

7663567



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

January 10, 2018

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: 62/596,096
FILING DATE: *December 07, 2017*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS US62/596,096



Certified by

Nichelle K. Lee

Under Secretary of Commerce
for Intellectual Property
and Director of the United States
Patent and Trademark Office

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.23800
		Application Number	
Title of Invention	SWITCHABLE GLAZING WITH IMPROVED TEMPERATURE RESPONSE		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Inventor Information:

Inventor	1				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Mario	Arturo	Mannheim Astete			
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service						
City	Lima		Country of Residence ⁱ		PE	
Mailing Address of Inventor:						
Address 1		Av. Guillermo Dansey 1996				
Address 2						
City	Cercado de Lima		State/Province			
Postal Code				Country ⁱ	PE	
Inventor	2				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Alfredo	Daniel	Koc Li			
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service						
City	Lima		Country of Residence ⁱ		PE	
Mailing Address of Inventor:						
Address 1		Av. Guillermo Dansey 1996				
Address 2						
City	Cercado de Lima		State/Province			
Postal Code				Country ⁱ	PE	
Inventor	3				Remove	
Legal Name						

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.23800
		Application Number	
Title of Invention	SWITCHABLE GLAZING WITH IMPROVED TEMPERATURE RESPONSE		

Prefix	Given Name	Middle Name	Family Name	Suffix
	Andres	Fernando	Sarmiento Santos	
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service				
City	Lima	Country of Residence ⁱ	PE	

Mailing Address of Inventor:

Address 1	Av. Guillermo Dansey 1996			
Address 2				
City	Cercado de Lima	State/Province		
Postal Code		Country ⁱ	PE	
Inventor	4			Remove
Legal Name				

Prefix	Given Name	Middle Name	Family Name	Suffix
	Gonzalo	Rafael	Vizcarra Mendoza	
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service				
City	Lima	Country of Residence ⁱ	PE	

Mailing Address of Inventor:

Address 1	Av. Guillermo Dansey 1996			
Address 2				
City	Cercado de Lima	State/Province		
Postal Code		Country ⁱ	PE	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add				

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).	
☐ An Address is being provided for the correspondence Information of this application.	
Customer Number	130961
Email Address	morales@moralesq.com Add Email Remove Email

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.23800
		Application Number	
Title of Invention	SWITCHABLE GLAZING WITH IMPROVED TEMPERATURE RESPONSE		

Application Information:

Title of the Invention	SWITCHABLE GLAZING WITH IMPROVED TEMPERATURE RESPONSE		
Attorney Docket Number	1511.23800	Small Entity Status Claimed	☐
Application Type	Provisional ▼		
Subject Matter	Utility ▼		
Total Number of Drawing Sheets (if any)	3	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐ Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.			
Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	130961		

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.23800
		Application Number	
Title of Invention	SWITCHABLE GLAZING WITH IMPROVED TEMPERATURE RESPONSE		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.23800
		Application Number	
Title of Invention	SWITCHABLE GLAZING WITH IMPROVED TEMPERATURE RESPONSE		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.23800
		Application Number	
Title of Invention	SWITCHABLE GLAZING WITH IMPROVED TEMPERATURE RESPONSE		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant	1	Remove
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section. Clear		
☒ Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		
Name of the Deceased or Legally Incapacitated Inventor:		
If the Applicant is an Organization check here. ☒		
Organization Name	AGP America S.A.	
Mailing Address Information For Applicant:		
Address 1	Edificio Mossfon, Segundo Piso Calle 54 Este	
Address 2		
City	Panama City	State/Province
Country	PA	Postal Code
Phone Number		Fax Number
Email Address		
Additional Applicant Data may be generated within this form by selecting the Add button. Add		

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.23800
		Application Number	
Title of Invention	SWITCHABLE GLAZING WITH IMPROVED TEMPERATURE RESPONSE		

Assignee	1			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
Remove				
If the Assignee or Non-Applicant Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country ⁱ		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add				

Signature:[Remove](#)

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Joseph L. Morales/		Date (YYYY-MM-DD)	2017-12-07
First Name	Joseph	Last Name	Morales	Registration Number
				58835
Additional Signature may be generated within this form by selecting the Add button. Add				

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.23800
		Application Number	
Title of Invention	SWITCHABLE GLAZING WITH IMPROVED TEMPERATURE RESPONSE		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

- 1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
- 2 A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
- 3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
- 4 A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
- 5 A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
- 6 A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
- 7 A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
- 8 A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
- 9 A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Provisional Application for Patent Cover Sheet

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)

Inventor(s)

Inventor 1

[Remove](#)

Given Name

Middle Name

Family Name

City

State

Country i

Mario

Arturo

Mannheim Astete

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Inventor 2

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City

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Country i

Gonzalo

Rafael

Vizcarra Mendoza

Lima

PE

All Inventors Must Be Listed – Additional Inventor Information blocks may be generated within this form by selecting the **Add** button.

