

PATENT COOPERATION TREATY

From the INTERNATIONAL PRELIMINARY EXAMINING
AUTHORITY

To:

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PCT

NOTIFICATION OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY (CHAPTER II OF
THE PATENT COOPERATION TREATY)

(PCT Rule 71.1)

Date of mailing

(day/month/year)

15 September 2021 (15.09.2021)

Applicant's or agent's file reference

19376 WO

IMPORTANT NOTIFICATION

International application No.

PCT/US2020/053195

International filing date

(day/month/year)

**29 September
2020 (29.09.2020)**

Priority date

(day/month/year)

**01 October 2019
(01.10.2019)**

Applicant

OWENS-BROCKWAY CLASS CONTAINER INC.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the *PCT Applicant's Guide*.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed invention is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the IPEA/US

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 19376 WO	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/US2020/053195	International filing date (<i>day/month/year</i>) 29 September 2020 (29.09.2020)	Priority date (<i>day/month/year</i>) 01 October 2019 (01.10.2019)
International Patent Classification (IPC) or both national classification and IPC IPC: C03B 5/235 CPC: C03B 5/2356		
Applicant OWENS-BROCKWAY CLASS CONTAINER INC.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of <u> 5 </u> sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☒ (<i>sent to the applicant and to the International Bureau</i>) a total of <u> 18 </u> sheets, as follows: ☒ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions). ☐ sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4bis, 70.2(e), 70.16 and 91.2). ☐ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)). b. ☐ (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) _____ containing a sequence listing, in the form of an Annex C/ST.25 text file, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3ter of Annex C of the Administrative Instructions). 4. This report contains indications relating to the following items: ☒ Box No. I Basis of the report ☐ Box No. II Priority ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability ☐ Box No. IV Lack of unity of invention ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement ☐ Box No. VI Certain documents cited ☐ Box No. VII Certain defects in the international application ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand 22 July 2021 (22.07.2021)	Date of completion of this report 10 September 2021 (10.09.2021)
Name and mailing address of the IPEA/US COMMISSIONER FOR PATENTS MAIL STOP PCT, ATTN: IPEA/US P.O. BOX 1450 ALEXANDRIA, VA 22313-1450, UNITED STATES OF AMERICA Facsimile No. (571)273-8300	Authorized officer CYNTHIA SZEWCZYK Telephone No. (571)270-5130

Box No. I Basis of the report

1. With regard to the **language**, this report is based on:

- ☒ the international application in the language in which it was filed.
- ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of:
- ☐ international search (Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a) and (b))

2. With regard to the **elements** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

- ☐ the international application as originally filed/furnished, or
- ☒ the description:
pages 1-22 as originally filed/furnished.
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____
- ☒ the claims:
Nos. _____ as originally filed/furnished.
Nos.* _____ as amended (together with any statement) under Article 19
Nos.* 1-15 received by this Authority on 22 July 2021 (22.07.2021)
- ☒ the drawings:
pages 1/2-2/2 as originally filed/furnished.
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____
- ☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-bis)):

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____

5. ☐ This report has been established:

- ☐ taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-bis) and 70.2(e)).
- ☐ without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4bis and 70.2(e)).

6. With regard to top-up searches (Rules 66.1ter and 70.2(f)):

- ☒ A top-up search was carried out by this Authority on 10 September 2021 (10.09.2021)
- ☒ Additional relevant documents have been discovered during the top-up search.
- ☐ No top-up search was carried out by this Authority because it would serve no useful purpose.

7. ☐ Supplementary international search report(s) from Authority(ies) _____ has/
have been received and taken into account in establishing this report (Rule 45bis.8(b) and (c)).

* If item 4 applies, some or all of those sheets may be marked "superseded."

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	1-15	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1-15	NO
Industrial applicability (IA)	Claims	1-15	YES
	Claims		NO
2. Citations and explanations (Rule 70.7)			
----- NEW CITATIONS -----			
US 20140144185 A1 (JOHNS MANVILLE) 29 May 2014 (29.05.2014)			
US 20130239618 A1 (ASAHI GLASS COMPANY, LIMITED) 19 September 2013 (19.09.2013)			
US 20140090421 A1 (JOHNS MANVILLE) 03 April 2014 (03.04.2014)			
US 5588978 A (ARGENT; RONALD D.) 31 December 1996 (31.12.1996)			
----- EXPLANATION -----			
Claims 1, 3, 5, 9-11 lack an inventive step under PCT Article 33(3) as being obvious over JEANVOINE et al. (US 2002/0162358) in view of SHOCK et al. (US 2014/0144185) and ISHIKAWA et al. (US 2013/0239618). Jeanvoine teaches a method for melting glass. Jeanvoine teaches providing a glass batch comprising a mixture of solid glass-forming materials and melting the glass batch in a melting chamber by application of heat from one or more submerged combustion (see figure 1). Figure 1 shows directing the unrefined molten glass from the melting chamber into a downstream treatment chamber including a refining section. Jeanvoine teaches heating the unrefined molten glass including the refining agent in the refining section of the treatment chamber at a temperature at most 1500°C (claim 11) which incorporates the claimed range of 1200°C to 1500°C. It is inherent that refined molten glass comprises, by volume fewer gas bubbles than unrefined molten glass. Jeanvoine is silent to the bubble content. Shock teaches a method of melting glass by a submerged combustion melter. Shock teaches that melting by a submerged combustion melter results in molten glass having up to 40% by volume of bubbles (para. 0002) which incorporates the claimed range of 20% to 40% gas bubbles. It would have been obvious to one of ordinary skill in the art that the glass of Jeanvoine would have bubbles of the same content because Jeanvoine teaches melting by a submerged combustion melter. Ishikawa teaches a method of melting glass raw materials. Ishikawa teaches adding an additive to a molten state glass. Ishikawa teaches a melting tank (30) and a fining chamber (20) downstream from the melting tank that has a housing having each of a glass inlet, a glass outlet, and an auxiliary access passage (para. 0071). Ishikawa teaches introducing additive particles into the fining chamber of the fining tank through the auxiliary access passage (para. 0079). Ishikawa teaches the additive particles comprising a glass reactant material and one or more fining agents (para. 0107). It would have been obvious to one of ordinary skill in the art to modify the method of Jeanvoine with the fining steps of Ishikawa because Ishikawa teaches that adding additives in the fining tank reduces energy consumption and exhaust gas (para. 0051). Regarding claim 3, Ishikawa shows in figure 1 that the refining agent is introduced into the unrefined molten glass in the refining section of the treatment chamber.			

