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UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

January 25, 2018

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APPLICATION NUMBER: 62/596,854
FILING DATE: *December 10, 2017*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS US62/596,854



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	1511.24100
		Application Number	
Title of Invention	VARIABLE LIGHT TRANSMITTANCE LAMINATE WITH SUPERIOR SOLAR PROTECTION		
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.)
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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	
	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	3				Remove
Legal Name					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.24100
		Application Number	
Title of Invention	VARIABLE LIGHT TRANSMITTANCE LAMINATE WITH SUPERIOR SOLAR PROTECTION		

Prefix	Given Name	Middle Name	Family Name	Suffix
	Merlyn		Rojas Valle	
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 Information:

Title of the Invention	VARIABLE LIGHT TRANSMITTANCE LAMINATE WITH SUPERIOR SOLAR PROTECTION		
Attorney Docket Number	1511.24100	Small Entity Status Claimed	☐
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	5	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 ⁱ

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.24100
		Application Number	
Title of Invention	VARIABLE LIGHT TRANSMITTANCE LAMINATE WITH SUPERIOR SOLAR PROTECTION		

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		

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).

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.24100
		Application Number	
Title of Invention	VARIABLE LIGHT TRANSMITTANCE LAMINATE WITH SUPERIOR SOLAR PROTECTION		

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (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	1511.24100
		Application Number	
Title of Invention	VARIABLE LIGHT TRANSMITTANCE LAMINATE WITH SUPERIOR SOLAR PROTECTION		

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	1511.24100
		Application Number	
Title of Invention	VARIABLE LIGHT TRANSMITTANCE LAMINATE WITH SUPERIOR SOLAR PROTECTION		

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	1511.24100
		Application Number	
Title of Invention	VARIABLE LIGHT TRANSMITTANCE LAMINATE WITH SUPERIOR SOLAR PROTECTION		

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:

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)	2017-12-10
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	1511.24100
		Application Number	
Title of Invention	VARIABLE LIGHT TRANSMITTANCE LAMINATE WITH SUPERIOR SOLAR PROTECTION		

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 j
Mario	Arturo	Mannheim Astete	Lima		PE
Inventor 2					Remove
Given Name	Middle Name	Family Name	City	State	Country j
Andres	Fernando	Sarmiento Santos	Lima		PE
Inventor 3					Remove
Given Name	Middle Name	Family Name	City	State	Country j
Merlyn		Rojas Valle	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		VARIABLE LIGHT TRANSMITTANCE LAMINATE WITH SUPERIOR SOLAR PROTECTION			
Attorney Docket Number (if applicable)		1511.24100			
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:	

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)	2017-12-08
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.

VARIABLE LIGHT TRANSMITTANCE LAMINATE WITH SUPERIOR SOLAR PROTECTION

Cross-References to Related Applications

5 None

Abstract of The Disclosure

Variable light transmittance glazing, with tint that can be dynamically changed, is starting to appear in the automotive market. Promising switchable technologies include polymer dispersed fluid crystal (PDLC) and suspended particle devices (SPD). While each has its own advantages and disadvantages both share one common limitation: exposure to high temperatures, for an extended period, will shorten the life of the glazing. One approach used to reduce the maximum temperature has been to use an infrared reflecting coating. However, an obscuration is needed to hide the busbars, connectors and the edge of the switchable film but the black frit and the printing process are not compatible with the coatings. These limitations are overcome by replacing the black frit with an opaque plastic interlay to provide the obscuration allowing the use of coated glass to provide a laminate with superior solar protection.

20 Inventors

Name	Nationality	Address
Mario Arturo Mannheim Astete	Peruvian	Av. Guillermo Dansey 1996, Cercado de Lima, Perú
Andres Fernando Sarmiento Santos	Colombian	Av. Guillermo Dansey 1846, Cercado de Lima, Lima, Perú
Merlyn Rojas Valle	Peruvian	Av. Guillermo Dansey 1846, Cercado de Lima, Lima, Perú

Field of the invention

This invention relates to the field of laminated automotive glazing.

25

Background of the invention

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
5 working to improve the energy efficiency of their vehicles.

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, by reducing the load on the air-conditioning unit
10 and allowing 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 range of the vehicle.

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

Infrared absorbing glass has a higher iron content than ordinary transparent glass giving it a greenish tint. The iron compounds in the glass absorb solar energy. By absorbing the energy before it enters the passenger compartment, the solar load on the vehicle is reduced. While
20 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. The glass will get hotter than ordinary transparent glass.

