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Datasheet for the decision of 13 February 2020

Case Number: T 1751/15 - 3.5.03

Application Number: 02737293.7

Publication Number: 1397732

IPC: G05D11/02, G01F1/84, C01B3/34

Language of the proceedings: EN

Title of invention:
Steam to carbon ratio control in steam reforming of hydrocarbons

Applicant:
Micro Motion, Inc.

Headword:
Steam-to-carbon ratio control/MICRO MOTION

Relevant legal provisions:
EPC Art. 123(2)
RPBA Art. 12(4), 13(1)
RPBA 2020 Art. 12(2)

Keyword:
Admitting of main request filed at oral proceedings - (no): returning to an earlier version
Added subject-matter - all other requests (yes)

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Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1751/15 - 3.5.03

D E C I S I O N
of Technical Board of Appeal 3.5.03
of 13 February 2020

Appellant: (Applicant)	Micro Motion, Inc. 7070 Winchester Circle Boulder, CO 80301 (US)
Representative:	Vossius & Partner Patentanwälte Rechtsanwälte mbB P.O. Box 86 07 67 81634 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 16 March 2015 refusing European patent application No. 02737293.7 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair	K. Bengi-Akyürek
Members:	T. Snell
	R. Winkelhofer

Summary of Facts and Submissions

I. This decision concerns an appeal against the decision of the examining division refusing the patent application on the grounds of non-compliance with Article 123(2) EPC and lack of novelty (Article 54 EPC).

II. The appellant requests that the decision under appeal be set aside and a patent granted on the basis of one of the following requests to be considered in the order:

- a **main request** as filed at the oral proceedings before the board;

- a request, entitled "**auxiliary request 2**" filed with the submission responding to the board's written preliminary opinion on the case;

- a request, entitled "**auxiliary request**", filed with the statement of grounds of appeal;

- the request refused by the examining division.

III. Claim 1 of the **main request** reads as follows:

"A mass flowmeter system (200) for use in controlling a reformation reaction in a hydrogen production system (206), the mass flowmeter system comprising:

a hydrocarbon feedstock supply (204) for supplying a hydrocarbon feedstock to said hydrogen production system; and

a steam supply (214) for supplying steam to said hydrogen production system;

said mass flowmeter system characterized by:

a first flowmeter (5) for measuring a mass flow rate of said hydrocarbon feedstock supplied to said hydrogen production system, and for producing a hydrocarbon flow rate signal representing said mass flow rate of said hydrocarbon feedstock;

a second flowmeter (218) for measuring a flow rate of said steam supplied to said hydrogen production system, and for producing a steam flow rate signal representing said flow rate of said steam; and

a controller (210) operable for receiving said hydrocarbon flow rate signal and said steam flow rate signal, the controller having program instructions for processing said mass flow rate of said hydrocarbon feedstock and a carbon content factor to determine an estimated carbon content of said hydrocarbon feedstock, said carbon content factor representing the amount of carbon contributed by the hydrocarbon feedstock relative to the total mass of said feedstock, and controlling at least one of said flow rate of said steam and said flow rate of said hydrocarbon feedstock based on a ratio of said estimated carbon content and said steam delivered to said hydrogen production system."

IV. Claim 1 of the request entitled "**auxiliary request 2**" reads as follows:

"A mass flowmeter system (200) for use in controlling a reformation reaction in a hydrogen production system (206), the mass flowmeter system comprising:

a hydrocarbon feedstock supply (204) for supplying a hydrocarbon feedstock comprising natural gas to said hydrogen production system; and

a steam supply (214) for supplying steam to said hydrogen production system;

said mass flowmeter system characterized by:

a first flowmeter (5) for measuring a mass flow rate of said hydrocarbon feedstock supplied to said hydrogen production system, and for producing a hydrocarbon flow rate signal representing said mass flow rate of said hydrocarbon feedstock;

a second flowmeter (218) for measuring a flow rate of said steam supplied to said hydrogen production system, and for producing a steam flow rate signal representing said flow rate of said steam; wherein the system further comprises:

