

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ARDAGH GLASS INC.,
Petitioner,

v.

CULCHROME, LLC,
Patent Owner.

Case IPR2015-00944
Patent 5,718,737

Before GRACE KARAFFA OBERMANN, CHRISTOPHER L.
CRUMBLEY, and ELIZABETH M. ROESEL, *Administrative Patent
Judges.*

OBERMANN, *Administrative Patent Judge.*

DECISION
Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

Petitioner filed a Petition for an *inter partes* review of claims 1–26 of
U.S. Patent No. 5,718,737 (Ex. 1001, “the ’737 patent”). Paper 1 (“Pet.”).
Patent Owner filed a Preliminary Response. Paper 8 (“Prelim. Resp.”)

Applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, we deny the Petition.

I. BACKGROUND

A. *Related Proceedings*

Petitioner identifies a related district court action involving the '737 patent. Pet. 1 (citing *Green Mountain Glass, LLC v. Saint-Gobain Containers, Inc. d/b/a Verallia North America n/k/a Ardagh Glass Inc.*, No. 14-cv-00392 (D. Del., filed Mar. 28, 2014) (J. Sleet)).

B. *The '737 Patent (Ex. 1001)*

The '737 patent relates to a method of creating recycled glass products from mixed color glass cullet, that is, crushed or broken pieces of mixed-color glass. Ex. 1001, 1:14–15 (“mixed color cullet (i.e., broken pieces of glass of mixed colors and types) can be recycled to make useful glass products”). Mixed color glass cullet includes varying percentages of green, amber, and flint (colorless) glass. *Id.* at 2:1–5.

The color distribution of glass in post-consumer solid municipal waste, and in typical mixed color glass cullet, varies regionally. *Id.* at 2:1-2. According to the disclosure of the '737 patent, at the time of the invention, mixed color glass cullet “had only limited commercial use,” for example, “as an aggregate in paving material” or “land-fill cover,” and often was “discarded in landfills.” *Id.* at 2:5–8. Mixed color glass cullet, therefore, was “substantially less valuable than color sorted cullet.” *Id.* at 2:8–9.

The invention is directed to “a process for re-using mixed colored glass, wherein mixed colored cullet can be used like color sorted cullet, to make new and useful glass products.” *Id.* at 2:10–13. Because “sorting is

not fully effective, what is needed and provided according to the present invention is a method selectively to colorize and/or decolorize one of the colors in the mixed colored cullet to render it useful in the manufacture of glass products of the other color.” *Id.* at 2:13–17; *see id.* at 3:29–40 (an aspect of the invention is that mixed color cullet “is selectively decolorized and/or colorized to a desired color”).

C. Illustrative Claim

Independent claim 1 is illustrative and is reproduced below.

A method of creating recycled glass products, comprising the steps of:

obtaining unsorted mixed color glass cullet having glass of at least two different colors;

adding to said mixed color glass cullet at least one of a decolorizing agent which selectively decolorizes at least one of the colors of said unsorted mixed color glass cullet and a colorizing agent which enhances a remaining color of said unsorted mixed color glass cullet;

melting the mixed color glass cullet and any agent added in said adding step to a molten state; and

creating a recycled glass product of said remaining color from the selectively colorized/decolorized molten mixed color glass cullet.

Ex. 1001, 7:39–54.

Independent claims 1, 9 and 18 are directed to methods of creating recycled glass products. *Id.* at 7:39–54; 8:14–29; 8:61–9:13. Claim 1 recites that such products are created from unsorted mixed color glass cullet and does not require any virgin (i.e., non-recycled) glass. Independent claims 9 and 18, on the other hand, require virgin glass, either in the form of a melt

(claim 9) or batch mixture (claim 18), where the melt or batch is “for glass of a particular color.” *Id.* at 8:19–21; 8:65–67.

