UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TOPSOE, INC.,
Petitioner

v.

L'AIR LIQUIDE, SOCIÉTÉ ANONYME POUR L'ETUDE ET L'EXPLOITATION DES PROCÉDÉS GEORGES CLAUDE,
Patent Owner

U.S. Patent No. 11,673,805
Filed: August 11, 2021
Issued: June 13, 2023
Inventors: Schmidt, *et al.*
TITLE: PROCESS AND PLANT FOR PREPARATION OF HYDROGEN AND SEPARATION OF CARBON DIOXIDE

Inter Partes Review Nos. IPR2025-01173, IPR2025-01174

PETITIONER'S EXPLANATION AND RANKING OF MULTIPLE PETITIONS

I. INTRODUCTION

Pursuant to the November 2019 Consolidated Trial Practice Guide, Petitioner Topsoe, Inc. submits this explanation for filing two petitions for *inter partes* review of U.S. Patent No. 11,673,805 ("the '805 patent"). Petitioner brings two petitions, each of which presents a unique combination of challenges. Two petitions are required because of both the length and the disjunctive nature of the '805 claim elements, covering two distinct alternative configurations. As explained below, the multiple petitions are appropriate in this instance and Petitioner respectfully requests institution of both petitions.

II. RANKING OF THE PETITIONS

Petitioner respectfully requests that the Board consider the merits of the petitions in the following order:

1. IPR2025-01173 ("the Series Petition"); and
2. IPR2025-01174 ("the Parallel Petition").

III. DIFFERENCES BETWEEN THE PETITIONS

The two petitions present materially different issues, and are not redundant. The petitions challenge the same claims over different prior art references:

Petition	Challenged claims of the '805 patent	Ground
Petition A (the "series" configuration): IPR2025-01173	1, 11 and 12	Ground 1: § 102 over Reinertsen
	1–6, 11 and 12	Ground 2: § 103 over Reinertsen and Darde
	1, 6, 11 and 12	Ground 3: § 103 over Rytter and Darde
	2–5	Ground 4: § 103 over Reinertsen, Darde and Terrien
Petition B (the "parallel" configuration): IPR2025-01174	1, 6, 11 and 12	Ground 1: § 103 over Martin and Rafati
	2–4, 6	Ground 2: § 103 over Martin, Rafati and Gauthier
	2–5	Ground 3: § 103 over Martin, Rafati and Terrien

The '805 patent claims "a process for preparing hydrogen by reforming hydrocarbons with steam, and for separation of carbon dioxide." EX1001, claim 1. Claim 1 is the only independent claim of the '805 patent, and recites a number of steps in the process, and manipulating a variety of different gas streams (e.g., a "feed gas stream", a "first synthesis gas stream", a "second synthesis gas stream", a "third synthesis gas stream", a "fourth synthesis gas stream", a "hydrogen-rich stream", a "first residual gas stream", a "first carbon dioxide-rich stream", and a "second residual gas stream.")

Of particular relevance is claim 1's recitation of two alternative processes for producing the "third synthesis gas stream:"

> (c) reforming a portion of the feed gas stream in an autothermal reforming step thereby producing a second synthesis gas stream, and combining the first synthesis gas stream and the second synthesis gas stream thereby producing a third synthesis gas stream,
>
> **or**
>
> reforming the first synthesis gas stream in an autothermal reforming step thereby producing a third synthesis gas stream…

EX1001, claim 1 (emphasis added)

As the specification explains, the first alternative can be thought of as using two reformers "arranged parallel to one another" while the second alternative has the reformers arranged "in series." EX1001, Abstract. The parallel arrangement involves splitting off "a portion of the feed gas stream FG" for reforming in an endothermic reforming step to yield SG1, while "preferably the remaining portion of the feed gas stream FG, is reformed in the autothermal reforming step to give the synthesis gas stream SG2." EX1001, col. 4, ln. 16–26.; FIG 2. The two reformed gas streams are then combined to form SG3.

In contrast, the series arrangement has the feed gas FG being "introduced fully into the reforming unit of the endothermic reforming step and converted to the synthesis gas stream SG1," which is then "reformed in the autothermal reforming step to give the synthesis gas SG3." EX1001, col. 4, ln. 27–44; FIG 3.

Claim 1 of the ’805 patent is broadly drafted using the disjunctive to encompass **both** the parallel and series configurations of the purported invention. The two petitions address these two mutually exclusive arrangements in a non-redundant manner. Although each set of references in the two petitions contain teachings directed to every claim element, the petitions rely on completely different references in order to address either the parallel or series configuration of claim 1: The “Series” Petition (Petition 1, IPR2025-01173) demonstrates that the series configuration of reformers was known in the art and that it was known and/or obvious to employ such a configuration, while the “Parallel” Petition (Petition 2, IPR2025-01174) demonstrates that it was known and/or obvious to employ a parallel configuration of reformers. Thus, the two petitions are complementary at least in that they address the two different alternative arrangements contemplated by the ’805 patent.

The differences in the references also lead to material differences in the obviousness analysis in each petition, as they have different starting points with different motivations to combine and different modifications to the respective primary reference’s teachings.

Respectfully submitted,

/Aaron R. Feigelson/

Aaron R. Feigelson, Reg. No. 59,022
Leydig, Voit & Mayer, Ltd.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6745
Telephone: (312) 616-5600
Facsimile: (312) 616-5700
Email: afeigelson@leydig.com

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CERTIFICATE OF SERVICE

I hereby certify that, on July 2, 2025, a true and correct copy of this **PETITIONER'S EXPLANATION AND RANKING OF MULTIPLE PETITIONS** was served in its entirety via Federal Express and/or additionally by electronic mail, upon the following attorneys of record as listed on USPTO Patent Center:

For Patent Owner:

AMERICAN AIR LIQUIDE
Intellectual Property Department
9811 Katy Freeway
Suite 100
Houston, TX 77024

/Aaron R. Feigelson/

Aaron R. Feigelson, Reg. No. 59,022
Leydig, Voit & Mayer, Ltd.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6745
Telephone: (312) 616-5600
Facsimile: (312) 616-5700
Email: afeigelson@leydig.com

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