[Add](#)

Title of Invention

SWITCHABLE GLAZING WITH IMPROVED TEMPERATURE RESPONSE

Attorney Docket Number (if applicable)

1511.23800

Correspondence Address

Direct all correspondence to (select one):

☒ The address corresponding to Customer Number

☐ Firm or Individual Name

Customer Number

130961

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

Yes, the invention was made by an agency of the United States Government. The U.S. Government agency name is:

Yes, the invention was under a contract with an agency of the United States Government. The name of the U.S. Government agency and Government contract number are:

Doc Code: **TR.PROV**

Document Description: Provisional Cover Sheet (SB16)

PTO/SB/16 (11-08)

Approved for use through 05/31/2015. OMB 0651-0032

U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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Entity Status

Applicant asserts small entity status under 37 CFR 1.27 or applicant certifies micro entity status under 37 CFR 1.29

- ☐ Applicant asserts small entity status under 37 CFR 1.27
- ☐ Applicant certifies micro entity status under 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
- ☒ No

Warning

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

Signature

Please see 37 CFR 1.4(d) for the form of the signature.

Signature	Joseph L. Morales/			Date (YYYY-MM-DD)	2017-12-07
First Name	Joseph	Last Name	Morales	Registration Number (If appropriate)	58835

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **This form can only be used when in conjunction with EFS-Web. If this form is mailed to the USPTO, it may cause delays in handling the provisional application.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that : (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

SWITCHABLE GLAZING WITH IMPROVED TEMPERATURE RESPONSE

Cross-references to related applications

None

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Abstract of the disclosure

Switchable (variable light transmittance) glazing, on which the tint can be dynamically controlled, is starting to appear in the automotive market. Promising switchable technologies include: polymer dispersed fluid crystal (PDLC), suspended particle devices (SPD) and electrochromic. While each has its own advantages and disadvantages all share one common limitation: they can only operate over a limited temperature range. The time that it takes to switch from light to dark and back is dependent upon temperature. Extremes of temperature adversely affect the time that it takes to change state. In addition, exposure to high temperatures, for an extended period will shorten the life of the glazing. These limitations are overcome by combining the switchable technology with a fluid coolant circuit which can heat or cool the glazing to maintain the glazing within the desired temperature range required for acceptable switching time and operation.

15

Inventors

Name	Nationality	Address
Mario Arturo Mannheim Astete	Peruvian	Av. Guillermo Dansey 1996, Cercado de Lima, Lima, Perú
Alfredo Daniel Koc Li	Peruvian	Av. Guillermo Dansey 1996, Cercado de Lima, Lima, Perú
Gonzalo Rafael Vizcarra Mendoza	Peruvian	Av. Guillermo Dansey 1996, Cercado de Lima, Lima, Perú
Andres Fernando Sarmiento Santos	Colombian	Av. Guillermo Dansey 1996, Cercado de Lima, Lima, Perú

20

Field of the invention

This invention relates to the field of laminated automotive glazing.

Background of the invention

14032v1

In response to the government regulatory requirements for increased automotive fuel economy, as well as the growing public awareness and demand for energy efficient environmentally friendly products, automotive original equipment manufacturers, around the world, have been working to improve the energy efficiency of their vehicles.

5

One of the key elements of this strategy to improve efficiency has been solar control. By reducing the solar load on the vehicle, substantial improvements can be made in energy consumption, especially in warmer climates. It helps to reduce the load on the air conditioning unit and allows the operation of the vehicle with the windows closed, which improves aerodynamics. This is especially important for electric vehicles where the improvement directly translates into an increase in the autonomy of the vehicle.

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Infrared absorbing and infrared reflecting glazing are the two primary technologies that are being used to improve solar control.

15

Infrared absorbing glass has a higher iron content than ordinary clear glass giving it a greenish tint. The iron compounds in the glass absorb solar energy. There are also plastic interlayers that can be used with laminated glass that contain solar energy absorbing compounds that can achieve the same effect. By absorbing the energy before it enters the passenger compartment, the solar load on the vehicle is reduced. Nevertheless, while infrared absorbing windows can be very effective in reducing the solar load, the glass will heat up and transfer some of the absorbed energy to the passenger compartment through convective transfer and radiation.

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A more efficient method is to reflect the energy back to the atmosphere. This allows the glass to stay cooler by reducing the energy transferred to the cabin. This is done through the use of various films and coatings that are reflective in the infrared.

25

Infrared coatings and films are generally not durable enough to be exposed to the elements. Instead, they must be fabricated as one of the internal layers of a laminated product to prevent damage and degradation. One of the advantages of a laminated window over a tempered monolithic glazing is that a laminate can make use of these infrared reflecting coatings and films in addition to infrared absorbing compositions and interlayers. It is a common practice to use a combination of infrared absorbing and infrared reflecting technologies on the same

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lamine. An infrared absorbing layer is placed behind an infrared reflecting layer to absorb the remaining energy that is not reflected.

Infrared reflecting coatings include but are not limited to the various metal/dielectric layered coatings applied primarily through Magnetron Sputtered Vacuum Deposition (MSVD) as well as others known in the art that are applied via pyrolytic, spray, controlled vapor deposition (CVD), dip and other methods.

Infrared reflecting films include both metallic coated plastic substrates as well as organic based non-metallic optical films which reflect in the infrared. Most of the infrared reflecting films are comprised of a plastic film substrate having an infrared reflecting layered metallic coating applied.