Similar to the “adding” step in claim 1, independent claims 9 and 18 require addition of “at least one of a decolorizing agent which selectively decolorizes at least one of the colors of [the] unsorted mixed color glass cullet other than [the] particular color and a coloring agent which enhances [the] particular color of [the] unsorted mixed color glass cullet,” where the “particular color” corresponds to the color of the virgin glass melt or batch. *Id.* at 8:22–27 (claim 9); 9:1–6 (claim 18).

C. Evidence Relied Upon

The Petition relies on the following prior art references:

M. Nix & H. P. Williams, *Calculation of the Redox Number of Glass Batches Containing Recycled Cullet*, GLASTECH. BER. 63K (1990) at 271–279 (Ex. 1004, “Nix”).

J. Wilsker, GB 362,938 (Dec. 8, 1931) (Ex. 1005, “Wilsker”).

W. Dusdorf, K. Al-Hamdan, G. Nolle, *Characterization and Stabilization of the Brown Glass Chromophore under the Aspect of Cullet Use*, Silikattechnik 42, No. 4, pp. 112–114 (1991) (Ex. 1007, “Dusdorf”) (certified English translation).

C. Baltazar-Brillante, *Cullet in Amber Glass Production*, presented at 14th AFGM Conference (reprinted in *glassmachineryplants&accessories*, pp. 47–51) (1989) (Ex. 1008, “Baltazar”).

The Petition also relies on the Declaration of Dr. Subhash Risbud. Ex. 1009.

D. Asserted Grounds of Unpatentability

Reference(s)	Basis	Claims
Nix	§ 102	1–26
Wilsker	§ 102	1, 6–9, 15–18, and 24–26
Nix, Wilsker, Dusdorf, and Baltazar	§ 103	1–26

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *see In re Cuozzo Speed Tech., LLC*, 793 F.3d 1268, 1275–79 (Fed. Cir. 2015). The ’737 patent appears to have expired on March 3, 2015, which would dictate an application of the approach set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005); *see In re Rambus Inc.*, 694 F.3d 42, 46 (Fed. Cir. 2012) (“the Board’s review of the claims of an expired patent is similar to that of a district court’s review”) (internal citation omitted). The result is the same regardless of which claim construction standard is applied here.

We give claim terms their ordinary and customary meaning, as understood by a person of ordinary skill in the art, in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). No claim term requires express construction for the purposes of this decision. *See, e.g., Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (“claim terms need only be construed ‘to the extent necessary to resolve the controversy’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

B. An Overview of the Asserted Prior Art

We consider the asserted prior art as representative of the level of ordinary skill in the art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (“[T]he absence of specific findings on the level of skill in the art does not give rise to reversible error ‘where the prior art itself reflects an appropriate level and a need for testimony is not shown’”) (*quoting Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985)). The information presented shows the following facts about the asserted prior art.

Nix discloses a method for calculating the redox number of glass batches containing recycled cullet. Ex. 1004, Title, 278.¹ According to Nix, the redox state is important for forecasting the color of the glass, and an accurate method for calculating the redox state of a batch is necessary for predicting the properties of the melted glass. *Id.* at 271.

Nix explains that modern container glass batches include appreciable quantities of recycled cullet and, for determining the redox number of those batches, a calculation method that includes a redox factor for recycled cullet is required. *Id.* Nix calculates “a first theoretical approximation” of a redox factor for recycled cullet based on several assumptions: 2000 kg of SiO₂ in the glass batch, a typical mixture of green, flint, and amber glass found in Germany, a mean chemical analysis of recycled cullet, and a level of organic contamination in the recycled cullet. *Id.* at 273–75.