A more efficient method is to reflect the energy back to the atmosphere before it can heat the
25 glass or the interior of the cabin. This is done using various films and coatings that reflect in the infrared.

However, infrared coatings and films are not durable. They cannot be exposed to the elements. The glazing must be fabricated with the coating or film as one of the internal layers of a
30 laminated product. The edge of the coating must also not be exposed to moisture as the coating will react with the water and corrode. Typically, the coating must be deleted such that the edge is inboard from the edge of glass and protected by the interlayer. This is typically done by

means of an abrasive process used to remove the coating although other means are known and can be used to equal effect.

5 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), spin, dip, roller and other methods.

10 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.

15 One of the drawback of both infrared absorbing and infrared reflecting glazing is that the solar load reduction is present even when not needed or desired. When heat is needed, it would be advantageous to have the capability to use the energy of the sun to heat the vehicle interior.

20 With internal combustion engines (ICE), heating was never a problem. Internal combustion engines are very inefficient and so abundant waste heat is available. A typical ICE powered vehicle has an engine coolant heat exchanger for heating the cabin 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 an electric resistive heating system.

25 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 when needed but to be able to let as much solar in as possible when heat is needed.

30 To control the level of light and energy transmission through the laminate, there are many technologies available: electrochromic, photochromic, thermochromic and electric field sensitive films which are designed to be incorporated into laminated glass. Of interest are suspended particle device (SPD) films and polymer dispensed 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. In the presence of an electrical field, the particles align with the field. 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 by 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 transparently through SPD.

PDLC is a light scattering technology which goes from opaque in the off state to transparent 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 with the field 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 produce a laminate, sheets of plastic bonding 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 between two plastic bonding interlayer layers and at least two glass layers to form a laminated glazing.

With both SPD and PDLC no chemical reaction takes place when they change state. The molecules that make up the active material undergo a kinetic change in response to the presence

of an electrical field. The switching time of SPD and PDLC is measured in seconds or fractions of a second. This is one of the primary advantage that the two have over other technologies.

5 SPD and PDLC can be used for solar control as they reduce the level of light transmittance and energy transferred to the cabin assisting with both heating and cooling.

Laminates that incorporate variable light transmittance (VLT) technologies are sometime referred to as “smart” glass or as switchable glazing. The three designations may be used interchangeably with the same meanings.

10

One disadvantage they both share is that exposure to high temperatures, over an extended period, will cause the organic compounds to break down, shortening the life of the glazing.

On approach that has been used to reduce the magnitude of the temperature has been to use an infrared reflecting coating.

15

The problem with IR coatings is that they are easily damaged. They are easily scratched and cannot be painted over. If an obscuration is needed, the glass must be painted and fired before the coating is applied.

20 The black frit print obscuration serves both a functional and an aesthetic role. The substantially opaque black print on the glass serves to protect the poly-urethane 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. On a switchable glazing, the black obscuration is required to hide the edge of the switchable film, the bus bars and the connector leads from view.

25

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

30

same manufacturer or with the same formulation of frit. Standard automotive black enamel inks (frits) have been developed that can meet these requirements.

5 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.

The biggest problem, with respect to IR reflecting coating, is that the coatings are not compatible with frits. The frit will damage the coating if the frit is printed after the glass has been coated. The frit must first be printed on the glass, fired and then coated. Very few manufacturers have this capability as it requires a large capital investment. Another drawback is that the black frit absorbs solar energy and can get very hot which is also not good for the VLT film.

20 It would be advantageous to be able to produce a switchable glazing with an IR coating.

Brief Summary of the Invention

The laminate of the invention is comprised of an outer glass layer 201 having an infrared reflecting coating 18 on the inside surface 102 of the outer glass layer and an obscuration 16 comprising a band of opaque plastic interlayer laminated inside of the glazing in place of a conventional printed black band. The infrared reflecting coating reduces the maximum temperature that the glass will be exposed to extending the life of the glazing. The coating also lowers the solar load on the vehicle and improves occupant comfort.

Advantages:

- 30
- Allows for the use of a number two surface IR coating on a switchable laminate.
 - Does not require large capital investment to paint and then coat.
 - Lowers maximum temperature of the glazing.
 - Extends the life of the glazing.

- Improves solar performance of glazing.
- Fabricated using standard automotive glass processes and equipment.