One of the drawbacks of both infrared absorbing and infrared reflecting glazing is that the solar load reduction is present all the time even when it is not needed or desired. In colder climates, and at times when heat is needed, it would be advantageous to have the capability to utilize the energy of the sun to heat the vehicle interior.

With internal combustion engines (ICE), heating was never a problem. Being inefficient, Internal combustion engines generate abundant waste heat. A typical ICE powered vehicle has a heater with a capacity of 4-5kW. In an electric vehicle, there is some waste heat from the battery but most if not all of the cabin heating must be provided by means of a resistive heating system.

It would be desirable to have a darker infrared absorbing tint to keep the solar energy out to reduce the load on the air conditioning but to be able to let as much solar light in as possible when heat is needed.

To control the level of light and energy transmission through the laminate, there are a number of technologies available: electrochromic, photochromic, thermochromic and electric field sensitive films which are designed to be incorporated into laminated glass. Of particular interest are electrochromic, suspended particle device (SPD) films and polymer dispersed fluid crystal

(PDLC) films with which we can change the light transmittance of the glazing in response to an electrical signal.

SPD is a variable tint technology with which the level of tint can be controlled and varied in response to an applied electrical field. SPD goes from a darker tint in the off state to a less dark tint in the on state. In a SPD film, microscopic droplets of fluid containing needle like particles, light valves, are suspended in a matrix. In the off state the particles are in a random state of alignment and block the transmission of light. The degree of alignment and resulting tint can be varied in response to the applied voltage. The light transmittance in the on and off states can also be shifted through changes to the thickness and composition of the active material. In the dark off state, even at less than 3% visible light transmittance, it is still possible to see clearly through SPD.

PDLC is a light scattering technology which goes from opaque in the off state to clear in the on state. In a PDLC film, microscopic droplets of fluid crystal are suspended in a polymer matrix. In the off state the fluid crystals are in a random state of alignment and scatter the light providing privacy. In the off state, the film is substantially opaque. Even at relatively high light transmittance, it is impossible to see through the film. When an electric field is applied, the crystals align and allow light to pass. The degree of scattering can be varied with the amplitude of the applied voltage. The level of light transmittance in the on and off states can also be shifted by making changes to the thickness and composition of the active material. PDLC is primarily a privacy product though it can also be used for solar control as it reduces the solar energy transmitted.

SPD and PDLC glazing are both manufactured by adding a SPD or PDLC film layer to the laminate. The film is comprised of the active material sandwiched between two thin plastic layers having a transparent conductive coating on each.

To incorporate into a laminate, sheets of plastic interlayer are needed on each side of the film so as to bond the film to the other layers of the laminate. The film is laminated in between two plastic bonding interlayer layers and at least two glass layers in order to form a laminated glazing.

Electrochromic switchable glazing undergoes a chemical reaction when a current is passed through the active material, in much the same way that a battery functions when it charges and discharges. The active material undergoes an oxidation or reduction reaction as the materials changes from light to dark and back. This is a relatively slow process in which the switching time measure is minutes.

SPD and PDLC however operate on a different principle. There is no chemical reaction. The molecules that make up the active material undergo a kinetic change in response to the presence of an electrical field. This is why the switching time of SPD and PDLC is measured in seconds or fractions of a second making it orders of magnitude faster than electro-chromic glazing. This is one of the primary advantage that the two have over electrochromic.

Electrochromic, SPD and PDLC can all be used for solar control as they reduce the level of light transmittance and energy transferred to the cabin.

Laminates that incorporate these variable light transmittance technologies are sometime referred to as “smart” glass or as switchable glazing.

One disadvantage that they all share is that smart glass can only operate over a limited range of temperature.

The viscosity of the microscopic droplets that the active material is suspended in (SPD) and of the fluid crystal itself (PDLC), is a function of temperature. As the temperature drops, the switching time increases. At sufficiently low temperatures the material is unable to change states. The actual temperature will depend upon the formulation.

At elevated temperatures, PDLC will reach a point where it will become clear and not switch to the light scattering state. SPD will still switch but the switching speed is much slower.

SPD and PDLC are also sensitive to heat. Exposure to high temperatures over an extended period will shorten the lifetime of the glazing.

Electrochromic glazing, which is relatively slow to switch states, relies on a chemical reaction which also takes longer at lower temperatures.

As a result, the use of electrochromic, PDLC and SPD has been limited due to these temperature
5 constraints.

It would be advantageous to be able to operate over an extended temperature range.

Brief summary of the invention

10 The ability to change light transmittance over an extended temperature range is improved by adding a coolant fluid system to the glazing that can be used to heat or cool the glazing. The circuit does need to deice or defog and so can be designed to draw minimal power.

Advantages:

- 15 • Extended lower temperature operation.
- Extended higher temperature operation.
- Shorter switching time at lower temperatures.
- Lower energy consumption for vehicle heating and cooling.
- Extends life of product by reducing exposure to higher temperatures.
- 20 • Fabricated using standard automotive glass processes and equipment.

Brief description of drawings

Figure 1A	Cross section of a typical automotive laminate.
Figure 1B	Cross section of a typical automotive laminate with coating and performance
Figure 2A	Cross section of typical laminated roof with a variable light transmittance film and a coolant heating and cooling circuit.
Figure 2B	Diagram of coolant system.
Figure 3	Exploded view of laminated roof with a variable light transmittance film and a coolant heating and cooling circuit.

