

Respuesta a Requerimientos

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2 Dato de la Creación

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3 Texto de la Comunicación

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4	Anexos
☒ Anexos	

The Handbook of Glass Manufacture

**3rd Edition
Volume II**

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Professor of Glass Technology, Emeritus
Department of Ceramic Engineering
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**A book of reference for the plant
executive, technologist and engineer.**

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DAVID A. WATTERS

The Handbook Of Glass Manufacture
Volume II

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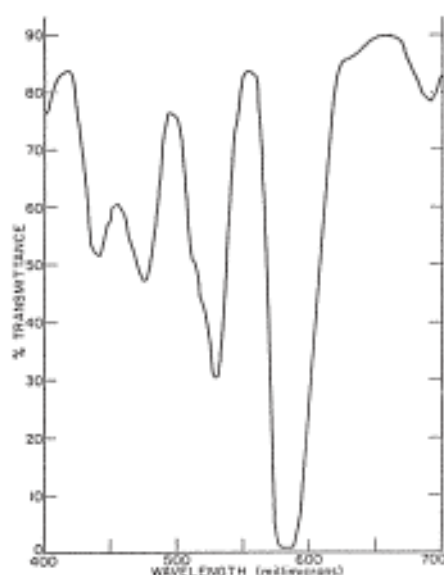


Figure 17. Spectral transmittance of didymium glass (Corning Glass Works Filter #5120).

these ions. Therefore they are less affected by the atomic environment and sharp line spectra (Fig. 17) are obtained. The resulting colors are a very pleasing purple for neodymium (which is used in art ware) and green for praseodymium. We can see that one of the absorption lines of neodymium is right at the wavelength of 589, the D line of the sodium spectra. Neodymium thus can be used when this line is to be suppressed

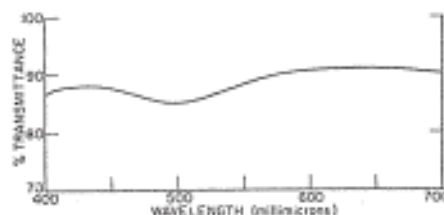


Figure 18. Spectral transmittance curve of selenium pink glass.

(glass blowers' goggles) or when an instrument is to be calibrated. Neodymium glasses are dichroic, that is, the color changes with thickness; it is bluish in thin, reddish in thick layers. Praseodymium and mixed neodymium praseodymium (didymium) glasses show similar effects. Neodymium can be used as one of the materials in decolorizers to compensate for yellow tints due to impurities. Its absorption spectrum makes it useful as a laser activator in glass. (See Subsection J(2)).

(8) **Titanium³⁴ and Cerium³⁵.** Titanium and cerium in glass absorb primarily in the ultraviolet, and are important in UV absorbing glasses. The absorption band reaching into the visible can cause yellow and brown tints, which can be increased in certain base glasses, and, more so, by combining both ions with each other. A high sodium glass containing TiO_2 is hardly colored. High lead and boron glasses show more color.

Significant changes occur in the presence of other coloring ions. Small amounts of iron and titanium combine to form strong brown colors. Copper titanium glasses are green, manganese titanium glasses deep brown.

The color of cerium glasses is increased by oxidizing conditions as the equilibrium $\text{Ce}^{3+} - \text{Ce}^{4+}$ is shifted toward Ce^{4+} .

In colorless glasses exposed to high energy radiation cerium prevents the characteristic radiation coloration of glass while more ultraviolet absorption is produced by the radiation instead.

F. Coloration by Sulfur, Selenium and Tellurium

(1) **Elemental Sulfur and Selenium.** In contrast to the colors produced by the absorption of radiant energy in the electronic shells of the transition elements described under 4.E, there are colors which resemble more those induced by definite compounds or bonds and are obtained by the replace-



Figure 19. Spectral transmittance curve of selenium pink glass.

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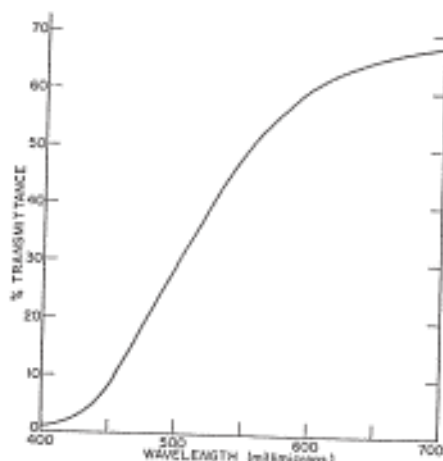


Figure 19. Spectral transmittance of commercial amber glass. (Pittsburgh Plate Glass Co. Amber B).

ment of some oxygen in the glass with the
elements of the sixth group (S, Se, Te).

Elemental sulfur is stable only in glasses
containing a very high percentage of boric
acid. Such glasses are blue. (Dietzel³⁶)

Elemental selenium, in equilibrium with
selenides as well as selenite groups, is be-
lieved responsible for selenium pink glass.
It is particularly beautiful if potash is used
in the base composition. The spectral trans-
mission due to Se is illustrated in Fig. 18.

It is important to prevent reducing con-
ditions which favor the colorless alkali
selenide or the equally undesirable brown
iron selenide, for the formation of which
small iron impurities suffice. Extreme ox-
idation, however may "burn out" the color
due to the formation of colorless selenate
groups. These delicate relations are the
subject of many studies. (See e.g. Hoefler³⁷
and Loeffler³⁸.) Often selenites of sodium,
barium or zinc are used as the raw material
with reliance upon the proper equilibrium
for the presence of enough elemental
selenium.

(2) ("Carbon") Amber. Such glasses

are most likely colored by iron sulfide and
polysulfides of sodium stabilized by reduc-
tion with carbonaceous materials such as
sugar, starch, and carbon. (See particularly
Neuman and Dietzel.³⁹) (Transmission see
Fig. 19.) It has been definitely established
that pure carbon does not tint glasses con-
taining no sulfur and iron impurities. There-
fore, the old name of this important bottle
color, "carbon" amber, is not adequate.
More reddish tints correspond to a higher
content in polysulfides. Impurities of iron
greatly affect the sulfide amber color, since
iron sulfide causes deep brown to black
colors.

(3) **Cadmium Sulfide.** When added to
glass, cadmium sulfide appears to be capa-
ble of being dissolved in the melt from which
a colorless glass may be frozen in as sulfur
is randomly distributed in the quenched
glass. On reheating, however, or during slow
cooling in which characteristic temperature
ranges allow rearrangement, sulfur is or-
dered in a way that cadmium neighbor-
hoods are preferred so that color centers
resembling cadmium sulfide are formed and
the glass becomes yellow (Weyl⁴⁰).

Exaggeration of this "striking" process
can cause crystallization of cadmium sulfide
to an extent that the glass can be called
devitrified.

The typical absorption of CdS glass is
shown in Curve (a) on Fig. 20.

The steep absorption edge is valuable for
its use in photographic filters, or for the
production of very pure yellows. It appears
that in some glasses cadmium sulfide is
enriched in one of two separate glass phases.
(W. Vogel 1967)⁴¹. The control of this phase
and the use of zinc which is also enriched
in this phase giving a colorless sulfide per-
mits the control of filters of steep absorption
edge at lower wavelengths than for example
(a) in Fig. 20.

(4) **Other Sulfides.** These are capable of
similar reactions, depending upon their solu-



US008785337B2

(12) **United States Patent**
Barton et al.

