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August 16, 2017

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APPLICATION NUMBER: 62/477,399
FILING DATE: *March 27, 2017*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS US62/477,399



Certified by

Nichelle K. Lee

Under Secretary of Commerce
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.20600
		Application Number	
Title of Invention	INTRUSION RESISTANT LAMINATED AUTOMOTIVE GLAZING		
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:

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Legal Name					
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Legal Name					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.20600
		Application Number	
Title of Invention	INTRUSION RESISTANT LAMINATED AUTOMOTIVE GLAZING		

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☐ An Address is being provided for the correspondence information of this application.			
Customer Number	130961		
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Application Information:

Title of the Invention	INTRUSION RESISTANT LAMINATED AUTOMOTIVE GLAZING		
Attorney Docket Number	1511.20600	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	9	Suggested Figure for Publication (if any)	1

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	1511.20600
		Application Number	
Title of Invention	INTRUSION RESISTANT LAMINATED AUTOMOTIVE GLAZING		

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.

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Prior Application Status		Remove
Application Number	Continuity Type	Prior Application Number
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Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Remove
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.20600
		Application Number	
Title of Invention	INTRUSION RESISTANT LAMINATED AUTOMOTIVE GLAZING		

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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.

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In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

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Applicant Information:

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.20600
		Application Number	
Title of Invention	INTRUSION RESISTANT LAMINATED AUTOMOTIVE GLAZING		

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. ☒		
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Assignee	1
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.20600
		Application Number	
Title of Invention	INTRUSION RESISTANT LAMINATED AUTOMOTIVE GLAZING		

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Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1				
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Signature:

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Signature	/Joseph L. Morales/		Date (YYYY-MM-DD)	2017-03-27
First Name	Joseph	Last Name	Morales	Registration Number
			58835	

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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 ASTE	Lima		PE
Inventor 2					Remove
Given Name	Middle Name	Family Name	City	State	Country j
Edward	Enrique	CUSTODIO SHEE	Lima		PE
Inventor 3					Remove
Given Name	Middle Name	Family Name	City	State	Country j
Charles	Stephen	VOELTZEL	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		INTRUSION RESISTANT LAMINATED AUTOMOTIVE GLAZING			
Attorney Docket Number (if applicable)		1511.20600			
Correspondence Address					
Direct all correspondence to (select one):					
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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:	
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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

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Signature

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

Signature	Joseph L. Morales/		Date (YYYY-MM-DD)	2017-03-27
First Name	Joseph	Last Name	Morales	Registration Number (If appropriate)
				58835

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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.
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INTRUSION RESISTANT LAMINATED AUTOMOTIVE GLAZING.

Field of the invention

The present invention relates to the field of laminated automotive safety glazing.

5

Abstract of the disclosure

Improved automotive security has led to an increase in carjacking and smash and grab crimes. Tempered glass offers little resistant to attacks. Laminated glass improves penetration resistance but only by several seconds. By including a stiff frame in the laminate and a plastic interior layer,
10 the present invention significantly increases the amount of time that an occupant has to react and possible escape an attack by driving off or for the attack to be detected. In the event of an accident, the invention also provides improved occupant retention, especially for movable glass that is not bonded to the vehicle.

15 Background of the invention

In recent years, the security of automotive vehicle ignition systems has been improved to the point where it has become virtually impossible to steal a car without having the keys or a tow truck. Similarly the doors and locks have been improved making it extremely difficult to get into a car without either the keys or breaking the glass. While these improvements decrease the incidence
20 of vehicle related theft they have led to an increase in more serious crimes known as “smash and grab” and “carjacking” as thieves have adapted to the new technology. In a smash and grab, the thief breaks a window and grabs a purse, computer, GPS or other valuable. In a car-jacking, the driver is forced to hand over the vehicle to the thief.

Vehicles are especially vulnerable to these types of crimes due to the type of glass that is used in
25 most of them. A closed window does not deter a determined thief due to the ease with which most car windows can be broken.