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
	Regarding claim 5, figure 1 of Ishikawa shows the refining agent is introduced into the unrefined molten glass at a turbulent location downstream of the melting chamber. Regarding claim 9, Ishikawa teaches that the additives have a mean particle diameter of 30 to 1000 μm (para. 0109) which falls into the claimed range of 0.1 micrometers to 1000 micrometers. Regarding claim 10, Ishikawa teaches the refining agent comprises a gaseous material of hydrogen (H_2) (para. 0077). Regarding claim 11, Jeanvoine teaches forming glass articles from the molten glass (para. 0030). Claims 2, 6, 7, 8 lack an inventive step under PCT Article 33(3) as being obvious over the prior art as applied in the immediately preceding paragraph and further in view of KOBAYASHI (US 5,922,097). Jeanvoine as modified by Shock and Ishikawa teaches a method of melting glass. Ishikawa is silent to the fining agents use in the additive. Kobayashi teaches a method of reducing gaseous inclusions in a glass making process. Kobayashi teaches a common fining agents is sodium sulfate (col. 1 lines 61-63). It would have been obvious to one of ordinary skill in the art to use sodium sulfate as the refining agent of modified Jeanvoine because Kobayashi teaches that it is a common fining agent use in the art (col. 1 lines 61-63). Regarding claim 6, Kobayashi teaches that sodium sulfate is typically added in an amount of 6 to 12 kg per metric ton of the glass (col. 2 lines 4-5), or 0.66% to 1.3% which overlaps with the claimed range of between 0.001% and 0.1% of the unrefined molten glass. Regarding claim 7, Kobayashi teaches that refining agents may include sodium (col. 1 lines 61-63), arsenic oxides, antimony oxides, and sodium chloride (col. 4 lines 44-45). Regarding claim 8, Kobayashi teaches that refining agents may include arsenic oxides or antimony oxides (col. 4 lines 44-45). Claim 4 lacks an inventive step under PCT Article 33(3) as being obvious over the prior art as applied in the immediately preceding paragraph and further in view of SHOCK et al. (US 2014/0090421). Jeanvoine as modified by Shock and Ishikawa teaches a method of melting glass. Shock (US 2014/0090421) teaches a method of melting glass. Shock teaches that the melter/finer may contain one or more apertures in the roof and/or sidewall of the furnace for introducing one or more compositions into the downstream apparatus (para. 0059). Figures 1 and 2 of Shock US 2014/0090421 shows an aperture for introducing additives (24, 24d, 24e) between the melting chamber (2) and the treatment chamber (14). It would have been obvious to one of ordinary skill in the art to modify the method of Jeanvoine to introduce the refining agent between the melting chamber and the treatment chamber because Shock US 2014/0090421 teaches that introducing additives here can result in higher foam decay rates (para. 0059). Claim 12 lacks an inventive step under PCT Article 33(3) as being obvious over JEANVOINE et al. (US 2002/0162358) in view of SHOCK et al. (US 2014/0144185) and ISHIKAWA et al. (US 2013/0239618) and ARGENT et al. (US 5,588,978). Jeanvoine teaches a method for melting glass. Jeanvoine teaches providing a glass batch comprising a mixture of solid glass-forming materials and melting the glass batch in a melting chamber by application of heat from one or more submerged combustion (see figure 1). Figure 1 shows directing the unrefined molten glass from the melting chamber into a downstream treatment chamber including a refining section. Jeanvoine teaches heating the unrefined molten glass including the refining agent in the refining section of the treatment chamber at a temperature at most 1500°C (claim 11) which incorporates the claimed range of 1200°C to 1500°C. It inherent that refined molten glass comprises, by volume fewer gas bubbles than unrefined molten glass. Jeanvoine is silent to the bubble content. Shock teaches a method of melting glass by a submerged combustion melter. Shock teaches that melting by a submerged combustion melter results in molten glass having up to 40% by volume of bubbles (para. 0002) which incorporates the claimed range of 20% to 40% gas bubbles. It would have been obvious to

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
	one of ordinary skill in the art that the glass of Jeanvoine would have bubbles of the same content because Jeanvoine teaches melting by a submerged combustion melter. Ishikawa teaches a method of melting glass raw materials. Ishikawa teaches adding an additive to a molten state glass. Ishikawa teaches a melting tank (30) and a fining chamber (20) downstream from the melting tank that has a housing having each of a glass inlet, a glass outlet, and an auxiliary access passage (para. 0071). Ishikawa teaches introducing additive particles into the fining chamber of the fining tank through the auxiliary access passage (para. 0079). Ishikawa teaches the additive particles comprising a glass reactant material and one or more fining agents (para. 0107). It would have been obvious to one of ordinary skill in the art to modify the method of Jeanvoine with the fining steps of Ishikawa because Ishikawa teaches that adding additives in the fining tank reduces energy consumption and exhaust gas (para. 0051). Argent teaches a method of making colored glass. Argent teaches adding a colorant to glass that has already undergone melting and refining (col. 2 lines 1-6). It would have been obvious to one of ordinary skill in the art to modify the method of Jeanvoine to add a colorant after refining because Argent teaches that this allows for the production of both clear and colored glass (col. 1 lines 14-17). Claims 13 and 14 lack an inventive step under PCT Article 33(3) as being obvious over the prior art as applied in the immediately preceding paragraph and further in view of KOBAYASHI (US 5,922,097). Jeanvoine as modified by Shock, Ishikawa and Argent teaches a method for melting glass. Ishikawa is silent to the fining agents use in the additive. Kobayashi teaches a method of reducing gaseous inclusions in a glass making process. Kobayashi teaches that refining agents may include sodium (col. 1 lines 61-63), arsenic oxides, antimony oxides, and sodium chloride (col. 4 lines 44-45). It would have been obvious to one of ordinary skill in the art to use the refining agents suggested by Kobayashi as the refining agent of modified Jeanvoine because Kobayashi teaches that these are conventional refining agents (abstract). Claim 15 lacks an inventive step under PCT Article 33(3) as being obvious over the prior art as applied in the immediately preceding paragraph and further in view of JACQUES et al. (US 2006/0105899). Jeanvoine as modified by Shock, Ishikawa and Argent teaches a method for melting glass. Modified Jeanvoine is silent to the amount of colorant in the final glass. Jacques teaches a method of melting glass. Jacques teaches that colorant typically represents from 1 to 5% of the glass composition (para. 0002) which overlaps with the claimed range of between 0.5 % and 3 %. It would have been obvious to one of ordinary skill in the art that the colored glass of Jeanvoine would have the range suggested by Jacques because Jacques teaches that typical amount of colorant in the prior art (para. 0002).

Claims

1 1.
2 A process for manufacturing glass comprising:
3 providing a glass batch comprising a mixture of solid glass-forming materials (18);
4 melting the glass batch in a melting chamber (12) by application of heat from one or more
5 submerged combustion burners (34) to produce a volume of unrefined molten glass comprising,
6 by volume, 20% to 40% gas bubbles;
7 directing the unrefined molten glass from the melting chamber (12) into a downstream
8 treatment chamber (14) including a refining section (44);
9 introducing a refining agent into the unrefined molten glass after it leaves the melting
10 chamber (12) to promote gas bubble removal from the molten glass; and
11 heating the unrefined molten glass including the refining agent in the refining section (44)
12 of the treatment chamber (14) at a temperature in the range of 1200°C to 1500°C to produce a
13 volume of refined molten glass, the refined molten glass comprising, by volume, fewer gas bubbles
14 than the unrefined molten glass.

1 2.
2 The process set forth in claim 1 wherein the glass batch contains, by weight, less than 0.1%
3 refining agents selected from the group consisting of: sulfur-containing materials, sulfate
4 compounds, arsenic oxides, antimony oxides, cerium oxides, and metal halide salts.

1 3.

2 The process set forth in claim 1 wherein the refining agent is introduced into the unrefined
3 molten glass in the refining section of the treatment chamber.

1

1 4.

2 The process set forth in claim 1 wherein the refining agent is introduced into the unrefined
3 molten glass between the melting chamber and the treatment chamber.

1

1 5.

2 The process set forth in claim 1 wherein the refining agent is introduced into the unrefined
3 molten glass at a turbulent location downstream of the melting chamber.

1

1 6.

2 The process set forth in claim 1 wherein the refining agent is introduced into the unrefined
3 molten glass in an amount constituting, by weight, between 0.001% and 0.1% of the unrefined
4 molten glass.

5

1 7.

2 The process set forth in claim 1 wherein the refining agent comprises at least one element
3 selected from the group consisting of: aluminum (Al), silicon (Si), zinc (Zn), copper (Cu), tin (Sn),
4 gallium (Ga), beryllium (Be), boron (B), calcium (Ca), chromium (Cr), germanium (Ge), indium
5 (In), iron (Fe), lithium (Li), magnesium (Mg), mercury (Hg), niobium (Nb), silver (Ag), sodium
6 (Na), strontium (Sr), tantalum (Ta), titanium (Ti), tungsten (W), uranium (U), vanadium (V),
7 yttrium (Y), zirconium (Zr), hafnium (Hf), niobium (Nb), molybdenum (Mo), phosphorus (P),
8 sulfur (S), carbon (C), and/or hydrogen (H).

1

1 8.

2 The process set forth in claim 1 wherein the refining agent comprises at least one oxide,
3 nitride, carbide, or oxynitride of silicon (Si), aluminum (Al), gallium (Ga), beryllium (Be), boron
4 (B), calcium (Ca), carbon (C), chromium (Cr), sulfur (S), germanium (Ge), indium (In), iron (Fe),
5 lithium (Li), magnesium (Mg), mercury (Hg), niobium (Nb), phosphorus (P), silver (Ag), sodium
6 (Na), strontium (Sr), tantalum (Ta), titanium (Ti), tungsten (W), uranium (U), vanadium (V),
7 yttrium (Y), zinc (Zn), zirconium (Zr), hafnium (Hf), and molybdenum (Mo).

