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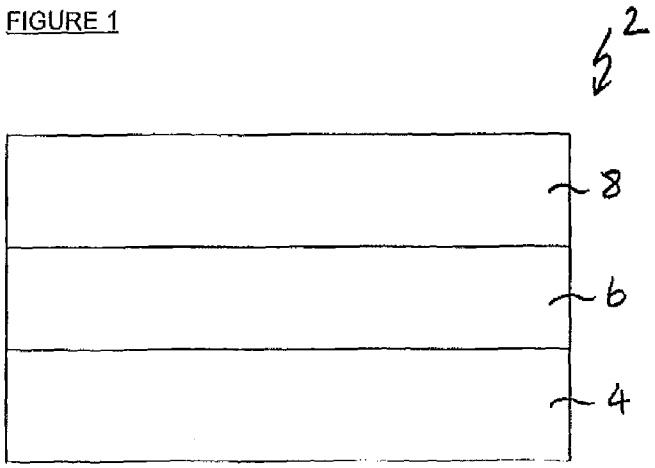
(54) Title: A GLAZING

FIGURE 1



(57) Abstract: The invention provides a coated glazing comprising at least one substrate; a first coating layer; and a second coating layer. The first coating layer is directly adjacent the at least one substrate. The second coating layer is directly adjacent the first coating layer. The first coating layer consists of silicon dioxide having a geometric thickness of between substantially 10nm to 50nm, and the second coating layer consists of titanium dioxide having a geometric thickness of between substantially 30nm to 45nm.

A Glazing

The invention relates to a coated glazing. Particularly, but not exclusively, the invention relates to a coated glazing for architectural use.

The increased use of glass in architecture today makes it imperative that consideration is given not only to the comfort of a building's occupants, for example, by using solar control glazing, but also to the commercial cost of glass. It is critical that glass can be manufactured having a functional capability but also at a competitive price.

It is an object of the present invention to provide an improved reflective solar control glazing which is economically advantageous to manufacture.

According to an aspect of the present invention there is provided a coated glazing comprising at least one substrate; a first coating layer; and a second coating layer; the first coating layer being directly adjacent the at least one substrate, the second coating layer being directly adjacent the first coating layer, wherein the first coating layer consists of silicon dioxide having a geometric thickness of between substantially 10nm to 50nm, and the second coating layer consists of titanium dioxide having a geometric thickness of between substantially 30nm to 45nm.

Most preferably, the silicon dioxide has a geometric thickness of substantially 30nm.

Most preferably, the titanium dioxide has a geometric thickness of substantially 37nm.

Preferably, the coated glazing has a reflectivity of between substantially 30 to 40%. Most preferably, when the titanium dioxide has a geometric thickness of 37nm, the reflectivity of the glazing is substantially 35%.

Advantageously, it has been found that a titanium dioxide coating of said thickness when deposited directly on top of a silicon dioxide coating of said thickness, results in a glazing having good reflectivity whilst also giving a degree

of solar control, due to the reflectivity. Provision of a glazing having only substrate and two coatings is economically advantageous to manufacture.

Preferably, the least one substrate is at least one ply of float glass. Preferably the glass sheet has a soda-lime-silica glass composition.

A typical soda-lime-silica glass composition is (by weight), SiO2 69 – 74 %; Al2O3 0
20 – 3 %; Na2O 10 – 16 %; K2O 0 – 5 %; MgO 0 – 6 %; CaO 5 – 14 %; SO3 0 – 2 %; Fe2O3 0.005 - 2 %. The glass may also contain other additives, for example, refining aids, which would normally be present in an amount of up to 2 %

Preferably, the titanium dioxide coating is provided on an exterior facing surface of the substrate, i.e. surface #1 of the substrate.

In a further aspect, the invention provides an insulated glazing unit comprising a first sheet of glazing material, a second sheet of glazing material, characterised in that a coating is provided on the first sheet of glazing material, the coating comprising a first coating layer, and a second coating layer, the first coating layer being directly adjacent said first sheet, the second coating layer being directly adjacent said first coating layer, wherein the first coating layer consists of silicon dioxide having a thickness of between substantially 10nm to 50nm, and the second coating layer consists of titanium dioxide having a thickness of between substantially 30nm to 45nm.

As is conventional in the art, the surface of the insulated glazing unit configured to face the external environment of a structure in which the insulated glazing unit is installed is referred to as surface #1. The surface opposite surface #1 is referred to as surface #2. The surface of the insulated glazing unit facing the interior of the structure in which the insulated glazing panel is installed is referred to as surface #4. The surface opposite surface #4 is surface #3.

Preferably, the coating is provided on surface #2. The coating may be on surface #3.