(10) **Patent No.:** **US 8,785,337 B2**
(45) **Date of Patent:** **Jul. 22, 2014**

(54) **GLASS CONTAINER COMPOSITION**

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Carol A. Click, Perrysburg, OH (US);
Terence K. G. Howse, Toledo, OH (US)

(73) Assignee: **Owens-Brockway Glass Container Inc.**, Perrysburg, OH (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 153 days.

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(21) Appl. No.: **13/179,161**

(22) Filed: **Jul. 8, 2011**

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(51) **Int. Cl.**

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C03C 3/087	(2006.01)
C03B 9/00	(2006.01)
C03B 11/00	(2006.01)
C03B 13/00	(2006.01)
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(58) **Field of Classification Search**

USPC 501/65, 66, 68, 69, 70; 65/66, 68, 69
See application file for complete search history.

Selenium dioxide as a constituent of glasses. Navias et al. Journal of the American Ceramic Society. vol. 14, Issue 6, Jun. 2, 2006.*
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Primary Examiner — Noah Wiese

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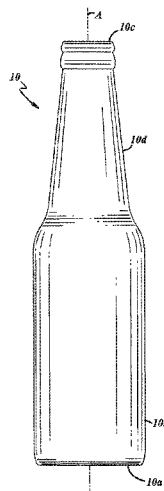
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(57) **ABSTRACT**

A glass container and related methods of manufacturing. The glass container has a glass composition including soda-lime base glass materials, and an oxide of vanadium for good ultraviolet light blocking properties and an oxide of selenium to decolor the glass for good clarity and decolorization. The glass composition of the glass container also may include an oxide of sulfur.

40 Claims, 2 Drawing Sheets



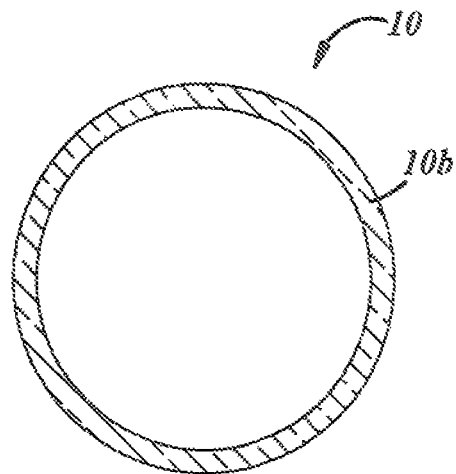
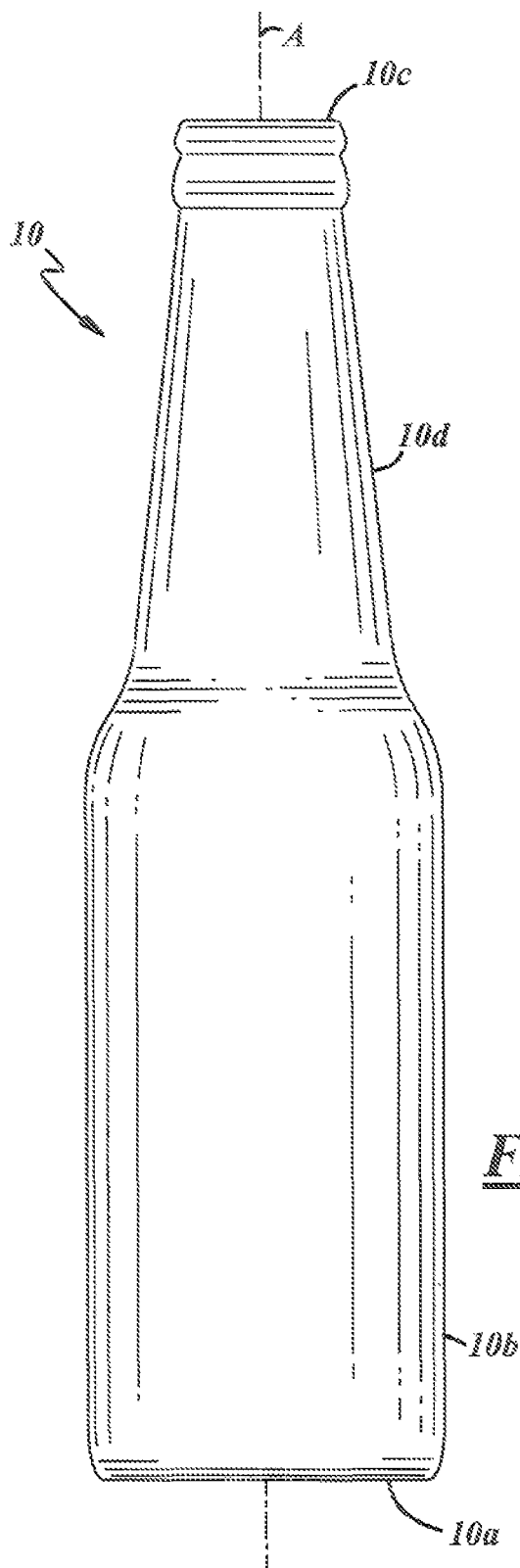
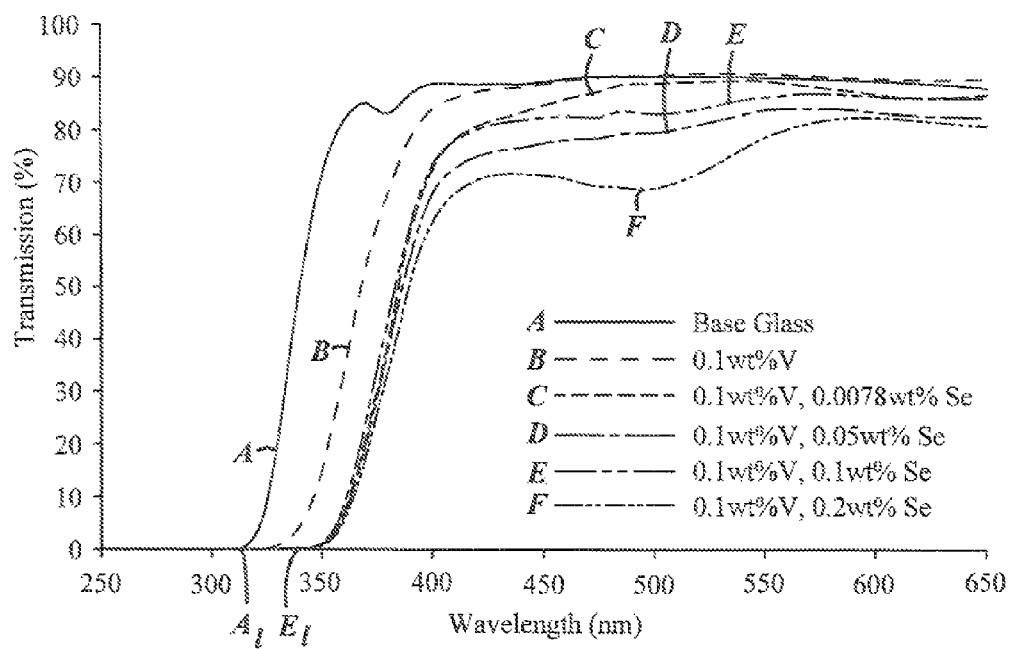


FIG. 2

FIG. 1

**FIG. 3**

GLASS CONTAINER COMPOSITION

The present disclosure is directed to glass containers and, more particularly, to compositions for glass containers.