1 9.

2 The process set forth in claim 1 wherein the refining agent comprises a solid powder having
3 a mean particle diameter in the range of 0.1 micrometers to 1000 micrometers.

1 10.

2 The process set forth in claim 1 wherein the refining agent comprises a gaseous material
3 selected from the group consisting of carbon monoxide (CO), hydrogen (H₂), nitrogen (N₂), and
4 combinations thereof.

5

1 11.

2 The process set forth in claim 1 including:
3 forming glass articles from the molten glass.

1 12.

2 A process for manufacturing glass comprising:

3 providing a glass batch comprising a mixture of solid glass-forming materials (18);

4 melting the glass batch in a melting chamber (12) via application of heat from one or more
5 submerged combustion burners (34) to produce a volume of unrefined molten glass comprising,
6 by volume, 20% to 40% gas bubbles;

7 directing the unrefined molten glass from the melting chamber (12) into a treatment
8 chamber (14) including a refining section (44) and a color control section (46) downstream of the
9 refining section (44);

10 introducing a refining agent into the unrefined molten glass after it leaves the melting
11 chamber (12) to promote gas bubble removal from the molten glass;

12 heating the unrefined molten glass including the refining agent in the refining section (44)
13 of the treatment chamber (14) at a temperature in the range of 1200°C to 1500°C to produce a
14 volume of refined molten glass, the refined molten glass comprising, by volume, fewer gas bubbles
15 than the unrefined molten glass;

16 introducing a colorant material into the refined molten glass in the color control section
17 (46) of the treatment chamber (14) to produce a volume of molten glass having a final desired
18 color; and then

19 forming glass articles from the molten glass.

20

1 13.

2 The process set forth in claim 12 wherein the refining agent is a reducing agent.

1 14.

2 The process set forth in claim 13 wherein the colorant material is an oxidizing agent, and
3 wherein the colorant material comprises at least one material selected from the group consisting
4 of sulfur-containing materials, sulfate compounds, arsenic oxides, antimony oxides, and cerium
5 oxides.

1 15.

2 The process set forth in claim 13 wherein the colorant material is introduced into the refined
3 molten glass in an amount constituting, by weight, between 0.5 % and 3 % of the refined molten
4 glass.

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT COOPERATION TREATY**

International Application No.:	PCT/US2020/053195
Applicant:	Owens-Brockway Glass Container Inc.
International Filing Date:	29 September 2020
Attorney Docket No.:	19376
In Response to:	Written Opinion Mailed 24 November 2020

ARTICLE 34 AMENDMENT AND RESPONSE TO WRITTEN OPINION

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PO Box 1450
Alexandria, VA 22313-1450

This Amendment is in response to the Search Report and Written Opinion mailed 24 November 2020 in connection with the subject application. The period for filing this Article 34 Amendment expires twenty-two months from the 1 October 2019 priority date, *i.e.*, 1 August 2021.

New claim 1 corresponds to original claim 1 and has been amended to recite additional elements of the claimed process.

New claims 2-11 correspond to original claims 2-11.

New claim 12 corresponds to original claim 12 and has been amended to recite additional elements of the claimed process.

New claims 13-15 correspond to original claims 13-15.

REMARKS

Item V

Original claims 1-15 of the application as filed were rejected as lacking novelty and/or an inventive step in view of US2002/162358, cited as reference D1, US2006/105899, cited as reference D2, and US5922097, cited as D3.

Original claim 12 was rejected as not complying with the requirements of Rule 6.4(a) PCT because it was alleged to contain all the features of claim 1 without referring to it. Original claim 12 does include steps in common with original claim 1; however, it also includes additional processing steps and structural features not found in original claim 1. Thus, it is properly drafted as an independent claim and it complies with the requirements of Rule 6.4(a) PCT. In particular, claim 12 includes a limitation to “a treatment chamber (14) including a refining section (44) **and a color control section 46 downstream of the refining section (44)**” (emphasis added) not found in original claim 1. In addition, it includes the steps of “introducing a colorant material into the refined molten glass in the color control section (46) of the treatment chamber (14) to produce a volume of molten glass having a final desired color; and then forming glass articles from the molten glass”, which are not found in original claim 1. Thus, original claim 12 complies with the requirements of Rule 6.4(a) PCT.

Amended independent claim 1 recites

A process for manufacturing glass comprising:

providing a glass batch comprising a mixture of solid glass-forming materials (18);

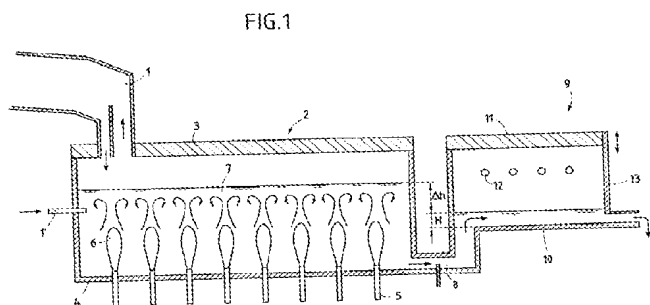
melting the glass batch in a melting chamber (12) by application of heat from one or more submerged combustion burners (34) to produce a volume of unrefined molten glass comprising, by volume, 20% to 40% gas bubbles;

directing the unrefined molten glass from the melting chamber (12) into a downstream treatment chamber (14) including a refining section (44);

introducing a refining agent into the unrefined molten glass after it leaves the melting chamber to promote gas bubble removal from the molten glass; and

heating the unrefined molten glass including the refining agent in the refining section (44) of the treatment chamber (14) at a temperature in the range of 1200°C to 1500°C to produce a volume of refined molten glass, the refined molten glass comprising, by volume, fewer gas bubbles than the unrefined molten glass.

D1, with reference to FIG. 1 at right, discloses a system and a method for refining vitrifiable materials. The system includes a canal (1) for simultaneously allowing the deposit of glass batch materials into a melting chamber (2)



through the roof (3) and allowing the escape of combustion smoke. Thus, some of the glass batch materials can be introduced to the melting chamber (2) from above the melt (7). The rest of the glass batch materials can be injected into the melt (7) from at least one point 1' located below the level of the melt (7). The base (4) of the melting chamber (2) is equipped with rows of submerged burners (5) which pass through it and penetrate into the melting chamber (2). The burners (5) in operation develop combustion zones (6), creating near them, convection streams within the melt (7). The convection stirring creates foams which transfer the heat throughout the melt (7). The molten foamy glass resulting from the melting by the submerged burners (5) is then drawn off at the bottom of the melting chamber (2) by a canal (8) to enter a static refining

compartment. The refining compartment is in the form of a channel (9) defined by a runner (10) and a roof (11). The refining compartment also has a series of oxygen burners (12). The molten foamy glass flow through the channel (9) without a return current over a height H of from 5 to 10 cm. This creates a plug flow in the channel (9). To create the desired thin-layer flow it is necessary to raise the level of the runner (10) with respect to the sieve (4) of the melting chamber (2). Reference D1 teaches in paragraph [0015] that the burners (5) produce a foamy glass having large bubbles with virtually no bubbles smaller than 200 microns in diameter. These large bubbles facilitate the coalescence of smaller bubbles. In addition, D1 teaches in paragraph [0015] that the coalescence is facilitated by adding into the glass batch materials refining agents of the coke or sulphate type. The formation of these large bubbles in the melting chamber (2) is described as a “microrefining” which allows the “thin-layer” refining step in the channel (9) to be very efficient in removing the residual large bubbles to refine the molten glass according to paragraph [0015]. In paragraph [0038] D1 teaches that to improve the refining of the glass by the thin-layer method it is advantageous to add to the glass batch materials various refining promoters as they are added to the melting chamber (2). This promotes the formation of large bubbles by coalescence of the smaller bubbles in the melting stage. The thin-layer refining is further described in paragraphs [0040] to [0043]. In all the descriptions it is formation of the thin-layer that constitutes the refining process. In one variant the thin-layer is also formed using a centrifugal rotating refiner. Most importantly, in using the apparatus of D1 the only place where any refining agents are added is to the glass batch materials in the melting chamber (2).