Nix verifies the theoretically calculated figure by preparing laboratory melts of dead leaf green glass containing recycled cullet and comparing the

¹ Citations to Nix, Ex. 1004, are to the original page numbers.

color with melts prepared from batches of known redox number. *Id.* at 275–77. Using the calculated and verified redox number for recycled cullet, Nix provides the following example of a redox calculation for a dead leaf green glass batch containing recycled cullet:

<u>raw material (kg)</u>	<u>redox factor</u>	<u>redox contribution</u>
Sand: 85.00	-0.007	-0.60
Soda ash: 20.00	---	
Dolomite: 12.00	---	
Limestone: 12.00	---	
Carbon: 0.33	-6.29	-2.08
Cullet: 1000.00	-0.004	-4.00
Glass: 1110.79 (72.31 % SiO ₂)		-6.68
SiO ₂ : 803.26		

By correction to 2000 kg of SiO₂, a redox number of

$$\frac{-6.68 \times 2000}{803.26} = -16.63 \quad \text{is obtained.}$$

Id. at 278.

Wilsker discloses “an improved process of glass manufacture” that nullifies an “objectionable colouring effect of ingredients rich in iron.” Ex. 1005, 1:20–26. Wilsker addresses a “peculiar bluish-green colour” that “is most difficult to remove” and that results from using “common red or brown sand having a high iron content” instead of “more costly white sand” in the manufacture of soda-lime glass. *Id.* at 1:9–32.

Dusdorf discloses combining mixed color cullet with virgin glass materials. Pet. 46 (citing Ex. 1007, 4). Dusdorf states that “brown glasses are produced nowadays using mixed cullet.” *Id.* 45 (citing Ex. 1007, 3). Baltazar discusses “the San Miguel Glassworks experience in the use of high level cullet up to 80% and the use of flint/green cullet in amber glass.” *Id.* (quoting Ex. 1008, 47 (Abstract)).

The Petition sets forth other assertions characterizing the disclosures of Dusdorf and Baltazar, with citations to declaration testimony, but no citations to the references themselves. Pet. 42–44. We do not accept those assertions, which are not consistent with applicable procedural requirements. *See* 37 C.F.R. § 42.22(a)(2) (petition must contain a “full statement of the reasons for the relief requested, including a detailed explanation of the significance of the evidence”); *see also* 37 C.F.R. § 42.6(a)(3) (prohibiting argument made in a supporting document from being incorporated by reference into a petition).

*C. Obviousness of Claims 1–26
Over Nix, Wilsker, Dusdorf, and Baltazar*

Petitioner alleges that the subject matter of claims 1–26 would have been obvious at the time of the invention over the combined teachings of Nix, Wilsker, Dusdorf, and Baltazar. Pet. 5, 42. Our decision with respect to claim 1, and its dependent claims, turns on Petitioner’s failure to set forth a cogent explanation of how the combined teachings of those references would have suggested to a skilled artisan a method of creating a recycled glass product “of” a “remaining color,” where a decolorizing agent selectively decolorizes at least one of the colors of unsorted mixed color glass cullet or a colorizing agent enhances the “remaining color.” Ex. 1001, 7:39-54 (claim 1). Nor does Petitioner, with respect to claims 9 and 18 and their dependent claims, explain how the combined teachings would have suggested a method of creating a recycled glass product of a “particular color,” where a decolorizing agent selectively decolorizes at least one of the colors of unsorted mixed color glass cullet or a colorizing agent enhances

the “particular color” of the virgin glass melt or batch. *Id.* at 8:14–29; 8:61–9:12 (independent claims 9, and 18).

In that regard, Petitioner shows sufficiently that Nix discloses an example of a dead leaf green laboratory glass melt from a batch that includes mixed color glass cullet. Pet. 18 (citing Ex. 1004, 278); *see id.* at 44–47 (incorporating anticipation arguments as to Nix and Wilsker in the analysis of the obviousness ground). Petitioner argues that the carbon in that example is a colorizing agent within the scope of the challenged claims. *Id.* at 18. Carbon is identified in the ’737 patent as a preferred colorizing agent for amber glass. Ex. 1001, 6:35–42 (including carbon in list of preferred coloring agents for amber glass production).