Brief description of drawings

Figure 1A	Cross section of a typical automotive laminate with black frit obscurations on surfaces number two and four.
Figure 1B	Cross section of a laminate with a number two surface IR coating, a variable light transmittance switchable film with transparent plastic interlayers on either side of the film, a printed black frit obscuration on surface number four and a black opaque interlayer band obscuration outboard of the transparent interlayer and between the number two surface and the switchable film.
Figure 2A	Cross section of a laminate with a number two surface IR coating, variable light transmittance switchable film, two transparent plastic interlayers, two black opaque interlayer band obscurations outboard of the two transparent interlayers and on either side of the switchable film between the major surfaces of the switchable film and the number two surface of the outer glass layer and the number three surface of the inner glass layer.
Figure 2B	Cross section of a laminate with an IR reflecting film, a variable light transmittance switchable film, three transparent plastic interlayers and two black opaque interlayer band obscurations outboard of the two outer transparent interlayers. The number two surface of glass is bonded to the IR film, the opposite face of the IR film is bonded to the switchable film and the opposite face of the switchable film is bonded to the number three surface of the inner glass layer.
Figure 3	Exploded view of a laminate with a number two surface IR coating, a variable light transmittance switchable film with a transparent plastic interlayers on either side of the film, a black frit obscuration on surface number four and a black opaque interlayer band obscuration outboard of the transparent interlayer and between the number two surface and the switchable film.

Figure 4	Exploded view of a laminate with number two surface IR coating, variable light transmittance switchable film, two transparent plastic interlayers, two black opaque interlayer band obscurations outboard of the two transparent interlayers and on either side of the switchable film between the major surfaces of the switchable film and the number two glass surface and the number three glass surface.
Figure 5	Exploded view of a laminate with an IR reflecting film, a variable light transmittance switchable film, three transparent plastic interlayers and two black opaque interlayer band obscurations outboard of the two outer transparent interlayers. The number two surface of glass is bonded to the IR film, the opposite face of the IR film is bonded to the switchable film and the opposite face of the switchable film is bonded to the number two glass surface and the number three glass surface.

Reference numerals

2	Glass
4	Plastic Bonding Interlayer
6	Black Frit Obscuration
16	Opaque Plastic Interlayer
18	IR Reflecting Coating
24	IR Reflecting Film
34	Bus bar
44	Switchable Film
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

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

14047v2

A typical automotive laminate cross section is illustrated in Figure 1A. The laminate is comprised of two layers of glass, the exterior or outer, 201 and interior or inner, 202 that are permanently bonded together by a plastic layer 4 (interlayer). The glass surface that is on the exterior of the vehicle is referred to as surface one 101 or the number one surface. The opposite
5 face of the exterior glass layer 201 is surface two 102 or the number two surface. The glass 2 surface that is on the interior of the vehicle is referred to as surface four 104 or the number four surface. The opposite face of the interior layer of glass 202 is surface three 103 or the number three surface. Surfaces two 102 and three 103 are bonded together by the plastic layer 4. An obscuration 6 may be also applied to the glass. Obscurations are commonly comprised of black
10 enamel frit printed on either the number two 102 or number four surface 104 or on both. The laminate may also comprise a coating 18 on one or more of the surfaces.

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
15 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.

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.

25 The glass layers may be annealed or strengthened. There are two processes that can be used to increase the strength of glass. They are thermal strengthening, in which the hot glass is rapidly cooled (quenched) and chemical tempering which achieves the same effect through an ion exchange chemical treatment. In the chemical tempering process, ions in and near the outside
30 surface of the glass are exchanged with ions that are larger. This places 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 (201 & 202) of annealed glass 2 together using a plastic bonding layer comprised of a thin sheet of transparent thermo plastic 4 (interlayer) 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
5 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 layer 4 also helps to prevent penetration by objects striking the laminate from the exterior and in the event
10 of a crash occupant retention is improved.

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.

15 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 become increasingly more flexible and can be bent without inducing stress
20 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 can 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.

25 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.

30 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, except for 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.

The plastic bonding layer 4 (interlayer) has the primary function of bonding the major faces of adjacent layers to each other. The material selected is typically a transparent plastic when bonding one glass layer 2 to another glass layer 2. For automotive use, the most commonly 30 used bonding layer 4 (interlayer) 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.

- 5 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).