BACKGROUND AND SUMMARY OF THE DISCLOSURE

Glass containers are often composed of so-called “soda-lime glass,” also called “soda-lime-silica glass,” and many such containers are colored to absorb ultraviolet radiation, and include green glass, blue glass, amber glass, and the like. For example, a base flint glass may be melted in a glass melt furnace and, downstream of the furnace, in one or more forehearths, colorants may be added to the base glass to impart green, blue, or amber hues to the glass. U.S. patents that illustrate glass compositions of this type for glass containers include U.S. Pat. Nos. 2,974,052, 3,291,621, 3,326, 702, 3,498,806, and 3,627,548.

Before the colorants are added, a decolorizer may be added to a batched glass composition of the base flint glass in the glass melt furnace to ensure a generally colorless appearance of the glass. But the decolorizer, such as selenium, tends to dull the effect of the colorants added downstream in the forehearths. Accordingly, additional materials accompany the decolorizer to counteract such detrimental effects of the decolorizer. For example, arsenic oxide or hexavalent chromium have been added to neutralize selenium. U.S. patents that illustrate glass compositions of this type for glass containers include U.S. Pat. Nos. 2,923,635, and 2,923,636. In other implementations, selenium can be added in the forehearths downstream of the glass melt furnace, as illustrated by U.S. Pat. No. 2,955,948.

A general object of the present disclosure, in accordance with one aspect of the disclosure, is to provide a container glass composition having an oxide of vanadium and an oxide of selenium to produce substantially clear glass containers with a relative non-green appearance and with good blocking of ultraviolet light.

The present disclosure embodies a number of aspects that can be implemented separately from or in combination with each other.

A flint glass container in accordance with one aspect of the disclosure includes an improvement for blocking ultraviolet light penetration into the container while providing decolorization in container glass, wherein the container glass includes an oxide of vanadium and an oxide of selenium present in the container glass in an amount ranging between 0.016 wt % and 0.175 wt % total.

In accordance with another aspect of the disclosure, there is provided a glass container having a glass composition including soda-lime base glass materials, and additives including an oxide of vanadium and an oxide of selenium retained in the container glass in an amount ranging between 0.016 wt % and 0.175 wt % total.

In accordance with an additional aspect of the disclosure, there is provided a method of making glass containers including the steps of preparing a batched glass composition including soda-lime base glass materials, and including an oxide of vanadium and an oxide of selenium in an amount ranging between 0.035 wt % and 0.25 wt % total, melting the batched glass composition in a glass melt furnace to produce a molten batched glass, forming the glass containers from the molten batched glass, and annealing the glass containers.

In accordance with a further aspect of the disclosure, there is provided a method of making glass containers including steps of preparing a batched glass composition including

soda-lime base glass materials, and additives including an oxide of vanadium and an oxide of selenium in substantially equal amounts, melting the batched glass composition in a glass melt furnace to produce a molten batched glass, forming the glass containers from the molten batched glass, and annealing the glass containers.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosure, together with additional objects, features, advantages and aspects thereof, will be best understood from the following description, the appended claims and the accompanying drawings, in which:

FIG. 1 is an elevational view of a glass container in accordance with an exemplary embodiment of the present disclosure;

FIG. 2 is a cross-sectional view of the glass container body before coating; and

FIG. 3 is a graphical plot of light transmission through samples of container glass having various amounts of oxides of vanadium and selenium.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

FIG. 1 illustrates an exemplary embodiment of a glass container 10 (e.g., glass bottle, jar, or the like) that may be produced in accord with an exemplary embodiment of a manufacturing process presently disclosed herein below. The glass container 10 includes a longitudinal axis A, a base 10a at one axial end of the container 10 that is closed in an axial direction, a body 10b extending in an axial direction from the axially closed base 10a, and a mouth 10c at another axial end of the container 10 opposite of the base 10a. Accordingly, the glass container 10 is hollow. In the illustrated embodiment, the container 10 also includes a neck 10d that may extend axially from the body 10b, may be generally conical in shape, and may terminate in the mouth 10c. However, the container 10 need not include the neck 10d and the mouth 10c may terminate the body 10b, such as in a glass jar embodiment or the like. The body 10b may be of any suitable shape in cross-section transverse to the axis A as long as the body 10b is circumferentially closed.

For example, as shown in FIG. 2, the body 10b may be of cylindrical transverse cross-sectional shape that is circumferentially closed. In other embodiments, the body 10b may be generally oval, square, rectangular, triangular, or of any other suitable transverse cross-sectional shape. As used herein, the term “circumferentially” applies not only to circular transverse cross-sectional shapes but also applies to any closed transverse cross-sectional shape.

The glass container 10 may be produced by the following method.

The method includes preparing a batched glass, or glass batch, composition. The composition includes base glass materials and additives including at least one ultraviolet (UV) light blocking enhancing material and at least one decolorizer. As used herein, the terminology “ultraviolet light blocking” includes the characteristic or property of reducing ultraviolet light transmission in a relative sense, and not necessarily in an absolute sense of UV opacity or zero UV light transmission.

The base glass materials may include soda-lime flint glass materials. For example, the base glass materials may be present in an amount ranging between 73.1 wt % and 99.9 wt % of the batched glass composition. More particularly, and by

way of example only, the base glass may include the following materials in amounts by weight:

60-75%	SiO ₂
7-15%	Na ₂ O
6-12%	CaO
0.1-3.0%	Al ₂ O ₃
0-2.0%	MgO
0-2.0%	K ₂ O

In a preferred embodiment, the base glass may include the following materials in about the stated amounts by weight:

72%	SiO ₂
13%	Na ₂ O
10%	CaO
1.2%	Al ₂ O ₃
0.2%	MgO
0.2%	K ₂ O

The batched glass composition also may include other materials in small amounts. For example, the batched glass composition may include TiO₂, Fe₂O₃, or the like. Such materials may be additives, residual materials from cullet, and/or impurities typical in the glass container manufacturing industry. Such materials may be present in the batched glass composition in trace amounts, for example, less than 0.2 wt %. But no arsenic (As), oxides of As, or hexavalent chromium are affirmatively added to the batched glass composition and, thus, the composition and container may be substantially free of those materials.

The preferred ultraviolet light blocking enhancing material includes vanadium. Vanadium forms numerous and complicated compounds because of its variable valence. Vanadium has at least three oxidation states: 2+, 3+, and 5+. Trivalent vanadium can be used to produce a green coloration in flint glass, and enhances ultraviolet light protection to glass. In general, the vanadium may be added in the form any oxide of vanadium. In one specific example, the vanadium may be added in the form of vanadium pentoxide (V₂O₅). In the absence of the presently disclosed decolorizer, the vanadium tends to produce a sea green coloration in the glass.

A preferred decolorizer includes selenium. In one example, the selenium may be added in the form of granulated selenium metal. In other examples, the selenium may be in the form any oxide of selenium, for example, selenium dioxide (SeO₂) or selenium trioxide (SeO₃).

Another preferred material includes sulfur. In one example, at least some of the sulfur may be added in the form of any oxide of sulfur, for example, sulfur trioxide (SO₃). In another example, at least some of the sulfur may be present as a residual material from cullet in any suitable form.

In one embodiment, the oxide of vanadium and oxide of selenium present in the batched glass composition may be in an amount ranging between 0.035 wt % and 0.25 wt % total. In other words, the total combined amount of oxides of vanadium and selenium in the glass batch equals 0.035 wt % to 0.25 wt %. In another embodiment, the oxides of vanadium and selenium are present in the batched glass composition in substantially equal amounts. As used herein the term "substantially" means within manufacturing tolerances customary in the glass container manufacturing industry. In another embodiment, the oxide of vanadium may be present in the batched glass composition in an amount ranging between 0.025 wt % and 0.15 wt %, and the oxide of selenium may be present in the batched glass composition in an amount rang-

ing between 0.01 wt % and 0.1 wt %. In one specific example, the oxides of vanadium and selenium each may be present in amounts of about 0.1 wt %. In another specific example, the oxides of vanadium and selenium each may be present in amounts of about 0.05 wt %. As used herein the term "about" means within 0.02 wt %.