Although D1 may disclose adding refining agents to the melting chamber (2), it does not disclose or suggest introducing a refining agent into the unrefined molten glass after it leaves the melting chamber, as recited in independent claim 1. Instead, D1 discloses adding any refining

agents to the glass batch materials in the melting chamber (2). Claim 1 also requires that the unrefined molten glass comprise by volume 20% to 40% gas bubbles. This is not disclosed in reference D1.

The Written Opinion stated that D1 teaches in claim 10, Fig. 1 and paragraphs 39 and 99 a glass manufacturing process including the steps of submerged combustion melting the raw materials including a refining agent, followed by refining the melt at temperatures not exceeding 1500° C. The Written Opinion suggested this was sufficient to rule that the subject matter of claim 1 is not new in the sense of Article 33(2) PCT, that therefore the criteria of Article 33(1) PCT was not met. This analysis leaves out any discussion of the other limitations of the method of claim 1 that are not found in or are directly taught against by D1. Namely, the production of a molten unrefined glass comprising by volume 20% to 40% gas bubbles and introducing a refining agent into the unrefined molten glass after it leaves the melting chamber.

Thus, the subject matter recited in independent claim 1 is novel and includes an inventive step over D1.

D2, with reference to FIG. 1 to the right, discloses a system and a method for improved melting of glass batch materials by using a plurality of melt tanks in series. In FIG. 1 the system includes three melt tanks (1, 2, 3) in series. The tanks (1, 2, 3) all include submerged burners (4) the gases

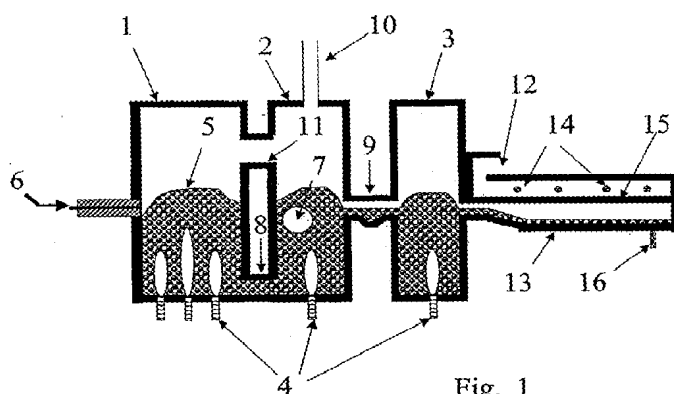


Fig. 1

from which make the glass foamy. The melted glass level is shown by (5). The silica and fluxing agent for the silica are introduced at (6) in tank (1). The thinner and coloring oxides are

introduced into the second melt tank (2) at (7). The molten glass flows from melt tank (1) to melt tank (2) via a throat (8) and from the second melt tank (2) to the third melt tank (3) via a spout (9). The second tank (2) includes a flue (10) to remove flue gases. The molten glass leaves the third tank (3) to undergo a fining step in the zone (13). The zone (13) is indirectly heated by burners (14) through a refractory stone (15). The flue gases from the burners (14) escape via opening (12). The final composition is then removed at (16). This system is described in detail in paragraph [0063] of D2. The temperature in the first tank is from 1230 to 1350° C while the other tanks (2, 3) use much lower temperatures of 1000 to 1150° C and 900 to 1000° C, respectively according to paragraph [0022]. In paragraph [0029] the fining system is described as follows: “On leaving the furnace according to the invention, the melt may be conveyed to a conventionally radiation-heated feeder to improve the fining or to a fining zone. In such a zone, the glass is spread out with a shallow depth, for example ranging from 3 mm to 1 cm, and heated so as to be effectively degassed. This fining step is generally carried out between 1050 and 1200° C.” Nowhere in D2 is there any discussion of the use of any refining agents.

Although D2 may disclose components for melting and refining glass, D2 does not disclose or suggest: creating an unrefined molten glass comprising by volume 20% to 40% gas bubbles; introducing a refining agent into the unrefined molten glass after it leaves the melting chamber (12) to promote gas bubble removal from the molten glass; and heating the unrefined molten glass including the refining agent in the refining section (44) of the treatment chamber (14) at a temperature in the range of 1200°C to 1500°C to produce a volume of refined molten glass, the refined molten glass comprising, by volume, fewer gas bubbles than the unrefined molten glass. All of these limitations are required by claim 1.

Instead, D2, like D1, teaches fining the molten glass by passing it through a zone (13) that produces a thin-layer of from 3 mm to 1 cm with refractory heating to drive the gas bubbles out. The reference D2 does not disclose any use of any refining agents at any point in the process. The Written Opinion suggests that the definitions of refining agents found in claim 7 of the present application are so broad that any raw material can be defined as a refining agent. One of skill in the art would recognize that claims 7 and 8 claim known refining agents and that not “any raw” material meets the definition of a refining agent.

Thus, the subject matter recited in independent claim 1 is novel and includes an inventive step over D2.

D3, with reference to FIG. 6 to the right, discloses which shows a cross-section of a typical atmospheric pressure glass making furnace (1), having combustion burners (2). The glass batch materials (3), are melted in the batch melting zone (5) to produce a

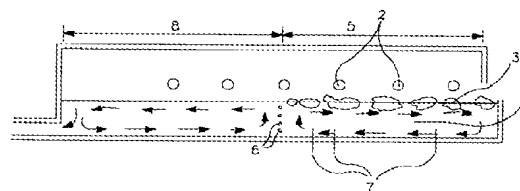


FIG. 6

glass melt (4) in the batch melting zone (5). The system also includes gas bubblers (6), submerged electrodes (7), and an active fining area (8). The process disclosed in D3 involves using a reduced level of conventional batch fining agents and substituting for them dissolved water provided by adding alkali metal hydroxides or bubbled steam into the molten glassmelt or by vacuum refining. As described in column 5, lines 27 to 38, the process comprises adding to the batch of glass forming materials a reduced amount of a conventional refining agent and dissolved water such that the conventional refining agent and the dissolved water are melted into the glassmelt and are sufficient to refine the glass produced. As described in column 11, lines 43 to 45, it is critical to add the dissolved water into the glassmelt at or before the fining zone for the

water to be effective. Thus, it is added between the batch charging end of the furnace and before the fining area.

Thus, although D3 may disclose adding refining agents, it does not disclose or suggest creating an unrefined molten glass comprising by volume 20% to 40% gas bubbles, directing the unrefined molten glass from the melting chamber (12) into a downstream treatment chamber (14) including a refining section (44), and introducing a refining agent into the unrefined molten glass after it leaves the melting chamber to promote gas bubble removal from the molten glass, as recited in independent claim 1. Thus, the subject matter recited in independent claim 1 is novel and includes an inventive step over D3.

Accordingly, it is respectfully submitted that the subject matter recited in independent claim 1 is novel and involves an inventive step over the cited references D1, D2, and D3, individually and collectively.

Dependent claims 2-11 are also novel and include an inventive step both by reason of their dependency from independent claim 1, and because of the additional inventive elements set forth therein.

Amended independent claim 12 recites

A process for manufacturing glass comprising:

providing a glass batch comprising a mixture of solid glass-forming materials (18);

melting the glass batch in a melting chamber (12) via application of heat from one or more submerged combustion burners (34) to produce a volume of unrefined molten glass comprising, by volume, 20% to 40% gas bubbles;

directing the unrefined molten glass from the melting chamber (12) into a treatment chamber (14) including a refining section (44) and a color control section 46 downstream of the refining section (44);

introducing a refining agent into the unrefined molten glass after it leaves the melting chamber to promote gas bubble removal from the molten glass;

heating the unrefined molten glass including the refining agent in the refining section (44) of the treatment chamber (14) at a temperature in the range of 1200°C to 1500°C to produce a volume of refined molten glass, the refined molten glass comprising, by volume, fewer gas bubbles than the unrefined molten glass;

introducing a colorant material into the refined molten glass in the color control section (46) of the treatment chamber (14) to produce a volume of molten glass having a final desired color; and then

forming glass articles from the molten glass.

D1 teaches the features as described above with respect to amended claim 1. It does not teach numerous features of amended claim 12 that are common with amended claim 1. These features are fully discussed above and will not be repeated here. In addition, D1 does not teach anything concerning a treatment chamber having a color control section (46) downstream of a refining section (44) or introducing a colorant material into the refined molten glass in the color control section (46) of the treatment chamber (14) to produce a volume of molten glass having a final desired color, as required by amended claim 12. D1 mentions in paragraph [0082] that colouring oxides can be added to the glass, but does not teach anything regarding how or where the coloring oxides are added to the glass. Accordingly, it is respectfully submitted that the

subject matter recited in independent claim 12 is novel and involves an inventive step over the cited reference D1.