Advantageously, provision of the coating on surface #2 minimises the risk of leaching of silicone adhesive used when fitting the unit.

The glazing or glazing unit is a mid reflection solar control glazing. The solar control properties are due to the reflective nature of the glazing. The glazing has an emissivity close to that of float glass and so is not a low emissivity product.

The glazing or glazing unit may be used for architectural purposes. Said glazing equally lends itself to being used in domestic appliance, for example, on the inner facing surface of an oven door where high reflection glass helps to reflect heat back into the oven.

The titanium dioxide coating and/or the silicon dioxide of the first aspect or second aspect of the invention may be deposited on the glazing by atmospheric chemical vapour deposition in accordance with the teachings of EP0944557 which are herein incorporated by reference.

All of the features described herein may be combined with any one of the above aspects, in any combination.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, wherein:

Figure 1 shows a schematic sectional view of a coated glazing according to the present invention;

Figure 2 shows a schematic sectional view of an insulated glazing unit according to the invention;

Figure 3 shows a schematic sectional view of a further insulated glazing unit according to the invention; and

Figure 4 shows a schematic perspective view of an oven incorporating a glazing according to the invention.

Figure 1 shows a coated glazing 2 according to the invention. The coated glazing 2 comprises a substrate 4 having a first coating layer 6 and a second coating layer 8. The first coating layer 6 is directly adjacent the substrate 4. The second coating layer 8 is directly adjacent the first coating layer 6. The phrase "directly adjacent" will be understood to mean that the second layer 8 is deposited directly on top of the first layer 6 such that the following sequence exists: substrate/first coating layer/second coating layer.

The substrate 4 is a ply of conventional clear float glass, for example, 4mm, 6mm, 8mm. The float glass comprises a soda-lime-silica glass composition of (by weight), SiO_2 69 – 74 %; Al_2O_3 0 20 – 3 %; Na_2O 10 – 16 %; K_2O 0 – 5 %; MgO 0 – 6 %; CaO 5 – 14 %; SO_3 0 – 2 %; Fe_2O_3 0.005 - 2 %. Other additives, for example, refining aids, may also be present, normally in an amount of up to 2 %.

The first coating layer 6 is silicon dioxide having a geometric thickness of substantially 30nm. The second coating layer 8 is titanium dioxide having a geometric thickness of substantially 37nm. The deposition of said coating layers 6,8 is as described in EP0944557 which is hereby incorporated by reference. Specifically, a chemical vapour deposition process is used for laying down both coating layers.

Reflectivity can be directly correlated to titanium dioxide thickness. In the present invention, the reflectivity of coated glazing is between substantially 30 to 40%. When the titanium dioxide has a geometric thickness of 37nm, the reflectivity of the glazing is substantially 35%.

Figure 2 shows a double glazed unit 100 having a first pane 110 and a second pane 112. The panes 110,112 are separated by a spacer 114 in a conventional manner. A coating 116 is provided on a surface 118 of the first pane 110. The surface 118 faces inwardly of the unit 100, towards an air space 120. Typically, this surface 118 is referred to as surface #2. The adjacent surface 122 of the second pane 112 is often referred to as surface #3. The coating 116 comprises a first coating layer 106 of silicon dioxide having a geometric thickness of substantially 30nm, and a second coating layer 108 of titanium dioxide having a geometric thickness of substantially 37nm.

Figure 3 shows an alternative glazed unit 200 in which a coating 216 is provided on both surface #2 and surface #3 of the unit. The coating 216 comprises a first coating layer 206 of silicon dioxide having a geometric thickness of substantially 30nm, and a second coating layer 208 of titanium dioxide having a geometric thickness of substantially 37nm.

Advantageously, the invention provides a reflective solar control glazing which is economical to manufacture and which can be used in many applications, including for architectural purposes but also for use in domestic appliances, for example, in oven doors as shown in Figure 4. The glazing 300 for the oven door may comprise at least one pane of glass having a low expansion, for example, a borosilicate glass and having a coating 416 comprising a first coating layer 406 of silicon dioxide having a geometric thickness of substantially 30nm, and a second coating layer 408 of titanium dioxide having a geometric thickness of substantially 37nm.

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features

disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A coated glazing comprising at least one substrate; a first coating layer; and a second coating layer; the first coating layer being directly adjacent the at least one substrate, the second coating layer being directly adjacent the first coating layer, wherein the first coating layer consists of silicon dioxide having a geometric thickness of between substantially 10nm to 50nm, and the second coating layer consists of titanium dioxide having a geometric thickness of between substantially 30nm to 45nm.