Reference numerals

1	Glazing
2	Glass
4	Plastic Interlayer
6	Obscuration
11	Coolant channel
12	Coolant circuit
18	Coating
34	Bus bar
42	Coated Film
44	Switchable Film
46	Silver
48	Wire
80	Pump
82	Heat Exchanger
101	Surface one
102	Surface two
103	Surface three
104	Surface four
201	Outer glass layer
202	Inner glass layer

Detailed description of the invention

The following terminology is used to describe the laminated glazing of the invention.

A typical automotive laminate cross section is illustrated in Figures 1A and 1B. The laminate is comprised of two layers of glass, the exterior or outer glass layer **201** and interior or inner glass layer **202** that are permanently bonded together by a plastic interlayer **4**. The exterior glass surface that is on the outer glass layer **201** is referred to as surface one **101** or the number one surface. The opposite face of the same glass layer is surface two **102** or the number two surface. The interior glass surface that is on the inner glass layer **202** is referred to as surface four **104** or the number four surface. The opposite face of same glass layer is surface three **103** or the number three surface. Surfaces two **102** and three **103** are bonded together by the plastic interlayer **4**. An obscuration **6** may be also applied to the glass. Obscuration are commonly comprised of black enamel frit printed on the surface two **102** or in the surface four **104** or on both. The laminate may also comprise a coating **18** on one or more of the surfaces. The laminate may also comprise a film **42** or a coolant circuit **12** sandwiching between at least two plastic interlayers **4**.

Most of the worlds' flat glass is produced by the float glass process, first commercialized in the 1950s. In the float glass process, the raw ingredients are melted in a large refractory vessel and then the molten glass is extruded from the vessel onto a bath of molten tin where the glass floats. The thickness of the glass is controlled by the speed at which the molten glass is drawn from the vessel. As the glass cools and hardens, the glass ribbon transfers to rollers. Float glass thickness can typically vary by +/-50 um over a short distance due to what is known as draw line distortion. This is caused by the mechanical means used to draw the molten glass extruded from the vessel into a thin ribbon on the flat glass float line.

We distinguish between the "air" side of the float glass and the "tin" side. A thin coating of tin remains on the glass which will fluoresce and thus can be detected with ultra-violet light.

The types of glass **2** that may be used include but are not limited to: the common soda-lime variety typical of automotive glazing as well as aluminosilicate, lithium aluminosilicate, borosilicate, glass ceramics, and the various other inorganic solid amorphous compositions which undergo a glass transition and are classified as glass included those that are not

transparent. The glass layers may be comprised of infrared absorbing glass compositions as well as infrared reflecting and other types of coatings.

The glass layers may be annealed or strengthened. There are two processes that can be used to increase the strength of glass. The first one is the thermal strengthening, in which the hot glass is rapidly cooled (quenched) and the second one is chemical tempering, in which achieves the same effect through an ion exchange chemical treatment. In the chemical tempering process, ions in and near the outside surface of the glass are exchanged with ions that are larger. This place the outer layer of glass in compression. Compressive strengths of up to 1, 000 MPa are possible.

Laminated safety glass is made by bonding two sheets of glass, the outer glass layer **201** and the inner glass layer **202** of annealed glass 2 together using a plastic bonding layer comprised of a thin sheet of transparent plastic or thermos plastic interlayer **4** as shown in Figure 1. Annealed glass is glass that has been slowly cooled from the bending temperature down through the glass transition range. This process relieves any stress left in the glass from the bending process. Annealed glass breaks into large shards with sharp edges. When laminated glass breaks, the shards of broken glass are held together, much like the pieces of a jigsaw puzzle, by the plastic layer helping to maintain the structural integrity of the glass. A vehicle with a broken windshield can still be operated. The plastic interlayer **4** also helps to prevent penetration by objects striking the laminate from the exterior and in the event of a crash occupant retention is improved.

Black enamel frit is comprised of pigments, carriers, binders and finely ground glass. Other materials are also sometimes added to enhance certain properties: the firing temperate, anti-stick, chemical resistance, etc. The black frit is applied to the glass using a silk screen or ink jet printing process prior to the heating and bending of the glass. As the flat glass is heated during the bending process, the powdered glass in the frit softens and melts, fusing to the surface of the glass. The black print becomes a permanent part of the glass. The frit is said to be “fired” when this takes place. This is a vitrification process which is very similar to the process used to apply enamel finishes on bathroom fixtures, pottery, china and appliances.

This black frit print obscuration on many automotive glazing serves both a functional and an aesthetic role. The substantially opaque black print on the glass serves to protect the polyurethane adhesive used to bond the glass to the vehicle from ultra-violet light and the degradation that it can cause. It also serves to hide the adhesive from view from the exterior of the vehicle. The black obscuration must be durable, lasting the life of the vehicle under all exposure and weather conditions. Part of the aesthetic requirement is that the black have a dark glossy appearance and a consistent appearance from part to part and over the time. A part produced today must match up with one that was produced and in service 20 years ago. The parts must also match up with the other parts in the vehicle which may not have been fabricated by the same manufacturer or with the same formulation of frit. Standard automotive black enamel inks (frits) have been developed that can meet these requirements.