In addition to the oxide of selenium, it is believed that the oxide of sulfur plays a role in producing a decolorized, or neutral colorization of, vanadium-selenium-containing glass. In development it was observed that glass melted with oxides of vanadium and selenium in the absence of oxide of sulfur tends to produce pink-peach coloration and minimal decolorization of the sea green coloration from the oxide of vanadium.

It was also observed that increasing oxide of sulfur content to a level up to about 0.4 wt % showed an increase in decolorization of the glass. In one example, when oxide of sulfur content was increased to a level between 0.1 wt % and 0.2 wt %, a shift in coloration was observed including a gray stroke/straw yellow coloration in a top melt portion of the glass, with a decrease in the pink-peach coloration and shift of that coloration to a location centered around the bottom melt portion of the glass. In another example, when oxide of sulfur content was increased to a level of about 0.4 wt %, the glass melt was substantially decolorized with no pink-peach coloration remaining in the glass. However, some greenish-yellowish coloration was noticeable to the eye through a relatively long section of the glass, but was not visible to the eye within a relatively short section of the glass (e.g. a 38 mm thick section of a glass container wall). In any event, any coloration was within acceptable industrial limits for a standard flint glass. The coloration from the melt could be due to iron content or excessive color matching/masking, which can give rise to a hazy, cloudy, or muddy appearance.

Therefore, in the batch glass composition, it is believed that an oxide of sulfur level ranging between 0.25 wt % and 0.35 wt % in the presence of about 0.1 wt % of oxide of vanadium and about 0.1 wt % of oxide of selenium would provide good decolorization of the glass. More particularly, an oxide of sulfur level of about 0.3 wt % in the presence of about 0.1 wt % of oxide of vanadium and about 0.1 wt % of oxide of selenium is believed to provide particularly good decolorization of glass. However, it is believed that, depending on the amounts selected for oxides of vanadium and selenium, an acceptable range of oxide of sulfur may be between 0.05 wt % and 0.35 wt %.

The specific role of sulfur may be responsible for one or two different mechanisms. A first mechanism is the role of sulfur as a fining agent in a glass melt. Sulfur in this role produces sulfur gas in the melt that rises up through the melt and coalesces with other bubbles. This also mixes the glass melt and results in improved homogeneity. A second mechanism involves sulfur acting as a redox couple with the oxide of vanadium and/or the oxide of selenium. If it is assumed that sulfur is acting to reduce the vanadium, such reduction would tend to shift the vanadium valence state to 2+. This valence state appears as a colorless/gray. In addition, it may be assumed that some of the sulfur is reacting with iron to produce a sulfur chromophore (a brown color in amber glass). In any event, there appears to be a direct relationship between increasing sulfur content and the production of a homogenous and/or decolorized glass. It is also possible that there is a maximum sulfur content where an amber colorization starts to dominate the color or that foaming of the melt surfaces starts to occur, but this was not examined during this work.

The method also includes melting the batched glass composition in a glass melt furnace to produce a molten batched

glass. Accordingly, the ultraviolet light blocking enhancing material and the decolorizer additives preferably are melted with the base glass materials in the glass melt furnace. The conditions and procedure for composing and melting production container glass can be found in, e.g. "Handbook of Glass Manufacture," Tooley, Odgen Publishing Co., New York, N.Y., 1985, 3rd edition. In a laboratory scale melt, the batched glass composition may be melted, preferably between 1400 and 1500 degrees Celsius for about two to four hours, more preferably between 1425 and 1475 degrees Celsius, and most preferably at about 1450 degrees Celsius for about three hours.

The method also may include forming the glass containers from the molten batched glass. The glass containers may be formed, for example, by press-and-blow or blow-and-blow processes and by individual section machines, or in any other suitable manner by any suitable equipment.

The method further may include annealing the glass containers in any suitable manner, for example, in an annealinglehr. At an entry, hot end, or upstream portion of the annealinglehr, the temperature therein may be between 600 and 550 degrees Celsius. Through the lehr, the temperature may be brought down gradually to a downstream portion, cool end, or exit of the lehr, for example, to a temperature therein of between 130 degrees Celsius and 65 degrees Celsius. In any event, the glass containers may be annealed, preferably between 550 and 600 degrees Celsius for about 30 to 90 minutes, more preferably between 525 and 575 degrees Celsius, and most preferably at about 550 degrees Celsius for about one hour. In any event, in one embodiment, the method may be carried out without having to heat the glass containers to striking temperatures. In other words, the glass containers need not be struck to provide decolorization.

The selenium potentially reduces the state of at least some of the vanadium from the trivalent state to a bivalent state in the glass. This reduction of the vanadium is believed to negate or mask the green coloration that otherwise would be produced by the vanadium. Such reduction may produce a generally colorless appearance, perhaps with a straw yellow to slight gray coloration in the glass and, in any event, a non-green appearance in the glass. It is believed that the slight gray color is attributed to a nearly uniform decrease of the percent transmission of visible light. The decrease in the visible light transmission may range from 10 to 20 percent less than a typical flint glass that is not decolorized. The decrease is based on the amount of vanadium and selenium additions to the base glass, wherein increases in the amounts of the oxides of vanadium and selenium additives results in decreases in the percent transmission in the visible light range. Accordingly, flint glass containers may be produced with good ultraviolet light blocking properties and without the green coloration normally associated with vanadium-doped glass. In other words, the oxides of vanadium and selenium additives and their disclosed amounts produce decolorized glass containers with non-green coloration, yet good UV protection.

The glass containers may have a retained glass composition that is different from the batched glass composition. For example, only about 10-35% of the oxide of selenium added to the batched glass composition may be present or retained in the retained glass composition. Similarly, only about 50-70% of the oxide of sulfur added to the batched glass composition may be present or retained in the retained glass composition. In contrast, the oxide of vanadium may be largely retained in the retained glass composition in the produced containers. In other words, the relative amounts of vanadium to selenium retained in the glass composition in the produced containers may be about a four to one ratio of vanadium to selenium.

The glass containers may include a total amount of oxides of vanadium and selenium present in the retained glass composition in an amount ranging between 0.016 wt % and 0.175 wt % total. In other words, the total combined amount of oxides of vanadium and selenium retained in the glass container equals 0.016 wt % to 0.175 wt %. Also, the glass container may include an oxide of sulfur content in an amount ranging between 0.03 wt % and 0.3 wt %. In another embodiment, the oxide of sulfur may be present in the retained glass composition in an amount between 0.08 wt % and 0.25 wt %, and the oxide of vanadium may be present in the retained glass composition in an amount ranging between 0.01 wt % and 0.14 wt %, whereas the oxide of selenium may be present in the retained glass composition in an amount ranging between 0.006 wt % and 0.035 wt %. In one specific example, the oxide of sulfur may be present in the retained glass composition in an amount of about 0.2 wt %, and the oxide of vanadium may be present in the retained glass composition in an amount of about 0.1 wt %, whereas the oxide of selenium may be present in the retained glass composition in an amount of about 0.025%. The soda-lime base glass materials may be retained in an amount ranging between 73.1 wt % and 99.9 wt %.

Several test samples were prepared in a laboratory environment and transmission of light therethrough was observed in each sample, as illustrated in FIG. 3. FIG. 3 illustrates six plots of light transmission vs. wavelength through six different samples of glass. The first plot, A, represents transmission through a sample of the base glass composition, standard white flint glass. The second plot, B, represents transmission through a sample of the base glass doped with about 0.1 wt % vanadium.