a controller (210) operable for receiving said hydrocarbon flow rate signal and said steam flow rate signal, the controller having program instructions for processing said mass flow rate of said hydrocarbon feedstock and an estimated carbon content factor,

said estimated carbon content factor comprising a mass of carbon for said feedstock in relation to a total mass of said feedstock, the carbon content factor comprising a predetermined constant corresponding to a predominant alkane component of the hydrocarbon

feedstock, to determine an estimated carbon content of said hydrocarbon feedstock, to calculate a carbon-to-steam ratio for the hydrogen production system and to control at least one of said flow rate of said steam and said flow rate of said hydrocarbon feedstock based on said estimated carbon content, said flow rate of steam, and said carbon-steam ratio."

V. Claim 1 of the request entitled **"auxiliary request"** reads as follows:

"A mass flowmeter system (200) for use in controlling a reformation reaction in a hydrogen production system (206), the mass flowmeter system comprising:

a hydrocarbon feedstock supply (204) for supplying a hydrocarbon feedstock to said hydrogen production system; and

a steam supply (214) for supplying steam to said hydrogen production system;

said mass flowmeter system characterized by:

a first flowmeter (5) for measuring a mass flow rate of said hydrocarbon feedstock supplied to said hydrogen production system, and for producing a hydrocarbon flow rate signal representing said mass flow rate of said hydrocarbon feedstock;

a second flowmeter (218) for measuring a flow rate of said steam supplied to said hydrogen production system, and for producing a steam flow rate signal representing said flow rate of said steam; characterized in that the system further comprises:

a controller (210) operable for receiving said hydrocarbon flow rate signal and said steam flow rate signal, the controller having program instructions for processing said mass flow rate of said hydrocarbon feedstock and an estimated carbon content factor, said estimated carbon content factor being based on the hydrocarbon feedstock wherein said feedstock comprises methane, to determine an estimated carbon content of said hydrocarbon feedstock, to receive a carbon-to-steam ratio for the hydrogen production system and to control at least one of said flow rate of said steam and said flow rate of said hydrocarbon feedstock based on said estimated carbon content, said flow rate of steam, and said carbon-steam ratio."

VI. Claim 1 of **the request refused by the examining division** is the same as claim 1 of the "auxiliary request" except that the wording "said estimated carbon content factor being based on the hydrocarbon feedstock wherein said feedstock comprises methane" is replaced by: "said estimated carbon content factor being based on at least one potential constituent of said hydrocarbon feedstock".

Reasons for the Decision

1. Main request - admissibility

1.1 The request was filed at the end of the oral proceedings held before the board, after the appellant had been informed that the other claim requests on file were not allowable. It consists of a version of claim 1 as originally filed, but amended as follows:

"... the controller having program instructions for processing said mass flow rate of said hydrocarbon feedstock and a carbon content factor to determine an estimated carbon content of said hydrocarbon feedstock, said carbon content factor representing the amount of carbon contributed by the hydrocarbon feedstock relative to the total mass of said feedstock ..." (changes with respect to claim 1 as filed being underlined).

1.2 This version of claim 1 omits *inter alia* any reference to a received or calculated carbon-to-steam ratio and in this sense is broader than claim 1 of the other pending claim requests. It also contains a definition of a *carbon content factor* appearing for the first time in present claim 1. It is a development of claim 1 as originally filed rather than of claim 1 of any of the requests on which the appeal proceedings have been based hitherto.

1.3 The main request was not admitted into the appeal proceedings in view of the criteria mentioned in Articles 12(4) and 13(1) RPBA 2007, for the following reasons:

(i) The request has been filed at a late stage of the oral proceedings. No reason can be seen why the appellant did not, at the very latest, file the request together with its response to the board's communication, enabling the board to properly examine it ahead of the oral proceedings.