The glass layers are formed using gravity bending, press bending, cold bending or any other conventional means known in the art. Gravity and press bending methods for forming glass are well known in the art and will not be discussed in the present disclosure.

Cold bending is a relatively new technology. As the name suggest, the glass is bent, while cold to its final shape, without the use of heat. On parts with minimal curvature a flat sheet of glass can be bent cold to the contour of the part. This is possible because as the thickness of glass decreases, the sheets becomes increasingly more flexible and can be bent without inducing stress levels high enough to significantly increase the long term probability of breakage. Thin sheets of annealed soda-lime glass, in thicknesses of about 1 mm, can be bent to large radii cylindrical shapes (greater than 6 m). When the glass is chemically or heat strengthened the glass is able to endure much higher levels of stress and can be bent along both major axis. The process is primarily used to bend chemically tempered thin glass sheets (≤ 1 mm) to shape.

Cylindrical shapes can be formed with a radius in one direction of less than 4 meters. Shapes with compound bend, that is curvature in the direction of both principle axis can be formed with a radius of curvature in each direction of as small as approximately 8 meters. Of course, much depends upon the surface area of the parts and the types and thicknesses of the substrates.

The cold bent glass will remain in tension and tend to distort the shape of the bent layer that it is bonded to. Therefore, the bent layer must be compensated to offset the tension. For more

complex shapes with a high level of curvature, the flat glass may need to be partially thermally bent prior to cold bending.

5 The glass to be cold bent is placed with a bent to shape layer and with a bonding layer placed between the glass to be cold bent and the bent glass layer. The assembly is placed in what is known as a vacuum bag. The vacuum bag is an airtight set of plastic sheets, enclosing the assembly and bonded together at the edges, which allows for the air to be evacuated from the assembly and which also applies pressure on the assembly forcing the layers into contact. The assembly, in the evacuated vacuum bag, is then heated to seal the assembly. The assembly is
10 next placed into an autoclave which heats the assembly and applies high pressure. This completes the cold bending process as the flat glass at this point has conformed to the shape of the bent layer and is permanently affixed. The cold bending process is very similar to a standard vacuum bag/autoclave process, well known in the art, with the exception of having an unbent glass layer added to the stack of glass.

15 Heat strengthened, full temper soda lime float glass, with a compressive strength in the range of at least 70 Mpa, can be used in all vehicle positions other than the windshield. Heat strengthened (tempered) glass has a layer of high compression on the outside surfaces of the glass, balanced by tension on the inside of the glass which is produced by the rapid cooling of
20 the hot softened glass. When tempered glass breaks, the tension and compression are no longer in balance and the glass breaks into small beads with dull edges. Tempered glass is much stronger than annealed laminated glass. The thickness limits of the typical automotive heat strengthening process are in the 3.2mm to 3.6 mm range. This is due to the rapid heat transfer that is required. It is not possible to achieve the high surface compression needed with thinner
25 glass using the typical blower type low pressure air quenching systems.

A panoramic windshield is a windshield on which the top edge has been substantially extended such that it comprises a portion of the vehicle roof.

30 A panoramic roof is a vehicle roof glazing which comprises a substantial area of the roof over at least a portion of both the front and rear seating areas of the vehicle. A panoramic roof may be comprised of multiple glazings and may be laminated or monolithic.

The plastic interlayer 4 has the primary function of bonding the major faces of adjacent layers to each other. The material selected is typically a clear plastic.. For automotive use, the most commonly used bonding interlayer 4) is polyvinyl butyl (PVB). In addition to polyvinyl butyl, ionoplast polymers, ethylene vinyl acetate (EVA), cast in place (CIP) fluid resin and thermoplastic polyurethane (TPU) can also be used. Interlayers are available with enhanced capabilities beyond bonding the glass layers together. The invention may include interlayers designed to dampen sound. Such interlayers are comprised whole or in part of a layer of plastic that is softer and more flexible than that normally used. The interlayer may also be of a type which has solar attenuating properties.

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Automotive interlayers are made by an extrusion process with has a thickness tolerance and process variation. As a smooth surface tends to stick to the glass, making it difficult to position on the glass and to trap air, to facilitate the handling of the plastic sheet and the removal or air (deairing) from the laminate, the surface of the plastic is normally embossed contributing additional variation to the sheet. Standard thicknesses for automotive PVB interlayer at 0.38 mm and 0.76 mm (15 and 30 mil).

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Resistive heating circuits are commonly provided on automotive backlites in order to assist vision and enhance safety by melting snow and ice and clearing fog. Heated circuits are also provided on some windshields. On vehicles that have wipers that are hidden below the hood line when not in use, a heated wiper rest area is needed to keep the wipers clear of snow and ice when not in use and to prevent the buildup of snow in ice in the rest area when in use. Windshields that have safety cameras also require a heated circuit that can quickly clear the portion of the windshield in the camera field of view. Most vehicle are equipped with hot air windshield defrosting systems. Some are also provided with full windshield resistive heating as well. A number of technologies are in use in the production of the various types of heated circuits. In general, for most climates and typical glazing, a power density of at least 4 - 5 watts per square decimeter is required for good de-ice performance. For more demanding applications, such as the wiper rest area, power densities as high as 15 watts per square decimeter are known.