The best combination of results of decoloration, clarity, and UV light blocking was achieved in a base glass composition doped with about 0.1 wt % of vanadium and about 0.1 wt % of selenium, as represented by plot E. In addition to the decolorizing, the combination of the oxides of vanadium and selenium causes a shift of the UV light edge "A" further from the Ultraviolet towards the visible light range. For example, a light edge A_1 of plot A is at about 315 nm, whereas a light edge E_1 of plot E is at about 345 nm for a shift in wavelength of about 30 nm. Accordingly, the glass does not transmit UV light up to about 345 nm. As used with reference to UV wavelength, the term "about" means within 5 nm.

Other results were observed with other combinations of vanadium and selenium. For example, plot C represents a base glass composition doped with about 0.1 wt % of vanadium and about 0.0078 wt % of selenium. In another example, plot D represents a base glass composition doped with about 0.1 wt % of vanadium and about 0.05 wt % of selenium, wherein green decoloration was incomplete. In a further example, plot F represents a base glass composition doped with about 0.1 wt % of vanadium and about 0.2 wt % of selenium, wherein green decolorization was complete but the glass was dark flint in color with streaks of pink due to incomplete mixing of selenium which created non-homogeneous sections in the glass.

Although the best results were achieved with 0.1 wt % of vanadium, glass doped with 0.05 wt % vanadium has shown better UV light protection. Therefore, it is believed that glass doped with 0.05 wt % vanadium and 0.05 wt % selenium may provide even better UV light protection, but may or may not provide better non-green and/or colorless appearance.

When vanadium is added, there can be observed a shift in light transmission towards the visible light range, a portion of which is blocked. However this induces a green coloration in the visible spectrum. With the addition of selenium there can

be observed a further shift to longer wavelengths, providing an increased level of UV protection compared with vanadium alone. However as the level of selenium increases there can be observed a decrease in overall transmission, and a decrease in green coloration and an increase in greyness in the visible spectrum.

As shown by plots C, D, E, or F, the container has transparency characterized by 0% to 2% transmission at 340 nm to 350 nm wavelength, and by 60% to 75% transmission at 390 nm to 410 nm wavelength.

The best results were achieved by weighting out the raw materials for a 200 g-300 g batch, and in accordance standard batch calculation practice common in the glass industry. The raw materials were mortar-and-pestled to break up agglomerate material. The raw materials then were mixed together using a mixer for about ten minutes. While mixing, a crucible for the batched glass melt was pre-heated at 1350 degrees Celsius for about ten minutes. The raw materials were added to the crucible until the crucible was half-full. The crucible was placed in a furnace at 1294 degrees Celsius and reached a temperature of 1450 degrees Celsius after 23 minutes. After 29 minutes, the crucible was charged and the rest of the raw materials were added thereto. The crucible was placed back in the furnace at 1402 degrees Celsius and reached 1450 degrees Celsius after one minute. The raw materials were melted for three hours and then poured into two patties, and then placed in an annealing oven at 546 degrees Celsius. The glass is then annealed at 550 degrees Celsius for on hour before shutting off the annealing oven to let the glass cool down to room temperature overnight. The patties were annealed to remove stress.

One of the resulting samples was cut with a core drill to a 30 mm diameter, polished on both sides using a polisher and grit sizes of 240, 125, 75, 15, 9, 3, and 1 micrometer, and final polished with colloidal silica. The sample was spectrum analyzed with a PERKIN-ELMER LAMDA 900 brand analyzer.

As used herein, the term "clear" or "clarity" relates to the quality or state of being clear which quality can be measured through spectroscopy. These terms may be referred to as transparency throughout the visible spectrum, which is a function of wavelength. Sometimes the terms are also referred to as translucence. Also as used herein, the term "unstained" or "colorlessness" is an estimation that relates to the degree to which glass lacks color throughout the visible spectrum. Most transition metal ions have the capability of coloring glass, and the degree to which they are present determines the level of color.

There thus has been disclosed a glass container that is substantially clear and non-green or colorless, and related methods, that fully satisfy all of the objects and aims previously set forth. The disclosure has been presented in conjunction with several exemplary embodiments, and additional modifications and variations have been discussed. Other modifications and variations readily will suggest themselves to persons of ordinary skill in the art in view of the foregoing discussion. The disclosure is intended to embrace all such modifications and variations as fall within the spirit and broad scope of the appended claims.

The invention claimed is:

1. In a flint glass container, an improvement for blocking UV light penetration into the container while providing decolorization in container glass,

wherein the container glass includes an oxide of vanadium and an oxide of selenium present in the container glass and wherein the oxide of vanadium is present in a retained amount ranging between 0.01 wt % and

0.14 wt % and the oxide of selenium is present in a retained amount ranging between 0.0125 wt % and 0.025 wt %.

2. The container set forth in claim 1 wherein the oxide of vanadium is present in an amount of about 0.1 wt %.

3. The container set forth in claim 2 wherein the oxide of selenium is present in an amount of about 0.025 wt %.

4. The container set forth in claim 1 wherein an oxide of sulfur is present in the container glass in an amount ranging between 0.03 wt % and 0.3 wt %.

5. The container set forth in claim 4 wherein the oxide of sulfur is present in the container glass in an amount ranging between 0.08 wt % and 0.25 wt %.

6. The container set forth in claim 5 wherein the oxide of sulfur is present in the container glass in an amount of about 0.2 wt %.

7. The container set forth in claim 1 wherein the oxide of vanadium is present in an amount of about 0.1 wt %, the oxide of selenium is present in an amount of about 0.025 wt %, and the oxide of sulfur is present in an amount of about 0.2 wt %.

8. A glass container having a glass composition including: soda-lime base glass materials; and additives including an oxide of vanadium and an oxide of selenium retained in the container glass and wherein the oxide of vanadium is retained in an amount of about 0.1 wt % and the oxide of selenium is retained in an amount of about 0.025%.

9. The container set forth in claim 8 wherein the soda-lime base glass materials are retained in an amount ranging between 73.1 wt % and 99.9 wt %.

10. The container set forth in claim 9 wherein the soda-lime base glass comprises the following materials in an amount by weight:

60-75% SiO₂;
7-15% Na₂O;
6-12% CaO;
0.1-3.0% Al₂O₃;
0-2.0% MgO; and
0-2.0% K₂O.

11. The container set forth in claim 8 wherein an oxide of sulfur is present in the container glass in an amount ranging between 0.03 wt % and 0.3 wt %.

12. The container set forth in claim 8 wherein the oxide of sulfur is present in the container glass in an amount ranging between 0.08 wt % and 0.25 wt %.

13. The container set forth in claim 8 wherein the oxide of sulfur is present in the container glass in an amount of about 0.2 wt %.

14. The container set forth in claim 8 wherein the oxide of sulfur is present in an amount of about 0.2 wt %.

15. The container set forth in claim 8 wherein the composition is substantially free of As, oxides of arsenic, and hexavalent chromium.

16. A method of making glass containers including the steps of:

preparing a batched glass composition including soda-lime base glass materials, and including oxides of vanadium and selenium wherein the oxide of vanadium is present in an amount ranging between 0.03 wt % and about 0.1 wt % and the oxide of selenium is present in an amount greater than 0.03 wt % and less than about 0.1 wt %; melting the batched glass composition in a glass melt furnace to produce a molten batched glass; forming the glass containers from the molten batched glass; and annealing the glass containers.

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17. The method set forth in claim 16 wherein the combination of the oxides of vanadium and selenium produces a non-green appearance in the glass containers.