The glass used in the doors, rear window and side windows of most vehicle is made from tempered glass (figure 5A). Tempered glass is much stronger than ordinary glass. Heat strengthened, full temper, soda lime float glass, with a compressive strength in the range of at least 70 Mpa, can be
30 used in all vehicle positions other than the windshield. Heat strengthened (tempered) glass has a

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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 the hot softened glass. When tempered glass breaks, the tension and compression are no longer in balance and the entire glass part breaks into small beads with dull edges. While tempered glass can withstand high loads, it can be easily broken by striking with a hard object or through the use of a spring loaded center punch. When tempered glass fails, the entire window opening is left unprotected.

Another problem that tempered glass presents is when it fails during an accident. In this case, and especially in a rollover accident, the glass disintegrates leaving the window opening with nothing to prevent ejection of the occupant. Ejection of the occupant and the extension of portions of the body through window openings is a major cause of traffic fatalities and injuries.

Windshields, shown in figure 9, on the other hand, are made of laminated annealed glass (Figure 5B). Annealed glass is glass that has been slowly cooled from the bending temperature down through the glass transition range. This is done to relieve any stress in the glass. Annealed glass breaks into large shards with sharp edges. In a laminate, two sheets of annealed glass are bonded together using a thermo plastic such. For automotive applications, the most commonly used bonding layer or interlayer is polyvinyl butyl (PVB). In addition to polyvinyl butyl, ionoplast polymers, ethylene vinyl acetate (EVA), cast in place (CIP) liquid resin and thermoplastic polyurethane (TPU) can also be used.

If the laminated glass should break, the plastic layer holds the shards of glass together, helping to maintain the structural integrity of the glass. The shards of broken glass tend to interlock much like the pieces of a jigsaw puzzle. A vehicle with a broken windshield can still be operated, often for an extended period if the damage is not in the vision zones or too extensive. On impact, the plastic bonding layer also helps to prevent penetration by the occupant in the event of a collision or by objects striking the laminate from the exterior of the vehicle.

Due to the lower cost and higher strength of tempered glass, tempered glass has been favored for all but the windshield position where tempered glass is not permitted. However, on some higher end vehicles, laminated glass has been used for the doors rather than tempered glass. This is at least in part to improve the safety and security of the occupants but also for the improved sound dampening that a laminate provides and to facilitate the use of heat reflecting coatings for solar control. Laminated glass has also been used for the side windows on some passenger vans, primarily to improve occupant retention in the event of a rollover accident.

With a laminated side window, intrusion time into the vehicle by an attacker is significantly increased. However, the time that it takes for an aggressive determined attacker to penetrate a conventional laminate is measured in several seconds. A significant enough delay that might help to overcome the advantage of surprise and provide sufficient time for escape but is still less than ideal. In the event of a rollover accident, glass that is not glued into the vehicle opening, has been found to be little better than tempered glass. Once the laminated glass breaks, it offers little resistance to penetration.

Another issue encountered when using laminated glass as an alternative to tempered in side windows is thickness. A laminated window requires a plastic bonding layer. To maintain the same thickness, less glass must be used. A 4 mm tempered window, figure 5A, might be replaced with a laminate comprised of two 1.6 mm glass layers bonded with a 0.76 layer of PVB, figure 5B. This reduces the thickness of the glass present by 0.8 mm or 20% leaving the window more susceptible to breakage from door slams and other shocks. Even if the 1.6 mm glass is heat strengthened, it is not possible to achieve the same level of strength as with a 4 mm thick glass due to the limitations of the conventional low pressure air tempering process common in the industry. The limit for full temper is approximate 3.2 mm. If the thickness is increased, the channels 20 and seals may need to be changed to accommodate.

Clearly, a glazing that could overcome these drawbacks would be desirable.

Brief summary of the invention

The intrusion resistance laminate of the invention is an assembly comprising: a glass layer **2**, a plastic layer **10**, a frame **12**, a spacer **14** and bonding layers **4** (**Figure 5C**). The frame **12** substantially surrounds and encloses the vision area of the laminate (day light opening or DLO). The frame **12** is bonded to the major faces of the glass layer and the plastic layer **10** by the bonding layers **4**. The spacer **14** is a transparent material which is about the same thickness as the frame **12**, and is used as a spacer **14** between the two bonding layer, one of each is adjacent to each of the glass layer **2** and the plastic layer **10**.

