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D E C I S I O N
of 22 June 2000

Case Number: T 0981/95 - 3.4.1

Application Number: 92100092.3

Publication Number: 0481958

IPC: H05H 1/34

Language of the proceedings: EN

Title of invention:
Nozzle shield for a plasma arc torch

Applicant:
HYPERTHERM, INC.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 76(1), 123(2)

Keyword:
"Divisional application - not extended subject-matter"

Decisions cited:
G 0001/93

Catchword:
-

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Case Number: T 0981/95 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 22 June 2000

Appellant: HYPERTHERM, INC.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 7 April 1995 refusing European patent application No. 92 100 092.3 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: G. Davies
Members: M. G. L. Rognoni
U. G. O. Himmler

Summary of Facts and Submissions

I. European patent application No. 92 100 092.3 (publication No. 0 481 958) is a divisional application from parent application No. 89 903 442.5 (publication No. 0 375 747) and was refused by a decision of the Examining Division issued on 7 April 1995 on the ground that its subject-matter extended beyond the content of the earlier application as originally filed (Article 76(1) EPC).

II. During prosecution of the parent application, which had been filed with claims directed to a plasma arc torch comprising a shield and to a plasma cutting process, the applicant (appellant) submitted an independent apparatus claim and three dependent claims relating to "an annular metallic member for a plasma arc torch", since such member was considered as an essential feature of the torch which could be manufactured independently. The Examining Division refused these claims essentially on the ground that the application as originally filed had consistently presented the shield as a constituent part of the disclosed plasma arc torch (Article 123(2) EPC). The parent application proceeded to grant without these claims which were subsequently made the subject of this divisional application.

III. The appellant lodged an appeal against the first instance's decision and paid the appeal fee on 7 June 1995. A statement of grounds of appeal was filed on 3 August 1995.

IV. With the statement of grounds of appeal, the appellant filed new claims 1 to 5 by way of **main request** and new

claims 1 to 4 by way of an **auxiliary request**.

V. Claim 1 of the **main request**, which corresponds essentially to the independent apparatus claim considered in contested decision, reads as follows:

"An annular metallic member (38) securable to a plasma arc torch that provides a plasma jet to pierce and cut a metallic workpiece (26) and in so piercing and cutting produces a splattering of molten metal (26 a) directed at the torch (10),

said torch (10) having a body (12), an electrode (14) mounted within the body and a nozzle (16), spaced from the electrode (14) and including a central port (18) through which an ionisable gas exits as a plasma jet (24) that attaches to a workpiece (26),

said torch further including internal passages to supply the ionisable gas, a cooling gas (48) directed around said nozzle (16) and conductors which introduce a direct current to the electrode nozzle pair,

characterised in that said annular metallic member consists of a shield (38), being formed of material having good heat transfer properties and including means to releasably secure said shield to said body (12) in electrical isolation therefrom, said member (38) being configured to surround said nozzle (16) in a spaced-apart relationship thereto, and having a cylindrical side wall (38 b), an end wall (38 c) extending transversely to a plasma jet (24) exiting the said nozzle (16) of said torch (10), and an exit orifice (42) formed in said end wall (38 c) for alignment with said torch nozzle exit port (18),

said exit orifice (42) having a sufficiently large cross sectional area such that it does not, in use, interfere with said jet (24), while being sufficiently

small that substantially all of the splattered molten metal (26a) strikes the shield member (38) without reaching the nozzle (16),

said shield (38) including at least one bleed port (44) to divert a portion of said cooling gas directed around said torch nozzle (16) to the exterior of said shield member (38)."

Claims 2 to 5 are dependent on claim 1.

Claim 1 according to the **auxiliary request** reads as follows:

"An annular metallic member (38) for a plasma arc torch (10) that pierces and cuts a metallic workpiece (26) and in so piercing and cutting produces a splattering of molten metal (26a) directed at the torch (10),

said torch (10) having a body (12), an electrode (14) mounted within the body and a nozzle (16), a space between the electrode (14) and nozzle (16) defining part of a primary gas flow which gas flow is ionised and exits through a central port (18) as a plasma jet (24) that attaches to the workpiece (26),

means to secure said member (38) to said torch (10),

said torch further including internal passages to supply the primary gas and conductors which introduce a direct current to the electrode nozzle pair,

said member (38) being formed of a metallic material with good heat transfer properties electrically isolated from said nozzle (16), having a cylindrical sidewall (38a).

and being in a spaced apart relationship from said nozzle (16) to define a flow path (40) for a secondary gas flow (48),

characterised in that:

said annular metallic member consists of a shield (38), including an end wall (38a) extending transversely to the plasma jet (24) exiting the said nozzle (16) and an exit orifice (42) formed in said end wall (38c) aligned with said nozzle exit port (18),

said exit orifice (42) having a sufficiently large cross sectional area that it does not interfere with said jet (24), while being sufficiently small that substantially all of the splattered molten metal (26a) strikes the shield member (38) without reaching the nozzle (16),

said shield (38) being cooled by said secondary gas flow (48) and including at least one bleed port (44) to divert a first portion of said cooling gas flowing toward the exit orifice (42) to the exterior of said shield member (38) such that the remaining second portion of said gas flow impinging on the plasma jet (24) does not destabilize it."

Claims 2 to 4 are dependent on claim 1.

VI. The appellant requested that the decision of the Examining Division be set aside and the application be allowed to proceed to grant of a European patent on the basis of claims 1 to 5 according to the **main request** or, alternatively, on the basis of claims 1 to 4 according to the **auxiliary request**.

Furthermore, the appellant requested that oral proceedings be held if the Board were minded to decide against the appeal on the basis of the written submissions.