Petitioner states that carbon “is added to the batch for making dead leaf green glass (*e.g.*, a particular color)” but does not show that carbon enhances the “dead leaf green” color of the batch. Pet. 18. In fact, the information presented shows that carbon, as a reducing agent, enhances an amber, not green, color. *See* Pet. 19–20 (by adding reducing agents, “the amber color will be enhanced by reduction of the sulfur in the cullet, since reduced sulfur is the source of amber color”); *see also* Ex. 1001, 7:5–29 (sole example in the ’737 patent, explaining that “[t]he addition of carbon, (reducing agent) controls the final amber color, i.e., as carbon content increases, the reddish-brown hue increases”).

According to Petitioner, dead leaf green is a “desired color” of the glass batch in Nix’s example. Pet. 19 (citing Ex. 1004, 278). Even assuming that dead leaf green is a “remaining color” in accordance with claim 1 or a “particular color” in accordance with claims 9 and 18, Petitioner does not show that this dead leaf green color is enhanced by carbon or any

other colorizing agent in Nix's example. Ex. 1001, 7:39–54; 8:14–29; 8:61–9:12 (independent claims). Stated in a different way, carbon is shown to enhance amber color, but Nix does not suggest a method of “creating a recycled glass product of” an amber color enhanced by carbon. Ex. 1001, 7:39–54; 8:14–29; 8:61–9:12 (claims 1, 9, and 18).

Petitioner also asserts that Nix discloses “a methodology for adding reducing agents and oxidizing agents to selectively colorize and decolorize particular colors by adjusting the redox numbers of the batch to arrive at a desired color.” Pet. 19 (emphasis omitted). That assertion misstates the disclosure of Nix. Petitioner directs us to no teaching in Nix of “a methodology” for adjusting the redox number of the dead leaf green glass of the example to produce amber glass, “just as was done in the Example in the '737 patent.” *Id.* at 20. That argument is fraught with hindsight bias. *See Graham*, 383 U.S. 1, 36 (1966) (warning against a “temptation to read into the prior art the teachings of the invention in issue”).

The Petition speculates, without support in Nix, that if amber glass were desired, a person of ordinary skill in the art would modify the example disclosed on page 278 of Nix (*see* page 7, *supra*) by adding reducing agents, such as Carbocite™, iron pyrite, or arsenic oxide. Pet. 19. Although the Petition cites Nix, page 272, lines 2–7 and Table 1, neither teaches or suggests modification of Nix's dead leaf green batch in the manner postulated by Petitioner. At best, Nix suggests that “a stronger amber colouration” of the dead leaf green batch could be obtained by using a reducing atmosphere above the melt. Ex. 1004, 278. But Nix teaches that such extreme reducing conditions should be avoided. *Id.* (“care has to be

taken . . . to ensure that extreme oxidizing or reducing conditions do not occur in the atmosphere above the melts.”).

On this record, Petitioner does not direct us to disclosure in Nix sufficient to teach or suggest adding a decolorizing agent, which selectively decolorizes at least one color of unsorted mixed color glass cullet, or a colorizing agent, which enhances a “remaining color” of unsorted mixed color glass cullet or a “particular color” of a virgin glass melt or batch, as recited in the independent claims of the ’737 patent. We agree with Patent Owner that “Nix does not disclose adding any colorizing agent to enhance a color of the mixed color cullet, much less adding a colorizing agent to enhance a remaining color not decolorized.” Prelim. Resp. 12. Petitioner advances three other references as suggesting that feature of the invention—Wilsker, Dusdorf, and Baltazar—but does not provide an “articulated reasoning with some rational underpinning” showing how the combined teachings of the applied prior art would have led a skilled artisan to that feature. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (*cited with approval in KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007)).

Wilsker is concerned with a “peculiar bluish-green colour” that results when “materials rich in iron” are used to produce soda-lime glass. Ex. 1005, 1:9–29. Wilsker recognizes that the “objectionable” bluish-green color “is due solely to the fact that the iron oxide contained in the [starting] materials is in the ferrous state.” *Id.* at 1:27–32. Wilsker’s object is to nullify that bluish-green color, which according to Wilsker, is produced when “common red or brown sand having a high iron content” is used in place of “more costly white sand having a comparatively low iron content.” *Id.* at 1:15–19. Wilsker accomplishes that object by controlling the proportions of the

ingredients containing ferric oxide and ferrous oxide and furnace conditions during melting. *Id.* at 1:37–48. Thereby, “the iron content of the finished glass consists of both such oxides in equal proportions by weight.” *Id.* at 1:41–44.