18. The method set forth in claim 16 wherein the combination of the oxides of vanadium and selenium improves ultraviolet light blocking of the containers.

19. The method set forth in claim 16 wherein the glass containers are annealed between 550 and 600 degrees Celsius for thirty to ninety minutes.

20. The method set forth in claim 16 wherein the batched glass composition is melted at about 1450 degrees Celsius for about three hours, and the glass containers are annealed at about 550 degrees Celsius for about one hour.

21. The method set forth in claim 16, without heating the glass containers to striking temperatures.

22. The method set forth in claim 16 wherein the soda-lime base glass materials are present in an amount ranging between 73.1 wt % and 99.9 wt %.

23. The method set forth in claim 16 wherein the soda-lime base glass comprises the following materials in an amount by weight:

- 60-75% SiO_2 ;
- 7-15% Na_2O ;
- 6-12% CaO ;
- 0.1-3.0% Al_2O_3 ;
- 0-2.0% MgO ; and
- 0-2.0% K_2O .

24. The method set forth in claim 16 wherein the oxides of vanadium and selenium are each present in substantially equal amounts.

25. The method set forth in claim 24 wherein the amounts of the oxides of vanadium and selenium are each about 0.1 wt %.

26. The method set forth in claim 16 wherein the batched glass composition is substantially free of As, oxides of arsenic, and hexavalent chromium.

27. The method set forth in claim 16 wherein the batched glass composition also includes up to 0.4 wt % of an oxide of sulfur.

28. The method set forth in claim 16 wherein the batched glass composition also includes an oxide of sulfur in an amount ranging between 0.005 wt % and 0.35 wt %.

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29. The method set forth in claim 16 wherein the batched glass composition also includes an oxide of sulfur in an amount ranging between 0.25 wt % and 0.35 wt %.

30. The method set forth in claim 16 wherein the oxide of vanadium is present in an amount of about 0.1 wt %, the oxide of selenium is present in an amount of about 0.1 wt %, and the oxide of sulfur is present in an amount of about 0.3 wt %.

31. A glass container produced by the method set forth in claim 16.

32. A method of making glass containers including the steps of:

- preparing a batched glass composition including soda-lime base glass materials, and including oxides of vanadium and selenium in about equal amounts;
- melting the batched glass composition in a glass melt furnace to produce a molten batched glass;
- forming the glass containers from the molten batched glass; and
- annealing the glass containers.

33. The method set forth in claim 32 wherein the oxide of vanadium and selenium are present in an amount ranging between 0.035 wt % and 0.25 wt % total.

34. The method set forth in claim 32 wherein the amounts of vanadium and selenium are each about 0.1 wt %.

35. The method set forth in claim 32 wherein the batched glass composition also includes up to 0.4 wt % of an oxide of sulfur.

36. The method set forth in claim 32 wherein the batched glass composition also includes an oxide of sulfur in an amount ranging between 0.005 wt % and 0.35 wt %.

37. A glass container produced by the method set forth in claim 32.

38. The method set forth in claim 32 wherein the oxide of vanadium is present in an amount ranging between 0.03 wt % and 0.1 wt % and the oxide of selenium is present in an amount greater than 0.03 wt % and less than about 0.1 wt %.

39. The method set forth in claim 38 wherein the oxide of selenium is present in an amount between about 0.05 wt % and about 0.1 wt %.

40. The method set forth in claim 16 wherein the oxide of selenium is present in an amount between about 0.05 wt % and about 0.1 wt %.

* * * * *

REIVINDICACIONES

1. Un recipiente de vidrio óptico, que tiene una mejora para el bloqueo de la penetración de luz UV en el interior del recipiente mientras que proporciona decoloración en el vidrio del recipiente, caracterizado porque el vidrio del recipiente incluye óxido de vanadio y óxido de selenio presentes en el vidrio del recipiente, y en el que el óxido de vanadio está presente en una cantidad retenida entre 0,01 % en peso y 0,14 % en peso y el óxido de selenio está presente en una cantidad retenida entre 0,0125 % en peso y 0,025 % en peso.
2. El recipiente según la reivindicación 1, caracterizado porque el óxido de vanadio está presente en una cantidad entre 0,02 % en peso y 0,1 % en peso y el óxido de selenio está presente en una cantidad entre 0,02 % en peso y 0,025 % en peso.
3. El recipiente según la reivindicación 1, caracterizado porque contiene adicionalmente óxido de azufre presente en el vidrio del recipiente en una cantidad entre 0,03 % en peso y 0,3 % en peso.
4. El recipiente según la reivindicación 3, caracterizado porque el óxido de azufre se encuentra en el vidrio del recipiente en una cantidad entre 0,08 % en peso y 0,25 % en peso.
5. El recipiente según las reivindicaciones 1 a 4, caracterizado porque el óxido de vanadio está presente en una cantidad entre 0,02 % en peso y 0,1 % en peso, el óxido de selenio está presente en una cantidad entre 0,02 % en peso y 0,025 % en peso y el óxido de azufre está presente en una cantidad entre 0,02 % en peso y 0,2 % en peso.
6. Un recipiente de vidrio que tiene una composición de vidrio que incluye:
 - materiales de vidrio a base de cal sodada, y
 - aditivos que incluyen un óxido de vanadio y un óxido de selenio retenidos en el recipiente de vidrio y en el que el óxido de vanadio está retenido en una cantidad entre 0,02 % en peso y 0,1 % en peso y el óxido de selenio está retenido en una cantidad entre 0,02 % en peso y 0,025 % en peso.

7. El recipiente de la reivindicación 6, caracterizado porque los materiales de vidrio a base de cal sodada están presentes en una cantidad entre 73,1 % en peso y 99,9 % en peso.

5 8. El recipiente de la reivindicación 7, caracterizado porque los materiales de vidrio a base de cal sodada comprenden los siguientes materiales en cantidades por peso:

entre 60 y 75 % de SiO_2 ;

entre 7 y 15 % de Na_2O ;

entre 6 y 12 % de CaO ;

entre 0,1 y 3,0 % de Al_2O_3 ;

10 entre 0 y 2,0 % de MgO ; y

entre 0 y 2,0 % de K_2O .

9. Un método para fabricar recipientes de vidrio, caracterizado porque incluye las etapas de:

15 - preparar una composición de vidrio mezclado que incluye materiales de vidrio a base de cal sodada, y que incluye óxidos de vanadio y selenio, donde el óxido de vanadio está presente en una cantidad entre 0,03 % en peso y dentro de 0,02 % en peso de 0,1 % en peso y el óxido de selenio está presente en una cantidad mayor que el 0,03 % en peso y menor que 0,12 % en peso;

20 - fundir la composición de vidrio mezclado en un horno de fusión de vidrio para producir un vidrio mezclado fundido;

- formar los recipientes de vidrio a partir del vidrio mezclado fundido; y

- recocer los recipientes de vidrio.

25 10. El método según la reivindicación 9, caracterizado porque los óxidos de vanadio y selenio están cada uno presentes en una cantidad entre 0,02 % en peso y 0,1 % en peso.

11. El método según la reivindicación 6, caracterizado porque la composición de vidrio mezclado incluye adicionalmente hasta 0,4 % en peso de un óxido de azufre.

12. El recipiente de la reivindicación 6, caracterizado porque el óxido de vanadio

está presente en una cantidad entre 0,02 % en peso y 0,1 % en peso, el óxido de selenio está presente en una cantidad entre 0,02 % en peso y 0,1 % en peso y el óxido de azufre está presente en una cantidad entre 0,02 % en peso y 0,3 % en peso.