2. A coated glazing as claimed in claim 1 having a reflectivity of between substantially 30 to 40%.

3. A coated glazing as claimed in claim 1 or 2, wherein the silicon dioxide has a geometric thickness of substantially 30nm, and the titanium dioxide has a geometric thickness of substantially 37nm.

4. A coated glazing as claimed in claim 3 having a reflectivity of substantially 35%.

5. A coated glazing as claimed in any one of the preceding claims, wherein the at least one substrate is at least one ply of float glass.

6. A glazing as claimed in any one of the preceding claims, wherein the titanium dioxide coating is provided on an exterior facing surface of the substrate, i.e. surface #1 of the substrate.

7. An insulated glazing unit comprising a first sheet of glazing material, a second sheet of glazing material, characterised in that a coating is provided on the first sheet of glazing material, the coating comprising a first coating layer, and a second coating layer, the first coating layer being directly adjacent said first sheet, and the second coating layer being directly adjacent said first coating layer, wherein the first coating layer consists of silicon dioxide having a thickness of between substantially 10nm to 50nm, and the second coating layer consists of titanium dioxide having a thickness of between substantially 30nm to 45nm.

8. An insulated glazing unit as claimed in claim 7, wherein the silicon dioxide has a geometric thickness of substantially 30nm, and the titanium dioxide has a geometric thickness of substantially 37nm.

9. An insulated glazing unit as claimed in claim 7 or 8, wherein the coating is provided on interior facing surface of the unit, said surface being surface #2.

10. A glazing or glazing unit substantially as hereinbefore described with reference to any one of the accompanying drawings.

11. Use of a glazing or glazing unit as claimed in any one of the preceding claims as a part of an oven, preferably, an oven door.