VII. The appellant's arguments may be summarized as follows:

Both the parent and the divisional applications addressed the problem of shielding the nozzle of a gas-cooled plasma arc torch from the ejection of molten metal which was splattered back towards the nozzle and could result in its destruction, when the torch was used for cutting. The solution consisted essentially in providing a shield for the nozzle which did not interfere with the plasma arc jet but which protected it from ejected metal during cutting, thereby extending the nozzle life of the torch. Since it was clearly shown in the parent application that the shield of the invention was intended to be manufactured as a separate functional unit that could be used not only with the precise form of torch claimed in the parent application but also with any other plasma arc torch that did not have a piercing protection, provided that that torch had means for providing a cooling gas flow, claims directed to the shield of the invention covered subject-matter which did not extend beyond the content of the parent application as originally filed.

Reasons for the Decision

1. The appeal is admissible.

2. The main question to be decided in the present appeal is whether the subject-matter of claim 1 of the main request is explicitly or implicitly disclosed in the parent application as originally filed.

3. Claims 1 to 5 according to the main request relate to an "annular metallic member securable to a plasma arc

torch" which corresponds to the shield 38 specified in the parent application (cf. Figures 3a, 4 and 5A).

Hence, all the features recited in these claims find support in the earlier application as originally filed.

4.1 In the contested decision, the Examining Division correctly pointed out that it was normally not possible to isolate a component part from an assembly and make it the subject of a new independent claim, and that such a claim could be permissible only if the description contained direct or implicit disclosure of the use of those individual features independently of the particular embodiment, or if said features in the embodiment clearly constituted a separate functional sub-unit.

4.2 In the opinion of the Examining Division, the "annular metallic member" was presented in the parent application as a component part of the torch and there was no suggestion that it might be a separate invention, or that it might be produced and marketed separately. Therefore, the Examining Division came to the conclusion that singling out the nozzle shield and making it the subject of a new independent claim resulted in the skilled reader being presented with information which was not directly and unambiguously derivable from that disclosed previously in the earlier application.

5.1 The parent application addresses essentially the problem of extending the life of the nozzle of a plasma arc torch. According to the description (page 2, lines 4 to 6), the ejection of molten metal from the cut kerf back on to the torch can disturb the plasma

jet and deflect it so that the nozzle may be damaged. Furthermore, molten metal can adhere to the nozzle and block it.

5.2 Prior art solutions adapted for **water-cooled** torches involve protecting the nozzle with a ceramic or copper ring. Low-current torches, however, are **gas-cooled** and have no protection for the nozzle (cf. parent application page 4, lines 2 to 5 and Figures 2a and 2b). While the replacement of the nozzle of a gas-cooled torch may be acceptable in the range up to 50A, above 50A the damage caused to the nozzle by the molten metal occurs so quickly that nozzle replacement becomes economically undesirable (cf. parent application page 4, last paragraph to page 5, first paragraph).

5.3 The gist of the invention disclosed in the parent application consists essentially in providing a **gas-cooled** plasma torch with a screen which protects the nozzle and comprises some holes from which part of the cooling gas escapes.

6.1 The Board agrees with the Examining Division that the functioning of the shield depends on its use with the other components of the torch in a given interrelated manner. In fact, a shield according to claim 1 is not securable to a gas-cooled plasma torch which has not been specifically adapted to receive it, since means (like a thread) are needed to attach the shield to the body of torch. Moreover, the effect of the invention (protection of the nozzle) can only be achieved by the combination of a gas-cooled plasma torch with a **suitable** annular metallic member.

6.2 However, the teaching of the parent application is not

limited to a particular embodiment of a plasma torch but extends to a nozzle protection for gas-cooled torches in general. As pointed out in the description (page 5, last paragraph), a principal feature of the invention is a nozzle shield which can be adapted to refit **existing** plasma arc torches without piercing protection (page 11, line 10), and, in fact, Figure 5 shows an "annular metallic member" 38 which can be easily detached and replaced. Though claim 1 refers to some parts of the torch to specify features of the nozzle shield, such parts are indeed **standard** in prior art gas-cooled torches. In the opinion of he Board, the fact that the annular metallic member of the invention can be defined without having recourse to any particular **new** feature of the torch means that the structural modifications of a known torch which are made necessary by the application of the claimed shield are implicit to the skilled person.

6.3 In summary, the starting point of the invention as defined in the parent application is a prior art gas-cooled torch (cf. Figures 2A or 2B). It is implicit that no substantial modification of such a prior art gas-cooled torch is necessary to apply the shield of the invention: a torch of known design could be easily adapted to receive a shield as recited in the claim by providing, for example, a thread and a ring to ensure electrical isolation. Hence, the claimed shield should not be regarded as a component part which has been artificially separated from a device constituting the invention. In the opinion of the Board, the shield is the actual invention.

6.4 As it is implicit from the disclosure of the parent application that the annular metallic member claimed in

the divisional application is not just a component part of a particular torch but can be used with a standard gas-cooled plasma arc torch to protect the nozzle, provided that some straightforward adaptation of the torch is made, the divisional application does not give the applicant "unwarranted advantage" and does not appear to be "damaging to the legal security of third parties relying on the content of the original application" (cf. G 1/93 OJ 1994, 541).

7. Hence, claim 1 according to the main request does not contain subject-matter which extends beyond the content of the earlier application, and, therefore, the divisional application complies with the requirements of Article 76(1) EPC.

8. As the appellant's main request is allowable, there is no need to consider the auxiliary request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside;

2. The case is remitted to the Examining Division for further prosecution on the basis of claims 1 to 5 according to the main request filed with the statement of grounds of appeal dated 2 August 1995.

The Registrar: The Chairman:

R. Schumacher G. Davies