The spacer **14** is sized to precisely fit the interior portion of the frame **12**. The spacer **14** may be made of the same material as used for the bonding layer of or another transparent material. On some embodiments, the edge of the frame **12** and the plastic layer may be offset inboard from the edge of glass to accommodate the seals and channels **20** that the glass must fit into. This allows for a thicker composition to be used as a direct replacement to a thinner conventional glazing with

no modification to the channels **20**, seals or other components comprising the door and operating mechanism. As a result, installation in the vehicle requires no more time and effort than normally required to replace the window.

Advantages include:

- 5 • Direct replacement for conventional glazing.
- Operating force required similar to conventional glazing.
- No modifications to channels 20, seals and other components needed to install.
- Quick easy installation.
- High level of intrusion resistance (up to 3 times that of a similar laminated window).
- 10 • Increased protection from occupant ejection in the event of an accident.
- Lower cost.

Brief description of the several views of the drawings

FIG. 1 shows an exploded view of an exemplary embodiment of the present invention.

- 15 FIG. 2A shows an isometric view of the laminate of Figure 1.

FIG 2B shows detailed view of the edge of glass of the laminate of Figure 1.

FIG. 3A shows a side view of the laminate of Figure 1.

FIG. 3B shows the corner detail of Figure 3A.

FIG. 4 shows a cross section of the invention installed in a typical car door frame.

- 20 FIG. 5A shows the cross section of a tempered window.

FIG. 5B shows the cross section of a laminated window.

FIG. 5C shows the cross section of the invention.

FIG. 6 shows cross sections exemplary embodiments of the invention.

FIG. 7 shows cross sections exemplary embodiments of the invention.

- 25 FIG. 8 shows cross sections exemplary embodiments of the invention.

FIG. 9 shows a cross section of a typical laminated glazing.

Reference numerals

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2	Glass
3	IR Film
4	Bonding/Adhesive Layer
5	IR Coating
6	Black
7	Adhesive
8	Steel
10	Plastic
12	Frame
14	Spacer
15	Scratch resistant coating
18	Sheet metal
20	Channel
101	Surface number one
102	Surface number two
103	Surface number three
104	Surface number four
201	Layer one – outer exterior layer, adjacent to the exterior of the vehicle.
202	Layer two – inner interior layer, adjacent to the inside of the passenger compartment.

Detailed description of the invention

As shown in Figure 9, standard terminology is used to describe the configuration of a laminated glazing wherein a normal automotive windshield is comprised of two layers of glass **201** and **202** that are permanently bonded together with a bonding layer **4**. The glass surface that is on the outside of the vehicle is referred to as surface one **101** or the number one surface. The opposite face of the exterior layer of glass **201** is surface two **102** or the number two surface. The glass surface that is on the inside of the vehicle is referred to as surface four **104** or the number four surface. The opposite face of the inside layer of glass **202** is surface three **103** or the number three surface.

As shown in Figures 1, 2 and 3, 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.

One of the big advantages of a laminated window over a tempered is that a laminated can make use of heat absorbing glass, infrared reflecting coatings and infrared reflecting films. Tempered monolithic windows can only make use of heat absorbing compositions to control solar load. A heat absorbing window can be very effective but the glass itself, absorbs the heat, as intended but

then allows energy to transfer to the passenger compartment through convective transfer and radiation whereas the infrared reflecting coatings and films reflect the heat back to the atmosphere allowing the glass so stay cooler.

Referring to Figure 7, the present invention relates to an embodiment of the laminated window, infrared reflecting coatings **5** include but are not limited to the various metal/dielectric layered coatings applied through magnetron sputtered vacuum deposition (MSVD) as well as others known in the art that are applied via pyrolytic, spray, CVD, dip and other methods.