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The optimum switching temperature is somewhere in the range of 10 - 20 C although it will vary with the technology and the film manufacturer. Likewise, the lower and higher end of the

range varies. A power density in the 2.5 – 3 Watt range is sufficient to raise and maintain the temperature of the switchable material at a close to optimal temperature under extremes of cold. The actual power density of the circuit will depend upon the technology, the position of the glazing and the manufacturer. Less power is required for cooling at the delta between the high
5 end of the operating range and the maximum that the vehicle is not as great as on the low end.

The circuit may be operated in a manual or automatic manner. Both methods have been used for deice and defog applications. The circuit may be operated in response to the user. Generally, a timer is used to limit the power consumption. Temperature feedback may be
10 provided for closed loop control of heating and cooling. As most modern vehicles have interior and exterior temperature sensors, the vehicle climate control may operate the circuit based upon the cabin and exterior temperatures. For optimum efficiency, a light sensor may be used to detect the switching speed and operating the circuit in response to the measured switching speed and the temperature.

15 It should be understood that while the switchable technology of the embodiments are SPD, the same circuits may be incorporated into laminates which utilize other switchable technologies.

While many methods are available to heat the glazing, cooling is more difficult. Cool air can
20 be directed at the glazing but forced air tend to result in drafts that may be uncomfortable for the occupants. It produces noise which is also an undesirable feature to commercial products.

Glass, being a poor conductor of heat, is difficult to heat or cool in a uniform manner with forced air as it is difficult to get uniform flow across the entire surface of the glazing.

25 The heating and cooling means of the invention utilize a coolant heat transfer fluid. Any convenient means, preferably clear and transparent fluid with high thermal capacity, low viscosity, low cost, compatibility with the components that it comes in contact with, being non-toxic, etc, which remain in the liquid phase across the temperature range, may be used. A
30 solution of water and alcohol is one possibility. The fluid is pumped through a circuit of small tubes laminated within the glazing. The circuit may be comprised of thin tubes or a circuit formed by the numerous methods provided by the art for shaping and forming materials such as LASER etching, machining, vacuum forming, extruding or injection molding.

Detailed description of the embodiments

1. The laminated panoramic glass roof of Figure 3, illustrates the first embodiment. The
5 laminate is comprised of a standard soda-lime 2.5 mm thick clear exterior glass layer **201**
and a 2.1 mm soda-lime solar green interior glass layer **202**. Black frit **6** is screen printed
on surface two **102** and surface four **104**. A layer of SPD switchable film **44**, with busbars
37 on opposite ends, is sandwiched between two layers of 0.36 mm thick clear plastic
bonding interlayer **4**. The SPD switchable film **44** has a light transmittance of 20% in the
10 ON state and 2% in the OFF, unpowered state.
A 0.9 mm thick sheet of thermo plastic is formed to create a set of triangular shaped coolant
channels of and then laminated with a flat 0.1 mm layer sheet to enclose the channels and
form the circuit. The final thickness of the circuit is 1 mm. the channels are approximately
3 mm by 0.5 mm and spaced on 12 mm centers. Over the 1-meter length of the coolant
15 circuit, the cross sectional area is 125 mm², the equivalent of a 6.35 mm radius inside
diameter tube. This allows for low resistance to flow so that the pump can be small and
operate at a low pressure. The coolant circuit **12** is added to the laminate along with an
additional 0.36 mm thick layer of thermo plastic interlayer **4**. The assembled laminated is
processed, using standard automotive laminating equipment.
20 A pump **80** and a heat exchanger **82** are used to circulate a mixture of 60% ethylene glycol
and 40% water solution to control the temperature of the coolant fluid and to force the fluid
through the channels. A 100-watt resistive heater is used to provide heat and a 100-watt
fan cooled thermoelectric cooler is used for cooling. For a 1 m² roof, only 500 ml of fluid
is needed to fill the circuit. A flow rate of 100 ml per minute is sufficient to maintain the
25 switchable glazing within the desired temperature range of -10 C to 70 C.
2. The glazing of embodiment one is used in conjunction with a heat exchanger located in the
cabin Heating, Ventilation and Air Conditioning (HVAC) system which makes us the cabin
heating and air conditioning system. As the glazing heating and cooling is only needed
30 during extremes of ambient temperature at which time the vehicle HVAC is likely to also
be needed.
3. Embodiment 3 is the same as embodiment 1 but with a PDLC film replacing the SPD.
4. Embodiment 4 is the same as embodiment 2 but with a PDLC film replacing the SPD.

It must be understood that this invention is not limited to the embodiments described and illustrated above. A person skilled in the art will understand that numerous variations and/or modifications can be carried out that do not depart from the spirit of the invention, which is
5 only defined by the following claims.