Interlayers, in addition are available in a wide range of colors ranging in transparency from transparent to substantially opaque. As it is not possible to print an obscuration on the number two surface after the coating has been applied, an opaque interlayer material is used to form an obscuration. A sheet of transparent interlayer is cut to the size of the transparent portion and the opaque interlayer is cut to the shape of the obscuration. The transparent portion may be cut slightly oversized to prevent any gaps between the transparent and opaque portions along the parting line. The opaque portion serves the function of hiding the edge, busbars and connectors of the switchable film from view form the exterior of the vehicle. A painted obscuration may be used on the interior number 4 surface of glass is needed. Alternately, the same method can be applied to the second interlayer between the interior side of the switchable film and the number three surface. This may be needed if the inner glass layer (202) is not compatible with black frit as is the case when the inner glass layer is chemically tempered or a non-soda-lime composition.

25 If needed, the two components of the black band obscuration interlayer may be bonded to each other along the cut edges though the use of heat or a solvent. Otherwise, the interlayer sections are assembled in the normal manner when the interlayer is placed between the two bent glass layers during the assembly portion of the lamination process.

30 Laminates made in this manner have surprisingly good aesthetics and performance. The opaque interlayer blocks more light than the fired black frit. The printed frit is only 10-20 um thick at best and tends to be translucent. Viewed side by side, the laminates made by both methods,

black frit vs. black interlayer, are virtually indistinguishable with the laminate of the invention having the same glossy deep black appearance as the back frit.

Detailed Description of the Embodiments

5

1. Figures 3 illustrates the laminated windshield of first embodiment.

The laminate is comprised of a standard transparent soda-lime glass, 2.5 mm thick, exterior glass layer **201** having an IR coating **18** on the number two surface **102** and a 2.1 mm thick soda-lime solar green interior glass layer **202**. The IR coating 18 is deleted, using an
10 abrasive wheel process, 6 mm inboard around the periphery of the glass to protect the coating **18** from exposure to the elements.

A layer of SPD film **44**, with busbars **37** on opposite ends, is sandwiched between two layers of 0.36 mm thick plastic bonding interlayer **4**. The SPD film **44** has a light transmittance of 20% in the ON state and 2% in the OFF, unpowered state.

15 Black frit is screen printed on surface four **104** of the inner glass 201 to form a black band obscuration **6** used to hide the bus bars **37** and the edge of the SPD **44** film for view from inside of the vehicle.

A black obscuration **16**, to hide the bus bars and the edge of the SPD **44** from view from the exterior, is formed by cutting a sheet of 0.36 mm black substantially opaque plastic bonding interlayer to the shape of the black band **16** and then filling the enclosed inner
20 portion of the black interlayer with a sheet of transparent plastic interlayer **4** cut to fit the opening. The transparent interlayer **4** is cut 0.2 mm oversize to allow for the tolerance stack and to prevent any gaps between the black and the transparent interlayer. The two interlayer sections are fit together when the laminate is assembled. This composite two-
25 piece sheet of interlayer is positioned between the number two 102 surfaces of the exterior or outer glass layer 201 and the SPD film serving to bond the two layers to each other. A sheet of transparent interlayer 4, extending to at least the edge of the laminate, is placed between the opposite side of the SPD film and the number three surface 103 of the interior glass layer 202. The assembled laminated is processed, using standard automotive
30 laminating equipment.

2. Figures 4 illustrates the laminated windshield of second embodiment.

The laminate is comprised of a standard transparent soda-lime glass, 2.1 mm thick, exterior glass layer **201** having an IR coating **18** on the number two surface **102** and a 0.7 mm thick chemically strengthened alumina silicate interior glass layer **202**. The IR coating is deleted, using an abrasive wheel process, 6 mm inboard around the periphery of the glass to protect the coating **18** from exposure to the elements.

A layer of SPD film **44**, with busbars **37** on opposite ends, is sandwiched between two layers of 0.36 mm thick plastic bonding interlayer **4**. The SPD film **44** has a light transmittance of 20% in the ON state and 2% in the OFF, unpowered state.

Black obscurations, to hide the bus bars and the edges of the SPD 44 from view from the exterior and the interior of the vehicle, are formed by cutting a set of two sheets of 0.36 mm black substantially opaque plastic bonding interlayer to the shape of the black band and then filling the enclosed inner portions of the black interlayer with sheets of transparent plastic interlayer cut to fit the openings. The two interlayer sections of each set are fitted together as the laminate is assembled. One set is positioned between the outer glass layer 201 and the SPD film. The second set is positioned between the SPD film and the inner glass layer. The interlayers serve to bond the glass to the SPD film and provide an obscuration.