Infrared reflecting films **3** include both metallic coated substrates as well as organic based optical films which reflect in the infrared.

10 The glass layer may be annealed or strengthened.

Two processes can be used to increase the strength of glass. They are thermal strengthening, in which the hot glass is rapidly cooled and chemical tempering which achieves the same effect through an ion exchange chemical treatment.

Glass can also be chemically tempered. In this process, ions in and near the outside surface of the glass are exchanged with ions from the bath that are larger. This places the outer layer of glass in compression. Compressive strengths of up to 1,000 Mpa are possible.

Chemical tempering is performed by immersing the glass in a bath of molten potassium nitrate. During the process, potassium ions replace ions of smaller elements in the glass surface creating a compression layer. The tempered strength is a function of the time that the glass is treated, the temperature of the bath, and the glass composition. The strength correlates to the depth of the compression layer. Typical parameters for chemical tempering are treatment at a temperature ranging from 350 to 475 °C for a period from 2 to 24 hours.

Unlike heat tempered glass, chemically tempered glass breaks into shards rather than the small bead typical of heat treated glass further improving the intrusion resistance of the window as the shards, held together by the bonding layer, tend to interlock maintaining structural integrity.

The bonding layer **4** has the primary function of bonding the major faces of adjacent layers to each other. As an example, surface two of the top glass layer **2** is bonded to surface one of the layer adjacent and below by the bonding layer **4**. The material selected is typically a clear plastic when bonding to another glass layer **2**. For automotive use, the most commonly used bonding layer **4** or interlayer is polyvinyl butyl (PVB). In addition to polyvinyl butyl, ionoplast polymers, ethylene vinyl acetate (EVA), cast in place (CIP) liquid resin and thermoplastic polyurethane (TPU) can

also be used. A wide variety of adhesives can be used when bonding glass to a non-glass layer **2** or when bonding non-glass layers to each other.

In some of the embodiments, a black **6** print is provided to create an obscuration used to hide the frame **12** from the interior and exterior of the vehicle. On fixed parts, glued to the vehicle, as shown in Figure 4, the black **6** obscuration also serves to hide the adhesive and to protect the adhesive from ultraviolet. The obscuration can be produced on any of the substrate surfaces including the glass, interlayer, film and plastic.

Black frit is a type of ink made from a mix of high temperature black pigments, fine ground glass and an organic carrier and binder. Black frit is commonly applied by silk screen printing or ink jet printing and used on automotive glazing to provide for an obscuration to hide the interior trim and the adhesive used to mount the glazing in the vehicle. The frit is applied before the bending of the glass. During the bending process, the glass powder fuses with the surface of the glass making for a durable permanent bond. Black **6** frit may be used to provide for the opaque layer required by printing on surface two **202** of the glass layer **1**.

Colors, other than black, may be used as well as other inks and types or printing processes. The print may be made on layers other than the glass such as the bonding layer and film layer.

The frame **12** itself can be painted or otherwise embellished to improve the aesthetic so as to not require an obscuration. As an example, the frame **12** could be made of carbon fiber composite which would enhance the aesthetic giving the glazing a high tech look.

The functional requirements for the frame **12** include providing the glazing with resistance to breakage by reinforcing the glazing in the periphery areas and after breakage to support the remaining components of the glazing inside of the frame **12** preventing collapse of the window, as shown in Figure 4. The frame **12** itself also serves as a barrier to penetration when the glazing is struck directly in the area of the frame **12**. The level of support required will vary with the application, the design of the vehicle window opening and the thickness of the conventional glazing that the opening is designed for.

The steel frame **12** of the exemplary embodiments may be formed through the use of a conventional metal stamping process. On flat and relatively flat parts, the frame **12** may be LASER cut from flat sheet and cold bent to the contour of the bent glass.

As the invention serves as a direct replacement for conventional glazing, with no modification to the vehicle, the outboard edge of the frame **12** and plastic layer needs to be offset inboard from the outboard edge of glass on some parts. The frame **12** and plastic layer offsets will also vary with

the application, the design of the vehicle window opening and the thickness of the conventional glazing that the opening is designed for.