D2 teaches the features as described above with respect to amended claim 1. It does not teach numerous features of amended claim 12 that are common with amended claim 1. These features are fully discussed above and will not be repeated here. In addition, D2 does not teach anything concerning a treatment chamber having a color control section (46) downstream of a refining section (44) or introducing a colorant material into the refined molten glass in the color control section (46) of the treatment chamber (14) to produce a volume of molten glass having a final desired color, as required by amended claim 12. Instead, D2 teaches in paragraph [0063] that the coloring oxides (7) in the form of frits are added to the second melt tank (2). Accordingly, it is respectfully submitted that the subject matter recited in independent claim 12 is novel and involves an inventive step over the cited reference D2.

D3 teaches the features as described above with respect to amended claim 1. It does not teach numerous features of amended claim 12 that are common with amended claim 1. These features are fully discussed above and will not be repeated here. In addition, D3 does not teach anything concerning a treatment chamber having a color control section (46) downstream of a refining section (44) or introducing a colorant material into the refined molten glass in the color control section (46) of the treatment chamber (14) to produce a volume of molten glass having a final desired color, as required by amended claim 12. Instead, D3 does not teach anything specifically concerning addition of colorant materials to glass. Accordingly, it is respectfully submitted that the subject matter recited in independent claim 12 is novel and involves an inventive step over the cited reference D3.

Accordingly, it is respectfully submitted that the subject matter recited in independent claim 12 is novel and involves an inventive step over the cited references D1, D2, and D3, individually and collectively.

Dependent claims 13-15 are also novel and include an inventive step both by reason of their dependency from independent claim 12, and because of the additional inventive elements set forth therein.

Thus, claims 1-15 are novel and include an inventive step over references D1-D3.

It therefore is believed and respectfully submitted that claims 1-15 meet the novelty, inventive step, and clarity and conciseness requirements of the PCT.

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SLS/SBW/RLS

TRATADO DE COOPERACIÓN EN MATERIA DE PATENTES

De la
AUTORIDAD DEL EXAMEN PRELIMINAR INTERNACIONAL

Para: STEPHEN L. SCHARF OWENS-BROCKWAY GLASS CONTAINER INC. ONE MICHAEL OWENS WAY PERRYSBURG, OHIO 43551 ESTADOS UNIDOS DE AMÉRICA		P C T NOTIFICACIÓN DE TRANSMISIÓN DEL INFORME DEL EXAMEN PRELIMINAR INTERNACIONAL (Regla 71.1 del PCT)	
		Fecha de Envío (día/mes/año) 15 de Septiembre de 2021 (15.09.2021)	
Referencia de registro del solicitante o mandatario 19376 WO		NOTIFICACIÓN IMPORTANTE	
Solicitud Internacional No. PCT/US2020/053195	Fecha de presentación Internacional (día/mes/año) 29 de Septiembre de 2020 (29.09.2020)	Fecha de Prioridad (día/mes/año) 01 de Octubre de 2019 (01.10.2019)	
Solicitante OWENS-BROCKWAY CLASS CONTAINER INC.			
1. El solicitante es notificado por medio de la presente que esta Autoridad del Examen Preliminar Internacional transmite con la misma el informe de examen preliminar internacional y sus anexos, si es que existe cualquiera, establecidos con base en la solicitud internacional. 2. Una copia del informe y sus anexos, está siendo transmitida a la Oficina Internacional para la comunicación a todas las Oficinas elegidas. 3. En donde se requiera por cualquiera de las Oficinas elegidas, la Oficina Internacional preparará una traducción al inglés del informe (pero no de cualquiera de los anexos) y transmitirá tal traducción a estas Oficinas. 4 RECORDATORIO El solicitante debe entrar a la fase nacional ante cada Oficina elegida, al efectuar ciertas acciones (traducciones de la presentación y el pago de los derechos nacionales) en el transcurso de 30 meses desde la fecha de prioridad (o al último en algunas Oficinas) (Artículo 39(1)) (ver también el recordatorio enviado por la Oficina o Despacho Internacional con la Forma PCT/IB/301). En donde una traducción de la solicitud internacional debe ser proporcionada a una Oficina elegida, esta traducción debe contener una traducción de cualquiera de los anexos al informe del examen preliminar internacional. Es responsabilidad del solicitante preparar y suministrar tal traducción directamente a cada Oficina elegida relacionada. Para detalles adicionales sobre los límites de tiempo aplicables y los requerimientos de las Oficinas elegidas, ver el Volumen II de la Guía del Solicitante del PCT. Se dirige la atención del solicitante al Artículo 33(5), que prevé que los criterios de novedad, actividad inventiva y aplicabilidad industrial descritos en el Artículo 33(2) a (4) sirven solo para los propósitos del examen preliminar internacional y que “cualquier estado contractante puede aplicar diferentes o adicionales criterios para los propósitos de decir si, en ese estado, las invenciones reivindicadas son patentables o no” (ver también Artículo 27(5)). Estos criterios adicionales pueden relacionarse, por ejemplo, a excepciones de patentabilidad y requerimientos para permitir la descripción la claridad y soporte de las reivindicaciones.			
Nombre y dirección de envío de la IPEA/USI COMISIONADO PARA PATENTES MAIL STOP PCT, ATTN: IPEA/US P.O. BOX 1450 ALEXANDRIA, VA 22313-1450, ESTADOS UNIDOS DE AMÉRICA Facsimile No. (571)273-8300		Oficina Autorizado CYNTHIA SZEWCZYK Tel. (571)270-5130	

Forma PCT/IPEA/416 (Enero de 2004)

TRATADO DE COOPERACIÓN EN MATERIA DE PATENTES
P C T
REPORTE PRELIMINAR INTERNACIONAL DE PATENTABILIDAD
(Capítulo II del Tratado de Cooperación en Materia de Patentes)

(Artículo 36 y Regla 70 del PCT)

Referencia de registro del Solicitante o del Agente 19376 WO	PARA TOMAR ACCION Ver Forma PCT/IPEA/416 ADICIONAL	
Solicitud Internacional No. PCT/US2020/053195	Fecha de Presentación Internacional 29 de Septiembre de 2020 (29.09.2020)	Fecha de Prioridad 01 de Octubre de 2019 (01.10.2019)
Clasificación de Patente Internacional (IPC) o Clasificación nacional e IPC IPC: C03B 5/235 CPC: C03B 5/2356		
Solicitante OWENS-BROCKWAY CLASS CONTAINER INC		
1. Este reporte de examen preliminar internacional ha sido preparado por esta Autoridad de Examen Preliminar Internacional y es transmitido al solicitante de acuerdo con el Artículo 36. 2. Este REPORTE consiste de <u>5</u> hojas, incluyendo esta hoja de cubierta 3. Este reporte también está acompañado por ANEXOS, que comprenden: a. ☒ (enviar al solicitante y al Buró Internacional) un total de <u>18</u> hojas, como sigue: ☒ hojas de la descripción, las reivindicaciones y/o los dibujos, los cuales han sido enmendados y son la base para este reporte y/o las hojas que contienen las rectificaciones hechas antes de esta Autoridad. (Ver la Regla 70.16 y la Sección 607 de las Instrucciones Administrativa). ☐ hojas que reemplazan las hojas anteriores, pero que esta Autoridad considera que contienen una enmienda que va más allá de la descripción en la solicitud internacional como se presentó, como se indica en el punto 4 del Cuadro No. I y el Cuadro Complementario. ☐ las hojas sustituidas y cualquier carta que las acompañe, cuando esta Administración considere que las hojas sustituidas contienen una modificación que va más allá de la divulgación en la solicitud internacional tal como fue presentada, o las hojas sustituidas las hojas sustituidas no iban acompañadas de una carta que indicara el fundamento de las modificaciones en la solicitud presentada, como se indica en el ítem 4 del Recuadro No I y en el Cuadro Suplementario (ver Regla 70.16.b)). b. ☐ (enviar al solicitante y al Buró Internacional) un total de (tipo indicado y número de conductor electrónico(s)) _____, contienen un listado de secuencias y/o tablas que se relacionan al mismo, en forma leíble por computadora únicamente, como se indica en el Cuadro Complementario Relacionado al Listado de Secuencias (ver Sección 802 de las Instrucciones Administrativas).		
4. Este reporte contiene las indicaciones que están relacionadas con los siguientes puntos: ☒ Cuadro No. I Base del reporte ☐ Cuadro No. II Prioridad ☐ Cuadro No. III Ningún establecimiento del reporte con respecto a la novedad, actividad inventiva, o aplicabilidad industrial ☐ Cuadro No. IV Carencia de unidad de la invención ☒ Cuadro No. V Declaración razonada de acuerdo con la Regla 66.2 con respecto a la novedad, actividad inventiva o aplicabilidad industrial; las citas y explicaciones que soportan tal declaración ☐ Cuadro No. VI Ciertos documentos citados ☐ Cuadro No. VII Ciertos defectos en la solicitud internacional ☐ Cuadro No. VIII Ciertas observaciones en la solicitud internacional.		
Fecha de presentación de la solicitud 22 de Julio de 2021 (22.07.2021)	Fecha de terminación de este reporte 10 de Septiembre de 2021 (10.09.2021)	
Nombre y dirección de la IPEA/US COMISIONADO PARA PATENTES MAIL STOP, PCT, ATTN: IPÉA/US P.O. BOX 1450 ALEXANDRIA, VA 22313-1450, ESTADOS UNIDOS DE AMÉRICA Facsimile No. (571)273-8300	Funcionario autorizado CYNTHIA SZEWCZYK Teléfono No. 5751-272-2287	

