylindrical portion (dotted lines) to the same nozzle as shown in the left-hand side drawings might as well lead to a thicker wall with better heat distribution characteristics, thereby contributing to an increased lifetime of the nozzle.

56. Further, it is not apparent to the Board, why the contour of the nozzle "Ade" would be less suitable for gas-cooling, or why it would lead to reduced visibility of a workpiece, or to a disadvantageous gas-flow, or to less efficient cooling when comparing nozzle "Ade" to examples illustrated by the figures of the patent. All examples in the patent, including the one of Figure 5D, show the general advantages of the invention, namely a longer nozzle life without negatively affecting the welding (implicit from paragraphs [0006], [0007], and [0039]), even if they are not within the scope of claim 1 of Auxiliary Request 4. Generally, it is mainly the geometry of the torch, including its possible shielding arrangement, which determines the flow of the cooling

agent and the rejection of the molten metal. However, these are not defined in the claim.

57. The differentiating feature of the nozzle itself, as defined in claim 1, does not cause any discernible technical effect with respect to the nozzle "Ade", at least not without any details as to its dimensions and angles.

58. In the absence of a technical effect, no inventive step can be recognized.

59. It follows that Auxiliary Request 4 is not allowable, because the subject-matter of claim 1 does not involve an inventive step in view of nozzle "Ade" (Articles 52(1) and 56 EPC).

Auxiliary Request 5 - inventive step over nozzle "Ade"

60. Claim 1 of Auxiliary Request 5 is identical to that of Auxiliary Request 4.

61. Therefore, irrespective of its admission, Auxiliary Request 5 is not allowable, because the subject-matter of claim 1 does not involve an inventive step in view of nozzle "Ade" (Article 52(1) and 56 EPC).

Auxiliary Requests 8, 9, 11, 13, and 15 - admission

62. Auxiliary Requests 8, 9, 11, 13, and 15 were filed, for the first time, after notification of the summons to oral proceedings. They are similar to Auxiliary Requests 4, 5, 6, 7, and 8, respectively, as filed with

the proprietor's statement of ground of appeal, except for the deletion of dependent claims.

63. The deletion of the dependent claims makes them amendments to the proprietor's appeal case the admission of which is subject to Article 13 RPBA 2020.

64. The proprietor justified the deletion of dependent claims by stating that they were a reaction to the Board's rephrased objection of added subject-matter in claims 3 and 15 of the Main Request. In order to avoid similar objections to other claims in the auxiliary requests, certain dependent claims were deleted. The independent claims themselves had not been amended and were therefore still the same as when they were first filed during opposition proceedings in previous auxiliary requests. They all constituted limitations to the claims as granted.

65. The Board is not persuaded by these arguments. None of Auxiliary Requests 8, 9, 11, 13, or 15 comprises a claim that combines the feature of a maximum heat transfer density, as defined in claims 1 and 15 of the Main Request, with any of the optional geometrical features defined in claims 3 and 15 of the Main Request. Hence, the added-matter objections that apply to the Main Request do not apply to any of those auxiliary requests, nor were they transferable to other similar claim features. As there were also no other new objections, in appeal proceedings, to these requests, the amendments cannot be considered to be a reaction to new objections.

66. Accordingly, there are no exceptional circumstances, let alone any that were justified by cogent reasons, which could lead to any of Auxiliary Requests 8, 9, 11,

13, or 15 being taken into account (Article 13(2) RPBA 2020).

67. Irrespective of the above, no maximum heat transfer density is defined in claim 1 of each of Auxiliary Requests 8, 9, 11, 13, and 15. Hence these requests are also not convergent with the Main Request or with Auxiliary Request 1.

68. They are also not convergent with Auxiliary Request 4, because their respective claims 1 do not define the contiguity and the conical shape with different tangent angles of the two portions. Claim 1 of each of Auxiliary Requests 8, 9, 11, 13, and 15 rather defines one portion as "at least substantially frusto-conical" and the other portion as "flared", wherein Auxiliary Requests 13 and 15 define the "flared" portion additionally as "substantially conical".

69. According to the proprietor, the claims of Auxiliary Request 4 expressly did not use the expression "substantially" or "generally" conical or frusto-conical in order to distinguish the surface from non-linear or irregular surface portions as those of "generally frusto-conical" portion 245 in Figure 4E of the patent ([0057]). Going back to broad definitions of the surface portions as "substantially frusto-conical", "substantially conical", or "flared", is a clear divergence from the direction chosen with Auxiliary Request 4.

70. Therefore, irrespective of Auxiliary Requests 8, 9, 11, 13, and 15 not being taken into account under Article 13(2) RPBA 2020, the Board also considers these requests to lack convergence, which, in this case, is

detrimental to procedural economy (Article 13(1) RPBA 2020).

Summary

71. The Main Request is not allowable, because it extends beyond the application as filed.

72. Auxiliary Request 1 is not allowable for lack of novelty.

73. Auxiliary Request 4 and 5 are not allowable for lack of inventive step.

74. Auxiliary Requests 8, 9, 11, 13, and 15 are not taken into account.

Order

For these reasons it is decided that:

- The decision under appeal is set aside.

- The patent is revoked.

The Registrar: The Chair:

D. Meyfarth P. Scriven

Decision electronically authenticated