Petitioner suggests that Wilsker teaches a method in which “common red sand selectively removes a ‘bluish-green colour’” and “iron oxide in the ferrous state . . . selectively enhances a ‘bluish-green colour.’” Pet. 35 (citation omitted). Wilsker, however, irrefutably is concerned with nullifying, not enhancing, that “objectionable” color. See Ex. 1005, 1:20–36. Wilsker’s attempt to nullify the bluish-green color, moreover, is not shown on this record to represent a selective decolorization or colorization of “unsorted mixed color glass cullet” as required by each challenged claim. Ex. 1001, 7:45–47; 8:22–24; 9:2–5 (independent claims 1, 9, and 18).

We recognize that Wilsker discloses an example glass batch containing “cullet” and “small proportions of . . . decolourising or colour-correcting agents.” Ex. 1005, 1:98–106, 2:1–26. The information presented, however, does not show sufficiently that Wilsker suggests compensating for the colors of unsorted mixed color glass cullet by addition of those agents. On the contrary, Wilsker contemplates adding selected colors of glass cullet according to the desired whiteness of the glass. *Id.* at 3:5–13 (“If desired, white or pale green cullet may be replaced by a mixture of dark green and amber cullet to an extent varying between 15% and 50%, according to the desired whiteness of the glass . . .”). Wilsker aims to make white soda-lime glass from white and red sand and suggests that limited amounts of certain colors of cullet can be added without degrading the white color. *Id.* 1:102, 3:5–13, 3:25–26 (claim 1). But Petitioner does not direct us to disclosure in

Wilsker sufficient to suggest the functionality of the decolorizing or colorizing agents relative to unsorted mixed color glass cullet, as recited in the “adding” step of independent claims 1, 9, and 18.

Petitioner further identifies, without elaboration, Baltazar’s reference to a “color adjustment.” Pet. 46 (quoting Ex. 1008, 50). On this record, neither Wilsker nor Baltazar is shown to have suggested a method of creating recycled glass products, including adding a decolorizing agent, which selectively decolorizes at least one color of unsorted mixed color glass cullet, or a colorizing agent, which enhances a “remaining color” of unsorted mixed color glass cullet or “particular color” of a virgin glass melt or batch, as required by the independent claims. Ex. 1001, 7:39–54; 8:14–29; 8:61–9:12 (claims 1, 9, 18).

Petitioner also directs us to Dusdorf for a disclosure of that limitation. Pet. 46–47 (citing Ex. 1007, 1, 6). Dusdorf discloses melting amber glass “under reducing conditions, generally with the addition of pulverized carbon.” Ex. 1007, 1. Dusdorf attempts to identify a quantitative relationship between glass color and chemical-analytical quantities of the raw materials. *Id.* at 6. In that context, Dusdorf states that, “if no additional coloring components such as $\text{Cr}^{3+}/\text{Cr}^{6+}$ are present,” then the brown glass color can be quantified by the concentration of iron oxides and sulfate. *Id.* On that basis, Petitioner proposes that, in Dusdorf, “brown glass is made by adding Carbon as a decolorizing agent and/or adding ‘coloring components such as $\text{Cr}^{3+}/\text{Cr}^{6+}$.[.]’” Pet. 47 (citing Ex. 1007, 1, 6).