The assembled laminated is processed, using standard automotive laminating equipment.

3. Figures 5 illustrates the laminated windshield of third embodiment.

The laminate is comprised of a standard transparent soda-lime glass, 2.1 mm thick, exterior glass layer **201** and a 0.7 mm thick chemically strengthened alumina silicate interior glass layer **202**. A layer of SPD film **44**, with busbars **37** on opposite ends, is sandwiched between two layers of 0.36 mm thick plastic bonding interlayer **4**. The SPD film **44** has a light transmittance of 20% in the ON state and 2% in the OFF, unpowered state.

An IR reflecting film is cut to 20 mm larger than the clear opening in the glass. The IR film is placed between the exterior glass layer number two surface and the SPD.

Black obscurations, to hide the bus bars and the edges of the SPD 44 and the edges of the IR reflecting film from view from the exterior and the interior of the vehicle, are formed by cutting a set of two sheets of 0.36 mm black substantially opaque plastic bonding interlayer to the shape of the black band and then filling the enclosed inner portions of the black interlayer with sheets of transparent plastic interlayer cut to fit the openings. The two interlayer sections of each set are fitted together as the laminate is assembled. One set is

positioned between the outer glass layer 201 and the IR film. The second set is positioned between the SPD film and the inner glass layer. The SPD and the IR film are bonding to each other by means of a third sheet of 0.36 mm transparent interlayer extending to the edge of glass. The interlayers serve to bond the glass to the SPD film and provide an obscuration.

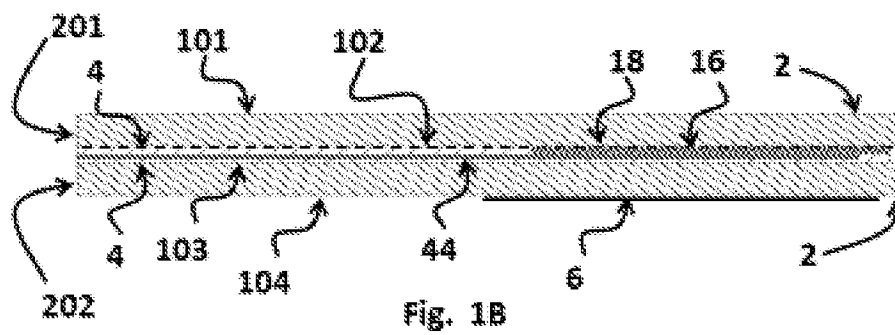
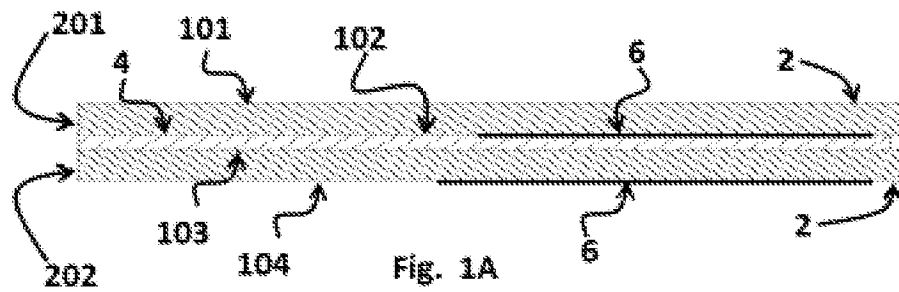
The assembled laminated is processed, using standard automotive laminating equipment.