CLAIMS

What is claimed is:

1. A variable light transmittance laminated glazing comprising:
 - a. one outer glass layer;
 - b. one inner glass layer;
 - c. an interlayer comprised by any of the following:
 - i. a fluid coolant circuit;
 - ii. at least one switchable layer;
 - d. a plastic interlayer layer placed between the glass layers, the fluid coolant circuit and the at least one switchable layer to each other.
2. A glazing system comprising:
 - i. The laminate of claim 1
 - ii. a fluid coolant means comprising:
 1. a thermal transfer fluid,
 2. a pumping means,
 3. a thermal transfer means.
3. The glazing system of claim 2, wherein the thermal transfer means comprises a heating means.
4. The glazing system of claim 2, wherein the thermal transfer means comprises a cooling means.
5. The laminate of claim 1 wherein the switchable layer is SPD.
6. The laminate of claim 1 wherein the switchable layer is PDLC.
7. The laminate of claim 1 wherein the switchable layer is electrochromic.
8. The laminate of claim 1 wherein the laminate comprises a cold bent glass layer.
9. The laminate of claim 1 wherein the laminate comprises a chemically tempered glass layer.
10. The laminate of claim 1 wherein a glazing is cooled by the fluid coolant means.
11. The laminate of claim 1 wherein the glazing is heated by the fluid coolant means.
12. The laminate of claim 1 wherein the temperature is controlled by a closed loop feedback system.

13. The laminate of claim 12 wherein the feedback control system comprises a temperature sensor.
14. The laminate of claim 12 wherein the feedback control system comprises a switching speed detection means.
- 5 15. A vehicle comprising the laminate of claim 1.

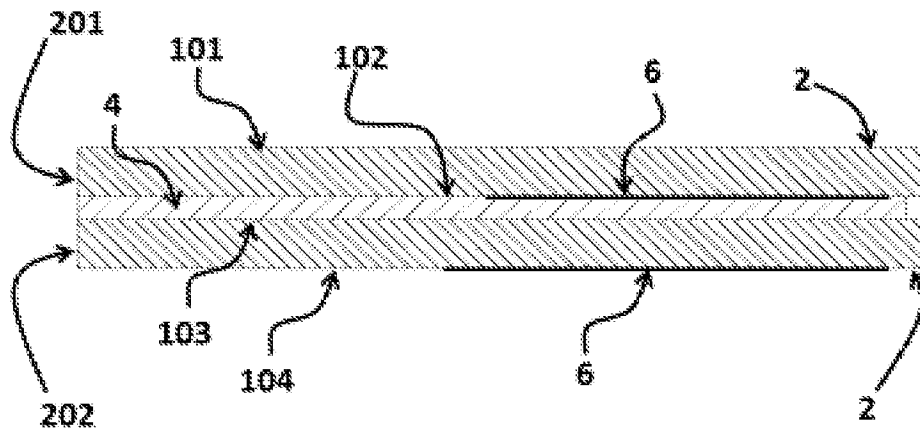


Fig. 1A

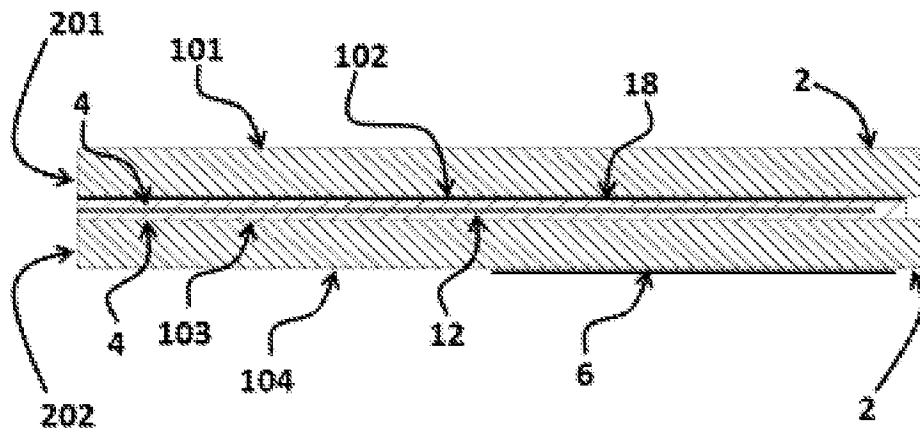
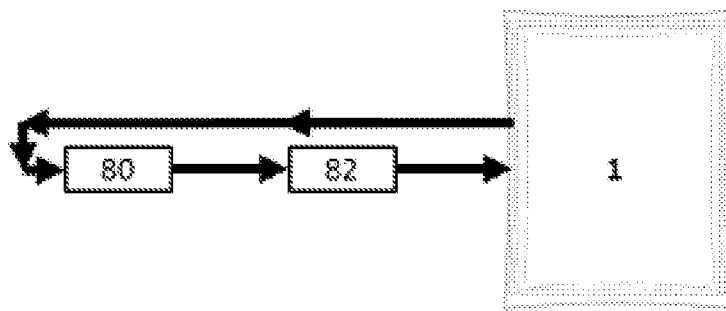
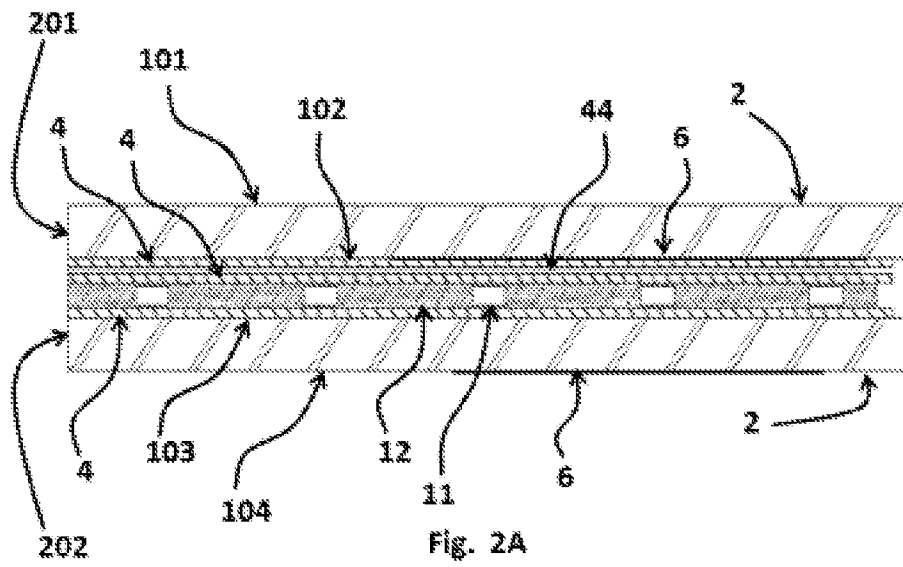