That proposition overstates the disclosure of Dusdorf. When read in the context of the entire disclosure, Dusdorf’s reference to brown glass, in which “no additional coloring components such as $\text{Cr}^{3+}/\text{Cr}^{6+}$ are present,”

fairly conveys the results of an analysis of the chromium ion content of brown glass, but does not fairly suggest a selective addition of chromium ions to enhance a color of mixed color glass cullet in a glass melt. Ex. 1007, 6. Furthermore, Petitioner does not explain adequately how carbon, which on this record enhances an amber color, acts as a “decolorizing agent” in the brown glass batches analyzed in Dusdorf. Pet. 47 (arguing that Dusdorf’s “brown glass is made by adding Carbon as a decolorizing agent”); see Ex. 1007, 1 (discussing variations of conditions that produce olive-brown or gray colorizations). In that regard, Petitioner’s claim charts direct us to page 6 of Dusdorf, but Petitioner does not explain adequately how or why that disclosure would have led a person of ordinary skill in the art to determine “the amount of decolorizing agent to add to the batch by inputting certain parameters into a computer program” or how to make “brown glass . . . by adding Carbon as a decolorizing agent and/or adding ‘coloring components such as $\text{Cr}^{3+}/\text{Cr}^{6+}$.’” Pet. 46–47; see *id.* at 49–51 (claim charts). Nor does Petitioner explain adequately how the teachings of Dusdorf would have suggested the functionality of the decolorizing or coloring agents relative to unsorted mixed color glass cullet, as recited in the “adding” step of independent claims 1, 9, and 18.

We have considered Petitioner’s other arguments that the combined teachings of the asserted prior art would have suggested the claimed method. Pet. 42–60. The Petition, however, does not provide analysis sufficient to show that Wilsker and Nix suggest the limitations of any challenged claim, or that Dusdorf and Baltazar “bridge the gap.” Prelim. Resp. 25. On this record, Petitioner is not reasonably likely to prevail in showing that any

challenged claim is unpatentable as obvious over Nix, Wilsker, Dusdorf, and Baltazar.

D. Anticipation of Claims 1–26 by Nix or Wilsker

Petitioner challenges claims 1–26 as anticipated by Nix, and 1, 6–9, 15–18, and 24–26 as anticipated by Wilsker. Pet. 4–5, 15, 32. Petitioner does not discharge its burden of establishing a reasonable likelihood of prevailing on either of those anticipation grounds. Accordingly, we decline to institute trial based on anticipation by Nix or Wilsker.

For example, Petitioner does not show sufficiently that Nix discloses a method of creating a recycled glass product “of” a “remaining color” of unsorted mixed color glass cullet, or “of” a “particular color” corresponding to the color of a virgin glass melt or batch. Ex. 1001, 7:39–54; 8:14–29; 8:61–9:12 (independent claims 1, 9, 18). Petitioner directs us to Nix’s general disclosure of “[m]odern container glass batches” that “include appreciable quantities of recycled cullet.” Pet. 20–21 (citing Ex. 1004, 271). But that disclosure does not describe, with sufficient specificity, a step of creating a recycled glass product of a “remaining” or “particular color,” as required by each challenged claim. Ex. 1001, 7:48, 52; 8:25, 28; 8:67, 9:4, 10 (the independent claims).

Nor does Petitioner show sufficiently that Wilsker anticipates any challenged claim. Pet. 32–41. As explained above in our analysis of the obviousness challenge, Wilsker does not selectively colorize or decolorize mixed color glass cullet, but rather, is concerned with nullifying a “peculiar bluish-green colour” that is produced when “red or brown sand” is selected over “more costly white sand” in the manufacture of commercial soda-lime glass. Ex. 1005, 1:9–36.

Based on the information presented, Petitioner fails to show sufficiently that Nix or Wilsker anticipates the subject matter of any challenged claim.

[U]nless a reference discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim, it cannot be said to prove prior invention of the thing claimed, and, thus, cannot anticipate under 35 U.S.C. § 102.

Net MoneyIN, Inc. v. VeriSign, Inc., 545 F.3d 1359, 1371 (Fed. Cir. 2008).

III. CONCLUSION

Based on the information presented in the Petition and the Preliminary Response, Petitioner does not show a reasonable likelihood of prevailing with respect to any claim challenged in the Petition.

It is

ORDERED that the Petition is denied, and no trial is instituted.

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