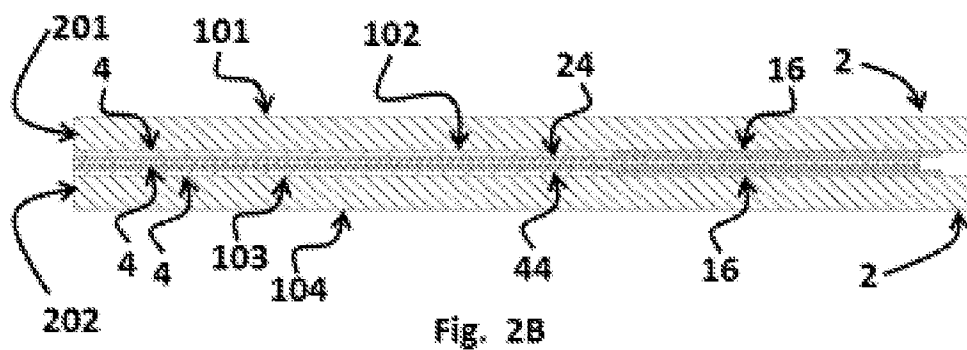
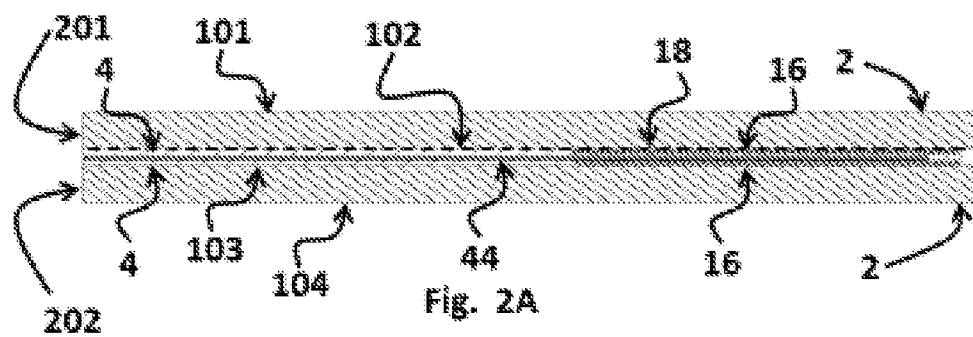
4. Embodiment 4 is the same as embodiment 1 but with a PDLC film replacing the SPD.
 5. Embodiment 5 is the same as embodiment 2 but with a PDLC film replacing the SPD.
 6. Embodiment 6 is the same as embodiment 3 but with a PDLC film replacing the SPD.
 - 10 7. Embodiment 7 is the same as embodiment 2 but with a cold bent interior glass layer 202.
 8. Embodiment 8 is the same as embodiment 3 but with a cold bent interior glass layer 202.
 9. Embodiment 9 is the same as embodiment 5 but with a cold bent interior glass layer 202.
 10. Embodiment 10 is the same as embodiment 6 but with a cold bent interior glass layer 202.
- 15 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 only defined by the following claims.

CLAIMS

What is claimed is:

1. A variable light transmittance laminated glazing comprising:
 - 5 a. one outer glass layer;
 - b. one inner glass layer;
 - c. at least one switchable layer;
 - d. an IR reflecting layer;
 - i. wherein the IR reflecting layer is positioned between the outer glass
10 layer and the switchable layer;
 - e. at least two plastic interlayer layers;
 - i. wherein at least one of the interlayers is comprised of:
 1. a substantially opaque plastic interlayer cut to the size of the
 obscuration needed; and
 - 15 2. a transparent plastic interlayer is cut to fit inside of the cutout
 portion of the opaque interlayer;
 - ii. wherein the plastic interlayer layers are positioned between and serve to
 bond the layers of the laminate together.
2. The laminate of claim 1 wherein the switchable layer is SPD.
- 20 3. The laminate of claim 1 wherein the switchable layer is PDLC.
4. The laminate of claim 1 wherein the laminate comprises a cold bent glass layer.
5. The laminate of claim 1 wherein the IR reflecting layer comprises a coating.
6. The laminate of claim 1 wherein the IR reflecting layer comprises a film.
7. The laminate of claim 1 wherein the obscuration serves to obscure from view the
25 laminate components from view from the exterior of the vehicle.
8. The laminate of claim 1 wherein the obscuration serves to obscure from view the
laminate components from view from the interior of the vehicle.
9. A vehicle comprising the laminate of claim 1.