A typical tempered door window has a thickness that is in the range of 3.2 mm to 4.0 mm with a variance of +/- 0.2 mm from nominal. The channel **20** and seals are designed for this range but do allow for some additional variation in build, temperature and other factors. The seals and channels **20** are also fabricated of soft compliant materials such as rubber. It is very important to maintain a good seal so as to prevent wind noise and water ingress.

A 7 mm thick glazing would not normally work in such a door unmodified. If the seals and channels **20** were wide enough to accommodate, most likely, the force required of the motor to open and close the window would be too high. In the exemplary embodiments, the frame **12** is offset by 6 mm and the plastic layer by 12 mm from the edge of the glass. Thus, only the thinner portions of the glazing, near the edges need to fit inside of the channels **20** and seals, allowing for normal operation and a good fit and seal. Actual offsets, once again, will depend upon the specific vehicle.

In some cases, where the glazing is fixed and glued into place, no offset may be needed. If a fixed flush glazed 4 mm window is being replaced with a 7 mm intrusion resistant window, the new window will protrude outboard towards the exterior by 3 mm. This may not be objectionable for some vehicles. Otherwise, an offset can be used to provide for a 7 mm glazing that is flush and does not protrude.

In different embodiments of the present invention, a frame **12** constructed of 1 – 2 mm carbon steel is used. However, a wide variety of materials, which can provide equivalent level stiffness and strength can be used. Examples include but are not limited to: aluminum, carbon composite, fiberglass reinforced plastic, titanium, stainless steel and some plastics. Other material, not yet known, may also be found which will also meet the functional requirements. Likewise, the thickness can be outside of the range of 1 – 2 mm depending upon the material and the applicant. As an example, a high strength steel would not need to be as thick as an ordinary mild steel frame **12**.

As shown in Figures 4, 5, 6, 7 and 8, inside of the frame, a spacer **14** is used. The spacer serves to support the area surrounded by the frame. The spacer must be comprised of a transparent material and have a thickness that is about the same as the frame. The material may be any suitable transparent material such as glass, polycarbonate, acrylic, polyurethane or other equivalents. A bonding layer material may also be used such for the spacer as polyvinyl butyl (PVB), ionoplast

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polymers, ethylene vinyl acetate (EVA), cast in place (CIP) liquid resin and thermoplastic polyurethane (TPU) can also be used.

The glass layer is formed using gravity bending, press bending or cold bending. Gravity and press bending methods for forming glass are well known in the art and will not be discussed here. On parts with minimal curvature, a flat sheet of glass can be bent cold to the contour of the frame **12** which maintains the curvature of the glass.

The plastic **10** interior layer is formed using any of the methods and processes typical for the specific material and known in the art including but not limited to thermoforming, injection molding and vacuum molding. A flat plastic sheet can be bent cold to conform to the bent glass and/or frame **12** on parts with minimal curvature. The plastic interior layer is comprised of a transparent plastic such as but not limited to a polycarbonate, acrylic or equivalent. By using a plastic interior layer, rather than a glass interior layer, intrusion resistance is enhanced as the plastic layer does not fail in the same manner that glass does. The plastic will tend to bend and undergo plastic deformation prior to breaking.

Scratch resistance coatings **15** are widely known in the art and typically used on transparent plastics such as automotive headlamp housings. A common type envisioned in the embodiments includes silica coatings applied using a magnetron sputtered vacuum deposition (MSVD) process or by a sol-gel process. As can be appreciated, other chemistries and application methods are available and will become available which are equivalent. The scratch resistant coating is provided for additional protection.

Description of embodiments

Embodiment 1 is shown in Figure 6A and is comprised of: 3 mm Glass, Black, 0.62 mm PU, 1 mm Frame, 1 mm PU spacer, 0.62 mm PU, Black and 2 mm Plastic.

Embodiment 2 is shown in Figure 6B and is comprised of: 3 mm Glass, Black, 0.62 mm PU, 2 mm Frame **12**, 2 mm PU spacer, 0.62 mm PU, Black and 1 mm Plastic.