(ii) In accordance with Article 12(4) RPBA 2007 (see Article 25(2) RPBA 2020), the consideration of such claim requests which could have been filed before the first instance is at the discretion of the board. The

boards of appeal in their jurisprudence generally do not admit claim requests which are essentially re-submitted versions of claim requests filed during the first-instance proceedings but not maintained. The same applies to requests which are essentially developments of a no-longer maintained request, especially as new requests are generally expected to be convergent, i.e. to develop the subject-matter in a consistent direction rather than to broaden the claimed subject-matter by omitting features, such as here the "received/calculated carbon-to-steam ratio".

(iii) If the request were admitted, the board would essentially, at this late stage, have to re-examine claim 1 as originally filed for (all) possible objections raised by the examining division, e.g. those which had motivated the appellant to file amendments during the examination proceedings. It would also have to examine the new wording "and a carbon content factor ... the amount of carbon contributed by the hydrocarbon feedstock relative to the total mass of feedstock" for compliance with Articles 84 and 123(2) EPC as well as, potentially, the effect of these amendments on novelty and inventive step. This is however not the purpose of appeal proceedings, which is essentially to review the impugned decision (cf. Article 12(2) RPBA 2020).

1.4 The appellant argued that claim 1 of the main request was now aimed at capturing the basic inventive concept of "applying a carbon content factor to the mass flow rate of the hydrocarbon feedstock rate". This claim, even if new, could easily be examined by the board.

1.5 The procedural aspects (i) to (iii) given above however take precedence. In any case, claim 1 does not actually

include the feature of "applying a carbon content factor to the mass flow rate of the hydrocarbon feedstock rate" (cf. page 14, lines 13-16 of the description as filed).

2. "Auxiliary request 2" - claim 1 - Article 123(2) EPC

2.1 Claim 1 includes *inter alia* the following feature combination (letters A to F having been added by the board):

"the controller having program instructions ....

A) to determine an estimated carbon content of said hydrocarbon feedstock,

B) to calculate a carbon-to-steam ratio for the hydrogen production system and

C) to control at least one of said flow rate of said steam and said flow rate of said hydrocarbon feedstock based on

D) said estimated carbon content,

E) said flow rate of steam, and

F) said carbon-steam ratio."

2.2 With respect to Article 123(2) EPC, the appellant saw a basis for this subject-matter in claim 1 as filed as well as the passages of the original description on page 14, lines 12-19 and from page 17, line 17 to page 8, line 22, including equation (8). In particular, the appellant argues: "Those of skill in the art will be able to use equation 8 to control a flow rate of

steam and/or a flow rate of hydrocarbon feedstock based on a calculated carbon steam ratio, which they will understand is further based on the flow rate of steam and the estimated carbon content of a hydrocarbon feedstock" (cf. page 4, lines 8-11 of the appellant's submission dated 13 January 2020).

2.3 However, the above feature combination A to F does not appear in this form either in claim 1 as filed or in the referred-to passages of the description. In this respect, claim 1 now specifies that the flow rates of steam and/or the hydrocarbon feedstock is/are based on the estimated carbon content, the flow rate of steam, and the carbon-steam ratio, i.e. features D, E and F. This not the same as basing it on feature F alone, as specified in claim 1 as filed and the cited passage on page 14, or the same as specifying that the flow rate(s) is/are based on feature F, wherein feature F is based on features D and E. The latter is derivable from the description as filed on pages 17 and 18, noting however that equation (8) is in any case more specific than the wording of the claim and therefore itself could not be a direct and unambiguous basis for present claim 1.

2.4 Consequently, claim 1 does not comply with Article 123(2) EPC.

3. *The "auxiliary request" and the request refused by the examining division - claim 1 - Article 123(2) EPC*

The objection raised in connection with claim 1 of "auxiliary request 2" applies, *mutatis mutandis*, to claim 1 respectively of the "auxiliary request" and the request refused by the examining division.

4. *Conclusion*

As there is no allowable request, it follows that the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

B. Brückner K. Bengi-Akyürek

Decision electronically authenticated