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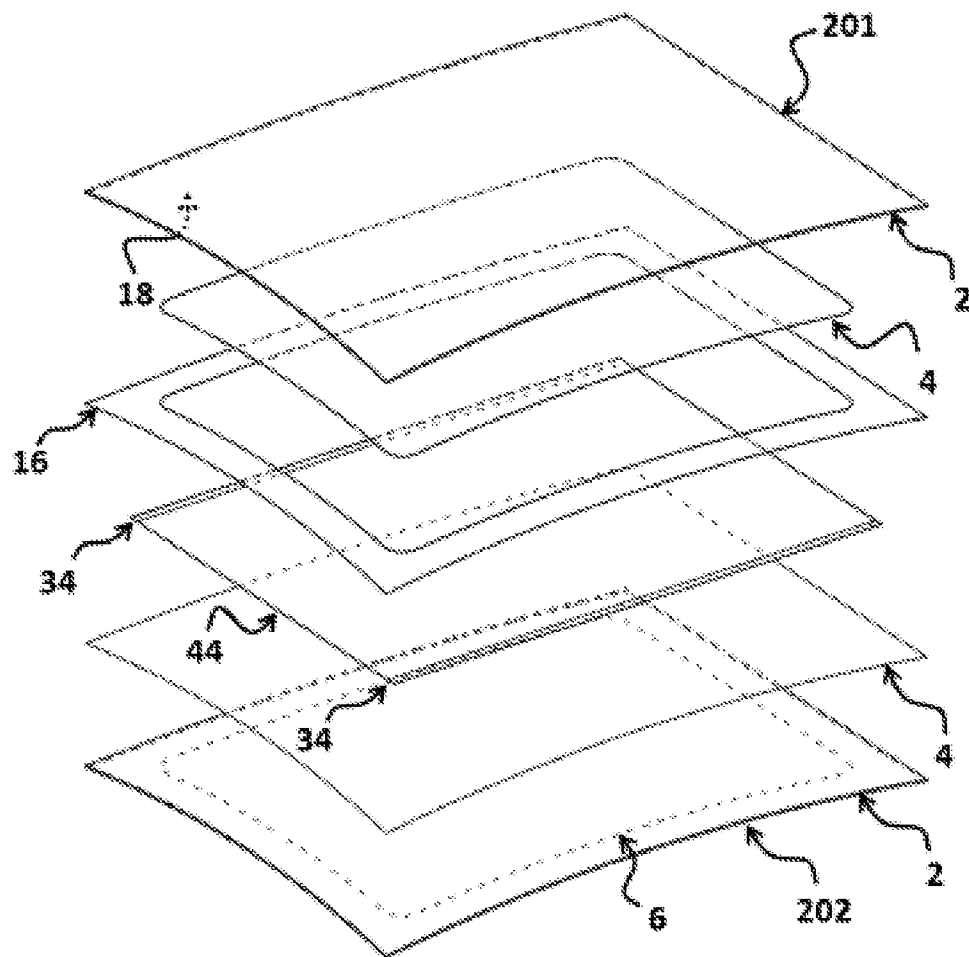