REPORTE PRELIMINAR INTERNACIONAL DE PATENTABILIDAD

Solicitud Internacional No.
PCT/US2020/053195

Cuadro No. I. Bases del reporte

1. Con respecto al idioma, este reporte se basa en
 - ☒ la solicitud internacional en el idioma original en el ha sido presentada
 - ☐ una traducción de la solicitud internacional en _____, que es el idioma de una traducción otorgada para los propósitos de:
 - ☐ búsqueda internacional (bajo la Regla 12.3 y 23.1(b))
 - ☐ publicación de la solicitud internacional (bajo Regla 12.4) (a))
 - ☐ examen preliminar internacional (bajo las Reglas 55.2 y/o 55.3(a)y(b))
2. Con respecto a los elementos de la solicitud internacional, este reporte se basa en (hojas de reemplazo que se han suministrado a la Oficina receptora en respuesta a una invitación bajo el Artículo 14 son referidas en este reporte como “presentadas originalmente” y no se anexan a este reporte):
 - ☐ la solicitud internacional como se presentó/otorgó originalmente.
 - ☒ la descripción,
 - páginas 1-21, como se presentó originalmente.
 - páginas* _____, recibidas por esta Autoridad en _____
 - páginas* _____, recibidas por esta Autoridad en _____
 - ☒ las reivindicaciones:
 - páginas _____, como se presentaron/otorgaron originalmente.
 - páginas* _____, como se enmendó (conjuntamente con cualquier declaración) bajo el Artículo 19
 - páginas* 1-15, recibidas por esta Autoridad en 22 de Julio de 2021 (22.07.2021)
 - ☒ los dibujos:
 - páginas 1/2-2/2, como se presentaron/otorgaron originalmente
 - páginas* _____, recibidas por esta Autoridad en _____
 - páginas* _____, recibidas por esta Autoridad en _____
 - ☐ un listado de secuencias y/o cualquier tabla(s) relacionada(s) - ver Cuadro Complementario Relacionado al Listado de Secuencias.
3. ☐ Las enmiendas han dado por resultado de la cancelación de:
 - ☐ la descripción, páginas _____
 - ☐ las reivindicaciones, Nos. _____
 - ☐ los dibujos, hojas/figs _____
 - ☐ el listado de secuencias (específico): _____
 - ☐ cualquier tabla(s) relacionada al listado de secuencias (específico): _____
4. ☐ Este reporte se ha establecido como si (alguna de) las enmiendas anexas a este reporte y listadas a continuación no se hayan hecho, puesto que se han considerado que van más allá de la descripción como se presentó, como se indica en el Cuadro Complementario (Regla 70.2 (c)).
 - ☐ la descripción, páginas _____
 - ☐ las reivindicaciones, Nos. _____
 - ☐ los dibujos, hojas/figs _____
 - ☐ el listado de secuencias (específico): _____
 - ☐ cualquier tabla(s) relacionada al listado de secuencias (específico): _____
5. ☐ Este reporte se ha establecido tomando en cuenta la rectificación de una autorización obvia por o notificada para esta Autoridad de acuerdo con la Regla 91(Regla 66.1(d-bis) y 70.2(e)).
6. ☒ Reporte de búsqueda internacional complementario de las autoridades 10 de Septiembre de 2021 (10.09.2021)
 - ☒ se ha recibido y tomado en cuenta en la redacción de este reporte (Regla 45bis.8(b) y (c)).
 - ☐ hay búsqueda top-up se llevó a cabo por esta Autoridad que serviría a ningún propósito útil.
7. ☐ informe de búsqueda internacional suplementaria(s) Autoridad(es) ha/han recibido y tenido en cuenta en el establecimiento de este informe (Regla 45bis.8 (b) y (c)).

* Si 4 puntos aplican, algunas o todas de aquellas hojas pueden ser marcadas “reemplazadas.”

REPORTE DE EXAMEN PRELIMINAR INTERNACIONAL

Solicitud Internacional No.

PCT/US2020/053195

Cuadro No. V Declaración razonada bajo el Artículo 35(2) con respecto a la novedad, la actividad inventiva o la aplicabilidad industrial; en las citaciones y explicaciones que soportan tal declaración

1. DECLARACION.

Novedad (N)	Reivindicaciones	1-15	SI
	Reivindicaciones		NO
Actividad Inventivo (PI)	Reivindicaciones		SI
	Reivindicaciones	1-15	NO
Aplicabilidad Industrial (AI)	Reivindicaciones	1-15	SI
	Reivindicaciones		NO

2. Citas y explicaciones (Regla 70.7)

----- NUEVAS CITAS -----

US 20140144185 AI (JOHNS MANVILLE) 29 de Mayo de 2014 (29.05.2014)

US 20130239618 AI (ASAHI GLASS COMPANY, LIMITED) 19 de Septiembre de 2013 (19.09.2013)

US 20140090421 AI (JOHNS MANVILLE) 03 de Abril de 2014 (03.04.2014)

US 5588978 A (ARGENT; RONALD D.) 31 de Diciembre de 1996 (31.12.1996)

----- EXPLICACIONES -----

Las reivindicaciones **1, 3, 5 y 9** carecen de actividad inventiva en virtud del artículo 33.3 del PCT, ya que son evidentes con respecto a **JEANVOINE et al (US 2002/0162358)** en vista de **SHOCK et al (US 2014/0144185)** e **ISHIKA WA et al (US 2013/0239618)**.

Jeanvoine enseña un método para fundir vidrio. Jeanvoine enseña a proporcionar un lote de vidrio que comprende una mezcla de materiales formadores de vidrio sólidos y fundir el lote de vidrio en una cámara de fusión mediante la aplicación de calor de una o varias combustiones sumergidas (ver la figura 1). La figura 1 muestra la dirección del vidrio fundido sin refinar de la cámara de fusión a una cámara de tratamiento posterior que incluye una sección de refinado. Jeanvoine enseña a calentar el vidrio fundido no refinado, incluido el agente de refinado, en la sección de refinado de la cámara de tratamiento a una temperatura máxima de 1500°C (reivindicación 11) que incorpora el intervalo reivindicado de 1200°C a 1500°C. Es inherente que el vidrio fundido refinado comprenda, en volumen, menos burbujas de gas que el vidrio fundido no refinado.

Jeanvoine guarda silencio ante el contenido de la burbuja.