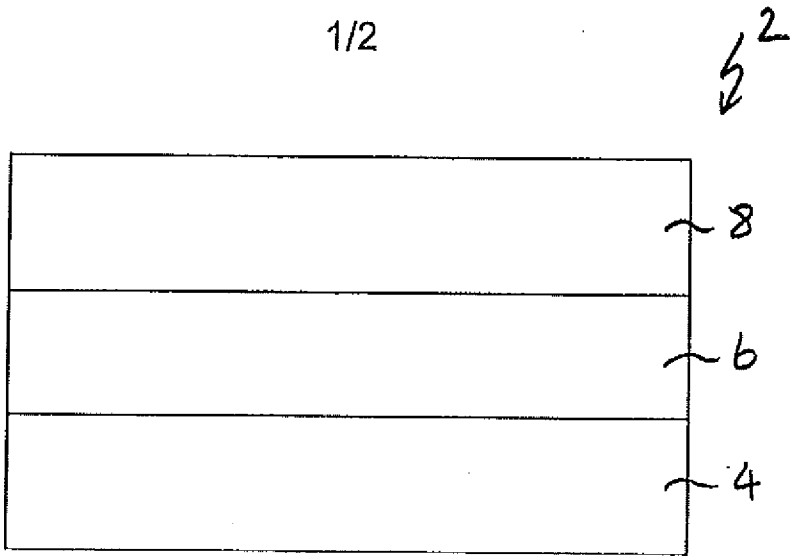


FIGURE 1

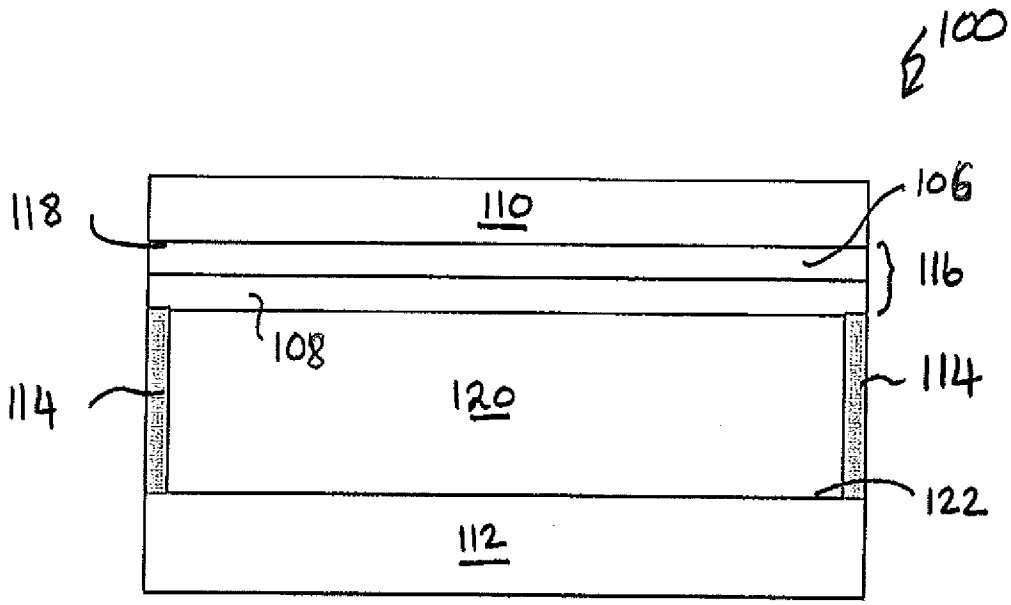


FIGURE 2

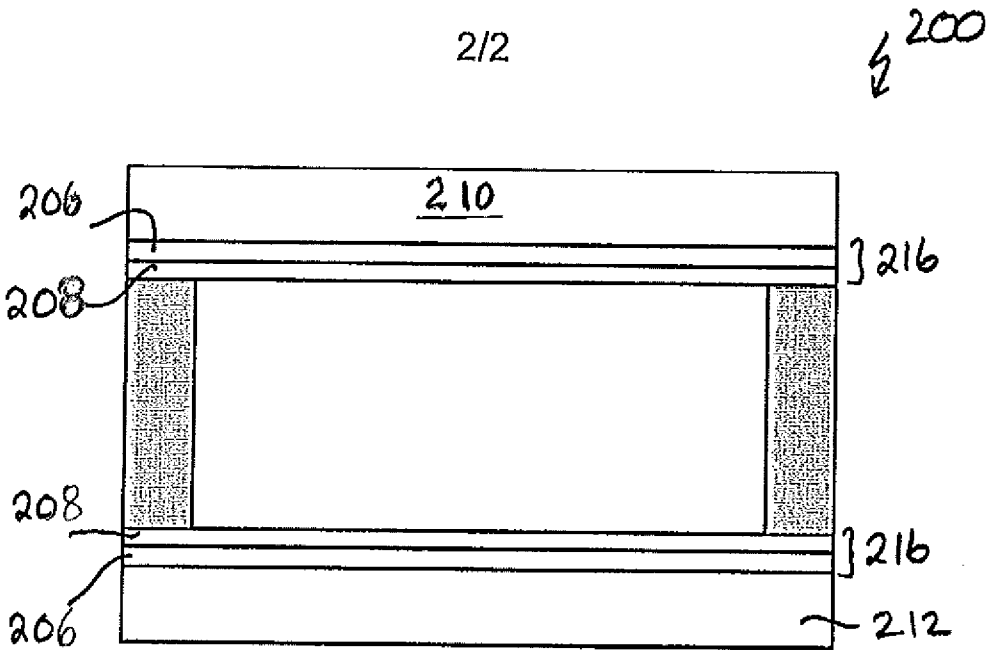


FIGURE 3

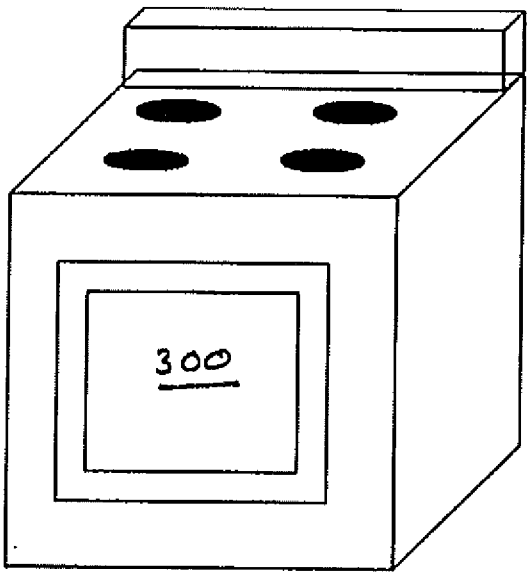


FIGURE 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2014/053244

A. CLASSIFICATION OF SUBJECT MATTER
INV. C03C17/34 C03C17/36 F24C15/22
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C03C F24C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012/202073 A1 (DUSOULIER LAURENT [BE]) 9 August 2012 (2012-08-09) abstract paragraphs [0011] - [0012], [0019], [0022] - [0025], [0030], [0048] - [0051] -----	1-11
X	WO 00/75087 A1 (PILKINGTON PLC [GB]; LIBBEY OWENS FORD CO [US]; AMMERLAAN JOHANNES AND) 14 December 2000 (2000-12-14)	1-8,10
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A	US 2010/261009 A1 (HENN CHRISTIAN [DE] ET AL) 14 October 2010 (2010-10-14) the whole document -----	1-11
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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search	Date of mailing of the international search report
6 March 2015	16/03/2015

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2014/053244

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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