- 5 13. Un método de fabricación de recipientes de vidrio que incluye las etapas de:
- preparar una composición de vidrio mezclado que incluye materiales de vidrio a base de cal sodada, y que incluye óxidos de vanadio y selenio en cantidades aproximadamente iguales;
 - fundir la composición de vidrio mezclado en un horno de fusión de vidrio
- 10 para producir un vidrio mezclado fundido;
- formar los recipientes de vidrio a partir del vidrio mezclado fundido; y
 - recocer los recipientes de vidrio.
14. El método según la reivindicación 13, caracterizado porque el óxido de vanadio y selenio están presentes en una cantidad entre 0,035 % en peso y 0,25 %
- 15 en peso total y donde la composición de vidrio mezclado incluye además un óxido de azufre en una cantidad que varía entre 0,005 % en peso y 0,35 % en peso.
15. El método según la reivindicación 14, caracterizado porque las cantidades vanadio y selenio están cada una entre 0,02 % en peso y 0,1% en peso.

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Superintendencia de Industria y Comercio

E. S. D.

REF: Expediente No. **14-014031**
Patente de Invención: **“COMPOSICIÓN DE RECIPIENTE DE VIDRIO”**
Fase Nacional: **PCT/US2012/041596**
Clasificación Int.: **C03C 3/87**
Titular: **OWENS-BROCKWAY GLASS CONTAINER INC.**

RESPUESTA A REQUERIMIENTO OFICIO No.488 NOTIFICADO POR FIJACION EN LISTA DE 2 DE FEBRERO DE 2016.

Humberto RUBIO CAMACHO, mayor de edad, domiciliado en Bogotá, identificado con la Cédula de Ciudadanía No.17'192.062 de Bogotá, Abogado en Ejercicio, portador de la Tarjeta Profesional No. 50.007 expedida por el Consejo Superior de la Judicatura, actuando en carácter de apoderado de la Sociedad **OWENS BROCKWAY GLASS CONTAINER INC.**, domiciliada en One Michael Owens Way, Perrysburg, Ohio 43551, Estados Unidos de América; conforme al poder que para todos los efectos relacionados con la Propiedad Industrial me fue conferido por la citada compañía; encontrándome dentro del término legal para dar contestación al auto proferido por su Despacho mediante Oficio No.488 notificado por fijación en lista de 2 de febrero de 2016, respetuosamente me permito dar respuesta a las objeciones emitidas por la Dirección de Nuevas Creaciones, por tanto me permito:

Manifestar:

I.- En el informe oficial emitido sobre la presente solicitud, se han emitido las objeciones que a continuación se resumen:

1. De la solicitud de patente

Reivindicaciones (Art 30 D 486, Art 22 PCT)

En la reivindicación 1 se presenta como característica técnica esencial términos generales, tal como: *“cantidad retenida”*, se sugiere realizar las modificaciones respectivas utilizando términos que describan de forma menos general o definir claramente los rangos.

En la reivindicación 2, 4, 5, 7 a 9, 12, y 14 los términos *“aproximadamente”*, *“sustancialmente”* son imprecisos y/o relativos, por lo cual no permiten distinguir la

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invención del estado de la técnica. Se sugiere eliminarlos o sustituirlo por términos precisos o rangos concretos.

Las reivindicaciones 6 y 12 presentan características funcionales del método.

Las reivindicaciones 5 y 7 hacen referencia a resultados a alcanzar.

L reivindicación 11 que tienen como objeto un recipiente de vidrio, presenta falsa dependencia de las reivindicaciones 6.

La reivindicación 15 que tienen como objeto un recipiente de vidrio, presenta falsa dependencia de las reivindicaciones 12.

Las reivindicaciones 6 y 12 no son concisas por cuanto las características técnicas de la reivindicación 12 se encuentran dentro del alcance de la reivindicación 6.

Se sugiere realizar la corrección ortográfica de la palabra “hasa” en la reivindicación 5.

2. Determinación del Estado de la Técnica

El estado de la técnica se determinó con base en la fecha de presentación de la solicitud de prioridad: 08 de julio de 2011, y se encontraron los siguientes documentos que anticipan el objeto de esta solicitud:

Ítem	Documento	Título	Fecha de Publicación
D1	US 5,908,702	“Ultraviolet ray absorbing colored glass ”	1 de junio de 1999
D2	US 2004/0157721	“Soda-lime glass of blue hue”	12 de agosto de 2004
D2	Guía	“Fabricación de vidrio y productos de vidrio”	diciembre de 1999

3. Examen de Patentabilidad (Art 14 D486)

Nivel inventivo (Art18 D486)

Los documentos D1 y D2 se consideran el estado de la técnica cercano a la invención definida en la reivindicación 1, porque divulgan vidrios de absorción de rayos ultravioleta, que comprenden en su composición el óxido de vanadio y el selenio como agentes colorantes.

4. Conclusión

Los requisitos de Patentabilidad de la presente solicitud están afectados así:

Ítem	Documento	Reivindicaciones afectadas	Requisito que afecta
D1	US 5,908,702	1, 2, 4, 6 a 9, 13 y 14	Nivel Inventivo
D2	US 2004/0157721	1, 3 a 5	Nivel Inventivo
D2	US 7,713,895	6, 10, 12 y 13	Nivel Inventivo

II.- En contestación a las objeciones anteriores, manifestamos lo siguiente:

- 1. De la solicitud de patente
 - 1.2. Reivindicaciones (Art 30 D486, Art 22 PCT)

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Con el objetivo de superar las objeciones contenidas en el informe del examen de patentabilidad de la presente solicitud, se adjunta a la presente respuesta un nuevo capítulo reivindicatorio en el cual:

- a. Se han adaptado las reivindicaciones de la presente solicitud a las reivindicaciones concedidas para la patente de la misma familia otorgada en el territorio de Estados Unidos de América número US 8,785,337, la cual se adjunta a la presente respuesta; advirtiéndole que el capítulo reivindicatorio modificado no incluye materia nueva que no haya sido incluida con la solicitud inicial.
- b. Una tabla de la correspondencia de las reivindicaciones de la mencionada patente norteamericana, y las actuales reivindicaciones enmendadas se establece a continuación

Sol CO 14-014031	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Patente US 8,785,337	1	2-3	4	5	7	8	9	10	16	25	27	30	32	33, 36	34

- c. En cuanto a la objeción sobre la frase "una cantidad retenida" descrita en la reivindicación 1, respetuosamente exponemos que en opinión de la solicitante la misma no es un término general. Como se explica en la página 10 de la memoria descriptiva de la solicitud original (WO 2013/009417), una "cantidad retenida" de un material se refiere a la cantidad de ese material que está presente o se retiene en la composición del vidrio final, y esta cantidad puede ser diferente de la cantidad de ese mismo material en la composición del vidrio mezclado (discontinuo) como se menciona en la solicitud como se presentó inicialmente.
- d. El término "aproximadamente" se ha eliminado de todas las reivindicaciones iniciales en las que el mismo se ha objetado.
- e. El término "sustancialmente" se ha eliminado de todas las reivindicaciones iniciales en las que el mismo se ha objetado.
- f. Las reivindicaciones 5, 7, 11, 12 y 15 anteriores se han eliminado del pliego actual de reivindicaciones.

2. **Determinación del estado de la técnica**
Examen de Patentabilidad
Objeto de la invención

Un objeto general de la presente descripción, de acuerdo con un aspecto de la divulgación, es proporcionar una composición de vidrio para recipientes que tiene un óxido de vanadio y un óxido de selenio, con el propósito de producir

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“recipientes de vidrio sustancialmente claros” con una apariencia relativa “no verde” y con buena capacidad para el bloqueo de la luz ultravioleta.