Shock enseña un método para fundir vidrio mediante un fundidor de combustión sumergida. Shock enseña que la fusión por un fundidor de combustión sumergida da como resultado que el vidrio fundido tenga hasta un 40 % en volumen de burbujas (párrafo 0002), lo que incorpora el intervalo reivindicado de 20 % a 40 % de burbujas de gas. Habría sido obvio para un experto en la técnica que el vidrio de Jeanvoine tendría burbujas del mismo contenido porque Jeanvoine enseña la fusión mediante un fundidor de combustión sumergida.

Ishikawa enseña un método para fundir materias primas de vidrio. Ishikawa enseña cómo adicionar un aditivo a un vidrio en estado fundido. Ishikawa enseña un tanque de fusión (30) y una cámara de clarificación (20) corriente abajo del tanque de fusión que tiene un alojamiento que tiene cada uno una entrada de vidrio, una salida de vidrio y un pasaje de acceso auxiliar (párrafo 0071). Ishikawa enseña la introducción de partículas de aditivo en la cámara de clarificación del tanque de clarificación a través del pasaje de acceso auxiliar (párr. 0079). Ishikawa enseña las partículas aditivas que comprenden un material reactivo de vidrio y uno o más agentes clarificantes (párrafo 0107).

Habría sido obvio para un experto en la materia modificar el método de Jeanvoine con los pasos de clarificación de Ishikawa porque Ishikawa enseña que adicionar aditivos en el tanque de clarificación reduce el consumo de energía y los gases de escape (párrafo 0051).

Con respecto a la reivindicación 3, Ishikawa muestra en la figura 1 que el agente refinador se introduce en el vidrio fundido sin refinar en la sección de refinado de la cámara de tratamiento.

Con respecto a la reivindicación 5, la figura 1 de Ishikawa muestra que el agente refinador se introduce en el vidrio fundido sin refinar en un lugar turbulento corriente abajo de la cámara de fusión.

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Solicitud Internacional No.

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Cuadro No. V Declaración razonada bajo el Artículo 35(2) con respecto a la novedad, la actividad inventiva o la aplicabilidad industrial; en las citaciones y explicaciones que soportan tal declaración

Con respecto a la reivindicación 9, Ishikawa enseña que los aditivos tienen un diámetro medio de partícula de 30 a 1000 μm (párrafo 0109) que cae dentro del intervalo reivindicado de 0.1 micrómetros a 1000 micrómetros.

Con respecto a la reivindicación 10, Ishikawa enseña que el agente de refinado comprende un material gaseoso de hidrógeno (H_2) (párrafo 0077).

Con respecto a la reivindicación 11, Jeanvoine enseña la formación de artículos de vidrio a partir del vidrio fundido (párrafo 0030).

Las reivindicaciones **2, 6, 7, 8 carecen** de actividad inventiva conforme al Artículo 33(3) del PCT por ser obvias sobre el estado de la técnica tal como se aplica en el párrafo inmediatamente anterior y además en vista de **KOBAYASHI (US 5,922,097)**.

Jeanvoine modificado por Shock e Ishikawa enseña un método para fundir vidrio. Ishikawa no dice nada sobre el uso de agentes clarificantes en el aditivo.

Kobayashi enseña un método para reducir las inclusiones gaseosas en un proceso de fabricación de vidrio. Kobayashi enseña que un agente clarificante común es el sulfato de sodio (col. 1, renglones 61-63). Hubiera sido obvio para alguien con conocimientos ordinarios en la técnica usar sulfato de sodio como agente refinador de Jeanvoine modificado porque Kobayashi enseña que es un agente clarificante de uso común en la técnica (col. 1 renglones 61-63).

Con respecto a la reivindicación 6, Kobayashi enseña que el sulfato de sodio generalmente se adiciona en una cantidad de 6 a 12 kg por tonelada métrica de vidrio (col. 2 renglones 4-5), o 0.66% a 1.3% que se superpone con el intervalo reivindicado de entre 0.001% y 0.1% del vidrio fundido sin refinar.

Con respecto a la reivindicación 7, Kobayashi enseña que los agentes refinadores pueden incluir sodio (col. 1 renglones 61-63), óxidos de arsénico, óxidos de antimonio y cloruro de sodio (col. 4 renglones 44-45).

Con respecto a la reivindicación 8, Kobayashi enseña que los agentes de refinado pueden incluir óxidos de arsénico u óxidos de antimonio (col. 4 renglones 44-45).

La reivindicación **4 carece** de actividad inventiva en virtud del Artículo 33(3) del PCT por ser evidente sobre el estado de la técnica tal como se aplica en el párrafo inmediatamente anterior y además en vista de **SHOCK et al (US 2014/0090421)**.

Jeanvoine modificado por Shock e Ishikawa enseña un método para fundir vidrio.

Shock (US 2014/0090421) enseña un método para fundir vidrio. Shock enseña que el fundidor/afinador puede contener una o más aberturas en el techo y/o la pared lateral del horno para introducir una o más composiciones en el aparato corriente abajo (párrafo 0059). Las figuras 1 y 2 de Shock US 2014/0090421 muestran una abertura para introducir aditivos (24, 24d, 24e) entre la cámara de fusión (2) y la cámara de tratamiento (14). Habría sido obvio para un experto en la materia modificar el método de Jeanvoine para introducir el agente refinador entre la cámara de fusión y la cámara de tratamiento porque Shock US 2014/0090421 enseña que la introducción de aditivos aquí puede dar lugar a mayores tasas de descomposición de la espuma. (párr. 0059).

La reivindicación **12 carece** de actividad inventiva en virtud del Artículo 33(3) del PCT, como es obvio sobre **JEANVOINE et al (US 2002/0162358)** en vista de **SHOCK et al. (US 2014/0144185)** e **ISHIKAWA et al. (US 2013/0239618)** y **ARGENT et al. (US 5.588.978)**.

Jeanvoine enseña un método para fundir vidrio. Jeanvoine enseña proporcionar un lote de vidrio que comprende una mezcla de materiales sólidos formadores de vidrio y fundir el lote de vidrio en una cámara de fusión mediante la aplicación de calor de una o más combustión sumergida (ver figura 1). La Figura 1 muestra la dirección del vidrio fundido sin refinar desde la cámara de fusión hacia una cámara de tratamiento corriente abajo que incluye una sección de refinado. Jeanvoine enseña cómo calentar el vidrio fundido sin refinar que incluye el agente refinador en la sección de refinado de la cámara de tratamiento a una temperatura máxima de 1500°C (reivindicación 11) que incorpora el intervalo reivindicado de 1200°C a 1500°C. Es inherente que el vidrio fundido refinado comprende, por volumen, menos burbujas de gas que el vidrio fundido sin refinar.

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Jeanvoine guarda silencio sobre el contenido de la burbuja.

Shock enseña un método para fundir vidrio mediante un fundidor de combustión sumergida. Shock enseña que la fusión por un fundidor de combustión sumergida da como resultado que el vidrio fundido tenga hasta un 40 % en volumen de burbujas (párrafo 0002), lo que incorpora el intervalo reivindicado de 20 % a 40 % de burbujas de gas. Habría sido obvio para un experto en la técnica que el vidrio de Jeanvoine tendría burbujas del mismo contenido porque Jeanvoine enseña la fusión mediante un fundidor de combustión sumergido.

Ishikawa enseña un método para fundir materias primas de vidrio. Ishikawa enseña cómo adicionar un aditivo a un vidrio en estado fundido. Ishikawa enseña un tanque de fusión (30) y una cámara de clarificación (20) corriente abajo del tanque de fusión que tiene un alojamiento que tiene cada uno una entrada de vidrio, una salida de vidrio y un pasaje de acceso auxiliar (párrafo 0071). Ishikawa enseña la introducción de partículas de aditivo en la cámara de clarificación del tanque de clarificación a través del pasaje de acceso auxiliar (párr. 0079). Ishikawa enseña las partículas aditivas que comprenden un material reactivo de vidrio y uno o más agentes clarificantes (párrafo 0107).

Habría sido obvio para un experto en la materia modificar el método de Jeanvoine con los pasos de clarificación de Ishikawa porque Ishikawa enseña que adicionar aditivos en el tanque de clarificación reduce el consumo de energía y los gases de escape (párrafo 0051).