Fig. 1B



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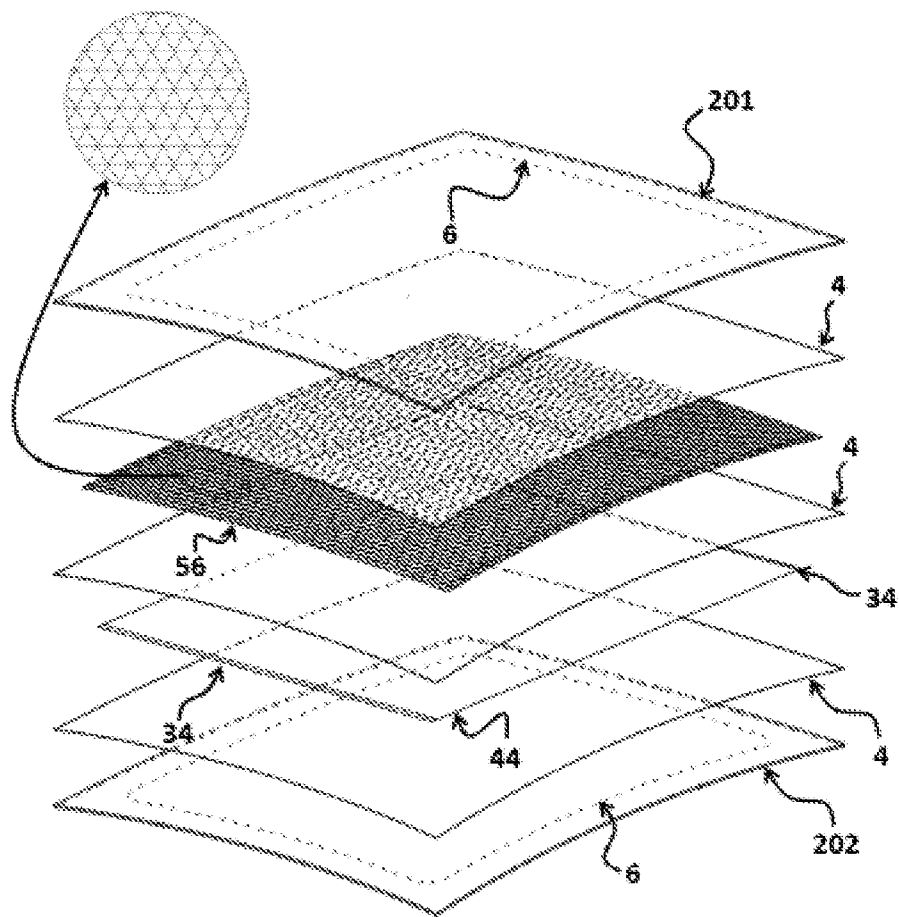


Fig. 3

Electronic Acknowledgement Receipt

EFS ID:	31166494
Application Number:	62596096
International Application Number:	
Confirmation Number:	3358
Title of Invention:	SWITCHABLE GLAZING WITH IMPROVED TEMPERATURE RESPONSE
First Named Inventor/Applicant Name:	Mario Arturo Mannheim Astete
Customer Number:	130961
Filer:	Joseph L. Morales
Filer Authorized By:	
Attorney Docket Number:	1511.23800
Receipt Date:	07-DEC-2017
Filing Date:	
Time Stamp:	23:01:36
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 260
RAM confirmation Number	120817INTEFSW23023600
Deposit Account	
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	14034.PDF	1823081	no	9
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Warnings:					
Information:					
2	Provisional Cover Sheet (SB16)	14031.PDF	1477258	no	4
			23dc562b8e5c605e9acc52bfd6a1940eba2ee70b		
Warnings:					
Information:					
3	Specification	14033.PDF	284881	no	20
			d74a97f887a14ebc43a54482ea7d12e3fa699c67		
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30116	no	2
			f53cb201f07e6f87a6d774df4524ae81f0d75442		
Warnings:					
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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

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