Análisis de patentabilidad

Las reivindicaciones 1-40 divulgadas en la correspondiente patente de los Estados Unidos número US 8,785,337 se consideraron como patentables por esa autoridad de examen, considerando las referencias citadas en el presente informe de patentabilidad, D1 (US 5,908,702) y D3 (US 7,713,895).

En el nuevo pliego de reivindicaciones que aquí se adjunta, la reivindicación independiente 1 reivindica, entre otras cosas, un recipiente de vidrio que incluye un óxido de vanadio presente en una cantidad retenida que oscila entre 0,01 % en peso y 0,14 % en peso, y un óxido de selenio presente en una cantidad retenida que oscila entre 0,0125 % en peso y 0,025 % en peso. La reivindicación independiente 6, por su parte, reivindica entre otras cosas, un recipiente de vidrio que tiene una composición de vidrio que incluye un óxido de vanadio retenido en una cantidad entre 0,02 % en peso y 0,1 % en peso y un óxido de selenio retenido en una cantidad entre 0,02 % en peso y 0,025 % en peso.

La reivindicación independiente 9 reivindica, entre otras cosas, una composición de vidrio mezclado (discontinuo), que incluye óxidos de vanadio y selenio, en la cual el óxido de vanadio está presente en una cantidad que oscila entre 0,02 % en peso y 0,1 % en peso y el óxido de selenio está presente en una cantidad mayor que 0,03 % en peso y menor que 0,12 % en peso.

La reivindicación independiente 12 reivindica, entre otras cosas, una composición de vidrio mezclado (discontinuo), que incluye óxidos de vanadio y selenio en cantidades aproximadamente iguales.

Por su parte, de los documentos del estado de la técnica citados por el examinador colombiano, el documento D1 describe un vidrio de color que absorbe rayos ultravioletas que incluye un componente a base de cal sodada y componentes colorantes que consisten esencialmente de 0,08 a 0,4 % en peso de hierro total calculado como Fe_2O_3 , 0,05 a 0,4 % en peso de vanadio, calculado como V_2O_5 , 0,0005 a 0,03 % en peso de Se, 0 a 0,005 % en peso de CoO , 0 a 2,0 % en peso de TiO_2 , y 0 a 0,8 % en peso de CeO_2 (resumen). D1, sin embargo, no explica si el contenido de Se en el vidrio representa la cantidad de Se elemental en el vidrio o la cantidad de un compuesto que contiene Se en el vidrio. Más específicamente, D1 no describe, enseña o sugiere si el Se en el vidrio está presente en forma elemental o en su forma de óxido, por ejemplo, SeO_2 .

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Tal como se reconoce en la página 4 de la acción oficial, D1 no menciona que el selenio en la composición es óxido de selenio. Sin embargo, el examinador asevera que "no hay evidencias de un efecto técnico ya sea de la inclusión del selenio como óxido de selenio o en forma de metal de selenio granulado". Sin embargo, las páginas 982-983 del Manual para la Fabricación de Vidrio (adjunto), se enseña que el selenio puede estar presente en el vidrio en diferentes formas, dependiendo de las condiciones redox de la masa fundida de vidrio y de los otros componentes en el vidrio. En particular, el manual enseña que la presencia de Se elemental en el vidrio produce una coloración rosa. Además, el manual enseña que las condiciones reductoras en una masa fundida de vidrio pueden favorecer la formación de "seleniuro de hierro marrón" (FeSe) si la masa fundida de vidrio también incluye pequeñas cantidades de hierro, tal como en la composición de vidrio de D1.

Por lo tanto, contrariamente a la afirmación del examinador, un efecto técnico resultaría necesariamente si el selenio elemental (Se) o seleniuro de hierro (FeSe) se incluyeran en una composición de vidrio en lugar del óxido de selenio.

D2, por otra parte, no supera las deficiencias de D1, al menos porque D2 no está en lo absoluto relacionado con un recipiente de vidrio o a un método de fabricación de recipientes de vidrio que incluyen un óxido de vanadio para buenas propiedades de bloqueo de luz ultravioleta o un óxido de selenio para decolorar el vidrio para una buena claridad y decoloración.

Por el contrario, D2 se dirige expresamente a un vidrio coloreado de cal sodada de tonalidad azul, que contiene más de 2 % en peso de MgO, más de 1,1 % en peso de Fe₂O₃, menos de 0,53 % en peso de FeO, y menos de 0,13 % en peso de MnO₂. D2 enseña que el vidrio puede incluir un agente colorante de cromo, cobalto, cerio, titanio, selenio, o vanadio. Pero D2 afirma además que "puede ser ventajoso evitar el uso de selenio, que es caro y se incorpora de manera ineficiente en el vidrio" (párrafo [0037]). Además, D2 no anticipa o sugiere la presencia de un óxido de selenio en el vidrio.

Por lo tanto, las divulgaciones de D1 y D2, ya bien sean consideradas individualmente o en combinación, no describen o sugieren un vidrio o una composición de vidrio mezclado (discontinuo) que incluye un óxido de selenio en cualquiera de las cantidades específicas de acuerdo con las reivindicaciones independientes 1, 6, 9, y 13.

Ni D3 (US 7,713,895) ni la Guía de Fabricación de vidrio y productos de vidrio (Santiago, diciembre de 1999), describen o sugieren una composición de vidrio que incluye un óxido de selenio, como se incluye entre las características esenciales en las reivindicaciones independientes 1, 6, 9 y 13.

En consecuencia, las reivindicaciones independientes 1, 6, 9 y 13, tal como se han enmendado, son claramente distinguibles de las referencias citadas por el examinador, D1, D2, D3, y la mencionada Guía, en cuanto a su patentabilidad, ya sean tomadas individualmente (no afectan su novedad) o en combinación (no hacen obvia la invención propuesta).

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Por lo tanto, entendemos que cabe concluir que las nuevas reivindicaciones no sólo definen materia novedosa sino también materia que no resulta evidente para una persona versada en la materia y, en consecuencia, también implican una actividad inventiva.

3.- Pago Examen de Patentabilidad

Dando cumplimiento a lo establecido en el Artículo 2 de la Resolución 3719 de 2 de febrero de 2016 mediante la cual se modificó el inciso segundo del numeral 1.2.2.5.1. del Capítulo Primero, del Título X de la Circular Única y con el propósito que sea estudiado el nuevo capítulo reivindicatorio aquí aportado, presentamos el pago por concepto de examen de patentabilidad a la presente solicitud.

III. ANEXAR:

- (i) Nuevo Capítulo reivindicatorio (1-15)
- (ii) Copia de la patente de los Estados Unidos de América, número US 8,785,337.
- (iii) Handbook of Glass Manufacture (Tooley, F. V. Volume II, 3rd Edition).

IV. PETICIÓN:

Conforme a lo anterior, una vez atendidos los requerimientos y exigencias del examinador y al tener en cuenta el nuevo capítulo de reivindicaciones que aquí se presenta, así como los argumentos expuestos, solicito muy respetuosamente a su Despacho, continuar el trámite de rigor y de ser el caso se hagan las correspondientes observaciones con al ánimo de hacer lo pertinente dentro del presente trámite, teniendo en cuenta que la presente solicitud cumple con las exigencias establecidas en la D486.

Atentamente,



HUMBERTO RUBIO CAMACHO

C.C. 17'192.062 de Bogotá

T.P. 50.007 Consejo Superior de la Judicatura

COD. 4134