Argent enseña un método para hacer vidrio coloreado. Argent enseña cómo adicionar un colorante al vidrio que ya se ha fundido y refinado (col. 2 renglones 1-6). Habría sido obvio para alguien con conocimientos ordinarios en la técnica modificar el método de Jeanvoine para adicionar un colorante después del refinado porque Argent enseña que esto permite la producción de vidrio transparente y coloreado (col. 1 renglones 14-17).

Las reivindicaciones **13 y 14 carecen** de actividad inventiva conforme al Artículo 33(3) del PCT por ser obvio sobre el estado de la técnica tal como se aplica en el párrafo inmediatamente anterior y además en vista de **KOBAYASHI (US 5,922,097)**.

Jeanvoine modificado por Shock, Ishikawa y Argent enseña un método para fundir vidrio. Ishikawa guarda silencio sobre el uso de agentes clarificantes en el aditivo.

Kobayashi enseña un método para reducir las inclusiones gaseosas en un proceso de fabricación de vidrio. Kobayashi enseña que los agentes de refinado pueden incluir sodio (col. 1 renglones 61-63), óxidos de arsénico, óxidos de antimonio y cloruro de sodio (col. 4 renglones 44-45). Habría sido obvio para un experto en la materia usar los agentes refinadores sugeridos por Kobayashi como el agente refinador de Jeanvoine modificado porque Kobayashi enseña que estos son agentes refinadores convencionales (resumen).

La reivindicación **15 carece** de actividad inventiva en virtud del Artículo 33(3) del PCT por ser evidente sobre el estado de la técnica tal como se aplica en el párrafo inmediatamente anterior y además en vista de **JACQUES et al. (US 2006/0105899)**.

Jeanvoine modificado por Shock, Ishikawa y Argent enseña un método para fundir vidrio. Jeanvoine modificado no dice nada sobre la cantidad de colorante en el vaso final.

Jacques enseña un método para fundir vidrio. Jacques enseña que el colorante representa típicamente del 1 al 5 % de la composición del vidrio (párrafo 0002) que se superpone con el intervalo reivindicado de entre el 0.5 % y el 3 %. Habría sido obvio para alguien con conocimientos ordinarios en la técnica que el vidrio coloreado de Jeanvoine tendría el intervalo sugerido por Jacques porque Jacques enseña esa cantidad típica de colorante en el estado de la técnica (párrafo 0002).

Reivindicaciones enmendadas capítulo II

1. Un proceso para fabricar vidrio que comprende:

proporcionar un lote de vidrio que comprende una mezcla de materiales formadores de vidrio sólidos;

fundir el lote de vidrio en una cámara de fusión mediante la aplicación de calor de uno o más quemadores de combustión sumergidos para producir un volumen de vidrio fundido no refinado que comprende, en volumen, 20% a 40% de burbujas de gas;

dirigir el vidrio fundido no refinado desde la cámara de fusión hacia una cámara de tratamiento corriente abajo que incluye una sección de refinado;

introducir un agente de refinado en el vidrio fundido no refinado después de que abandona la cámara de fusión para promover el retiro de burbujas de gas del vidrio fundido; y

calentar el vidrio fundido no refinado que incluye el agente de refinado en la sección de refinado de la cámara de tratamiento a una temperatura en el intervalo de 1200 °C a 1500 °C para producir un volumen de vidrio fundido refinado, el vidrio fundido refinado que comprende, en volumen, menos burbujas de gas que el vidrio fundido no refinado.

2. El proceso expuesto en la reivindicación 1, en donde el lote de vidrio contiene, en peso, menos de 0.1% de agentes de refinado seleccionados del grupo que consiste en: materiales que contienen azufre, compuestos de sulfato, óxidos de arsénico, óxidos de antimonio, óxidos de cerio y sales de haluro de metal.

3. El proceso expuesto en la reivindicación 1, en donde el agente de refinado se introduce en el vidrio fundido no refinado en la sección de refinado de la cámara de tratamiento.

4. El proceso expuesto en la reivindicación 1, en donde el agente de refinado se introduce en el vidrio fundido no refinado entre la cámara de fusión y la cámara de tratamiento.

5. El proceso expuesto en la reivindicación 1, en donde el agente de refinado se introduce en el vidrio fundido no refinado en una ubicación turbulenta corriente abajo de la cámara de fusión.

6. El proceso expuesto en la reivindicación 1, en donde el agente de refinado se introduce en el vidrio fundido no refinado en una cantidad que constituye, en peso, entre 0.001% y 0.1% del vidrio fundido no refinado.

7. El proceso expuesto en la reivindicación 1, en donde el agente de refinado comprende al menos un elemento seleccionado del grupo que consiste en: aluminio (Al), silicio (Si), zinc (Zn), cobre (Cu), estaño (Sn), galio (Ga), berilio (Be), boro (B), calcio (Ca), cromo (Cr), germanio (Ge), indio (In), hierro (Fe), litio (Li), magnesio (Mg), mercurio (Hg), niobio (Nb), plata (Ag), sodio (Na), estroncio (Sr), tantalio (Ta), titanio (Ti), tungsteno (W),

uranio (U), vanadio (V), itrio (Y), circonio (Zr), hafnio (Hf), niobio (Nb), molibdeno (Mo), fósforo (P), azufre (S), carbono (C), carbono y/o hidrógeno (H).

8. El proceso expuesto en la reivindicación 1, en donde el agente de refinado comprende al menos un óxido, nitruro, carburo u oxinitruro de silicio (Si), aluminio (Al), galio (Ga), berilio (Be), boro (B), calcio (Ca), carbono (C), cromo (Cr), azufre (S), germanio (Ge), indio (In), hierro (Fe), litio (Li), magnesio (Mg), mercurio (Hg), niobio (Nb), fósforo (P), plata (Ag), sodio (Na), estroncio (Sr), tantalio (Ta), titanio (Ti), tungsteno (W), uranio (U), vanadio (V), itrio (Y), zinc (Zn), circonio (Zr), hafnio (Hf), molibdeno (Mo).

9. El proceso expuesto en la reivindicación 1, en donde el agente de refinado comprende un polvo sólido que tiene un diámetro medio de partícula en el intervalo de 0.1 micrómetros a 1000 micrómetros.

10. El proceso expuesto en la reivindicación 1, en donde el agente de refinado comprende un material gaseoso seleccionado del grupo que consiste en monóxido de carbono (CO), hidrógeno (H₂), nitrógeno (N₂) y combinaciones de los mismos.

11. El proceso expuesto en la reivindicación 1, que incluye:

formar artículos de vidrio del vidrio fundido.

12. Un proceso para fabricar vidrio que comprende:

proporcionar un lote de vidrio que comprende una mezcla de materiales formadores de vidrio sólidos;

fundir el lote de vidrio en una cámara de fusión mediante la aplicación de calor de uno o más quemadores de combustión sumergidos para producir un volumen de vidrio fundido no refinado que comprende, en volumen, 20% a 40% de burbujas de gas;

dirigir el vidrio fundido no refinado desde la cámara de fusión hacia una cámara de tratamiento que incluye una sección de refinado y una sección de control de color corriente abajo de la sección de refinado;

introducir un agente de refinado en el vidrio fundido no refinado después de que abandona la cámara de fusión para promover el retiro de burbujas de gas del vidrio fundido;

calentar el vidrio fundido no refinado que incluye el agente de refinado en la sección de refinado de la cámara de tratamiento a una temperatura en el intervalo de 1200 °C a 1500 °C para producir un volumen de vidrio fundido refinado, el vidrio fundido refinado que comprende, en volumen, menos burbujas de gas que el vidrio fundido no refinado;

introducir un material colorante en el vidrio fundido refinado en la sección de control de color de la cámara de tratamiento para producir un volumen de vidrio fundido que tiene un color final deseado; y luego

formar artículos de vidrio del vidrio fundido.

13. El proceso expuesto en la reivindicación 12, en donde el agente de refinado es un agente reductor.

14. El proceso expuesto en la reivindicación 13, en donde el material colorante es un agente oxidante y en donde el material colorante comprende al menos un material seleccionado del grupo que consiste en materiales que contienen azufre, compuestos de sulfato, óxidos de arsénico, óxidos de antimonio y óxidos de cerio.

15. El proceso expuesto en la reivindicación 13, en donde el material colorante se introduce en el vidrio fundido refinado en una cantidad que constituye, en peso, entre 0.5 % y 3 % del vidrio fundido refinado.