Fig. 3

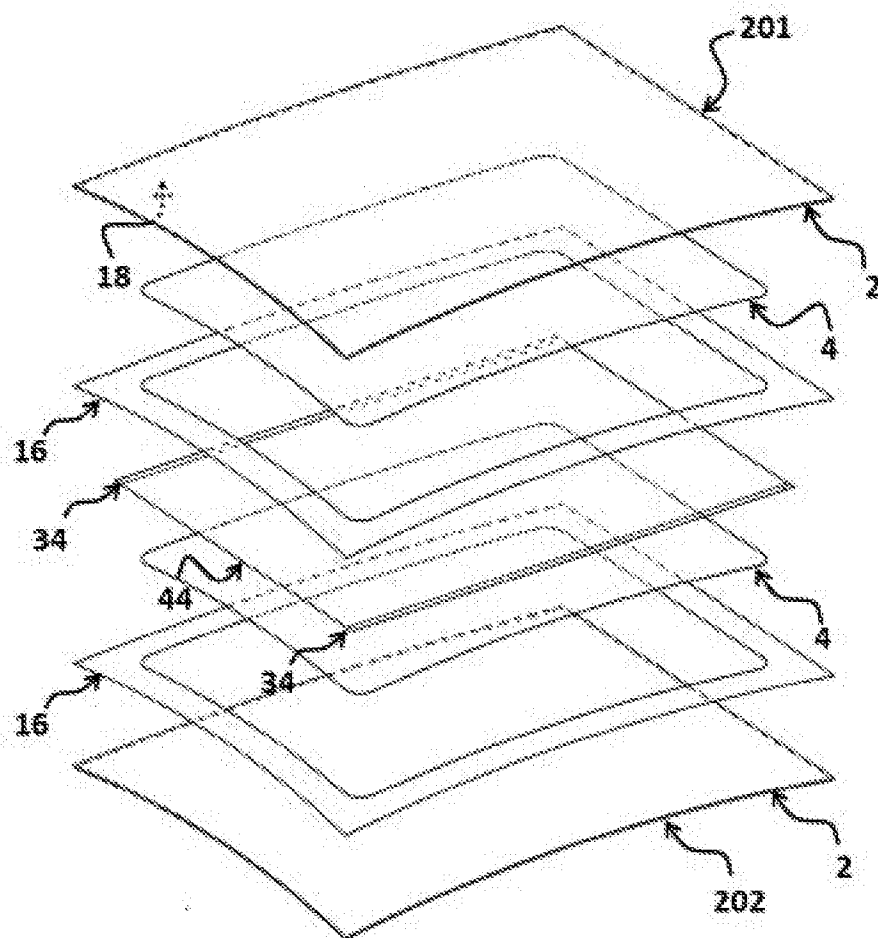
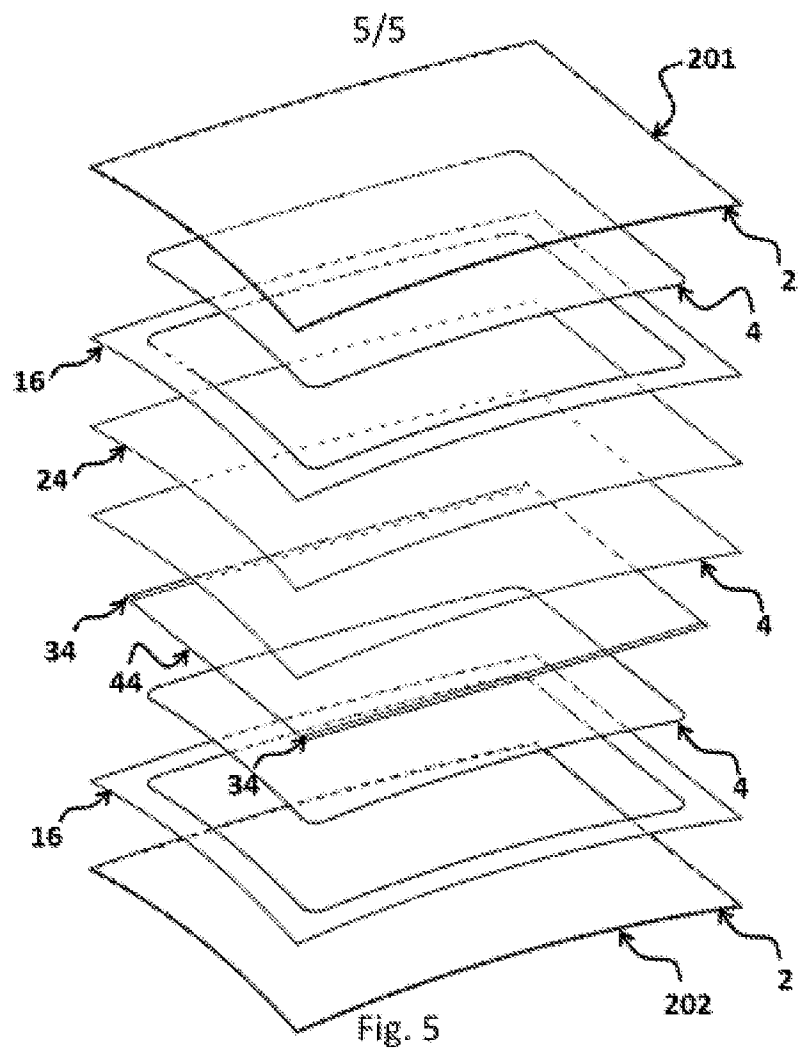


Fig. 4



Electronic Acknowledgement Receipt

EFS ID:	31179957
Application Number:	62596854
International Application Number:	
Confirmation Number:	9981
Title of Invention:	VARIABLE LIGHT TRANSMITTANCE LAMINATE WITH SUPERIOR SOLAR PROTECTION
First Named Inventor/Applicant Name:	Mario Arturo Mannheim Astete
Customer Number:	130961
Filer:	Joseph L. Morales
Filer Authorized By:	
Attorney Docket Number:	1511.24100
Receipt Date:	10-DEC-2017
Filing Date:	
Time Stamp:	12:18:29
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$260
RAM confirmation Number	121117INTEFSW12184900
Deposit Account	
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File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	14055.PDF	1823098	no	9
			7d64c79d203e5c3397c2e8843d56573e58ef3191		
Warnings:					
Information:					
2	Provisional Cover Sheet (SB16)	14046.PDF	1477191	no	3
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Warnings:					
Information:					
3	Specification	14053.PDF	275079	no	22
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4	Fee Worksheet (SB06)	fee-info.pdf	29822	no	2
			77ec34907c9138dda822684cccb0ed4c60472bf		
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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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.