Embodiment 3 is shown in Figure 7A and is comprised of: 3 mm glass, black, 0.62 mm PU, IR film, 0.62 mm PU, 1 mm frame, 1 mm PU spacer, 0.62 mm PU, black and 2 mm plastic.

Embodiment 4 is shown in Figure 7B and is comprised of: 3 mm glass, black, IR coating, 0.62 mm PU, 1 mm frame, 1 mm PU spacer, 0.62 mm PU, black and 2 mm plastic.

Embodiment 5 is shown in Figure 8A and is comprised of: 1 mm glass, Black, 0.62 mm PU, 2 mm frame, 2 mm PU spacer, 0.62 mm PU, black and 2 mm plastic with a scratch resistant coating

Embodiment 6 is shown in Figure 8B and is comprised of: 2 mm glass, 0.62 mm PU, 2 mm frame, 2 mm PU spacer, 0.62 mm PU and 2 mm plastic.

5

Further, it can be appreciated that all of the embodiments described can be further enhanced through the application of a scratch resistant coating 15 to the exterior number one **101** glass **2** surface and/or the interior number four **104** plastic surface. An anti-reflective coating can also be beneficial when applied to the interior number four **104** plastic **10** surface

10

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 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. An automotive laminate comprising:
 - 5 a glass layer having oppositely disposed major faces;
 - a frame having oppositely disposed major faces;
 - a spacer having oppositely disposed major faces;
 - a plastic layer having oppositely disposed major faces; and
 - at least two bonding layers;
 - 10 wherein said frame substantially surrounds the vision area of said laminate;
 - wherein said spacer comprises a transparent material with said spacer having a thickness which is about the same as said frame and sized to precisely fit the interior portion of said frame;
 - wherein said spacer positioned within the interior portion of said frame;
 - 15 one major face of said frame and corresponding major face of said spacer bonded to corresponding major face of said glass layer by means of said bonding layers,
 - opposite major face of said frame and said spacer bonded to corresponding major face of said plastic layer by means of said bonding layer.
2. The automotive laminate of claim 1 further comprising an exterior edge offset inboard
20 relative to the edge of said glass layer.
3. The automotive laminate of claim 1 further comprising an exterior edge offset inboard relative to the outboard edge of said frame.
4. The automotive laminate of claim 1 further comprising a frame substantially made using one of the materials selected from the following group consisting of: steel, aluminum,
25 titanium, plastic and carbon composite.
5. The automotive laminate of claim 1 further comprising a heat reflecting layer.
6. The automotive laminate of claim 1 further comprising a heat absorbing layer.
7. The automotive laminate of claim 1 further comprising a heat strengthened glass layer.

8. The automotive laminate of claim 1 further comprising a borosilicate glass layer.
9. The automotive laminate of claim 1 further comprising a chemically strengthened glass layer.
10. The automotive laminate of claim 1 further comprising a glass layer having a thickness in
5 the range of about 0.4 mm to about 3.00 mm.
11. The automotive laminate of claim 1 further comprising a plastic layer having a thickness in the range of about 0.4 mm to about 3.00 mm.
12. The automotive laminate of claim 1 further comprising a frame having a thickness in the range of about 0.4 to about 3.00 mm.
- 10 13. The automotive laminate of claim 1 further comprising a thickness in the range of about 5 mm to about 9.00 mm.
14. The automotive laminate of claim 1 further comprising a sound deadening layer.
15. The automotive laminate of claim 1 further comprising a cold bent layer.
16. The automotive laminate of claim 1 further comprising a hard scratch resistant coating on
15 the exterior surface of said glass layer.
17. The automotive laminate of claim 1 further comprising a hard scratch resistant coating on the interior surface of said plastic layer.
18. The automotive laminate of claim 1 further comprising an anti-reflective coating on the interior surface of said plastic layer.
- 20 19. The automotive laminate of claim 1 further comprising an infrared reflecting layer.
20. A vehicle comprising the automotive laminate of claim 1.

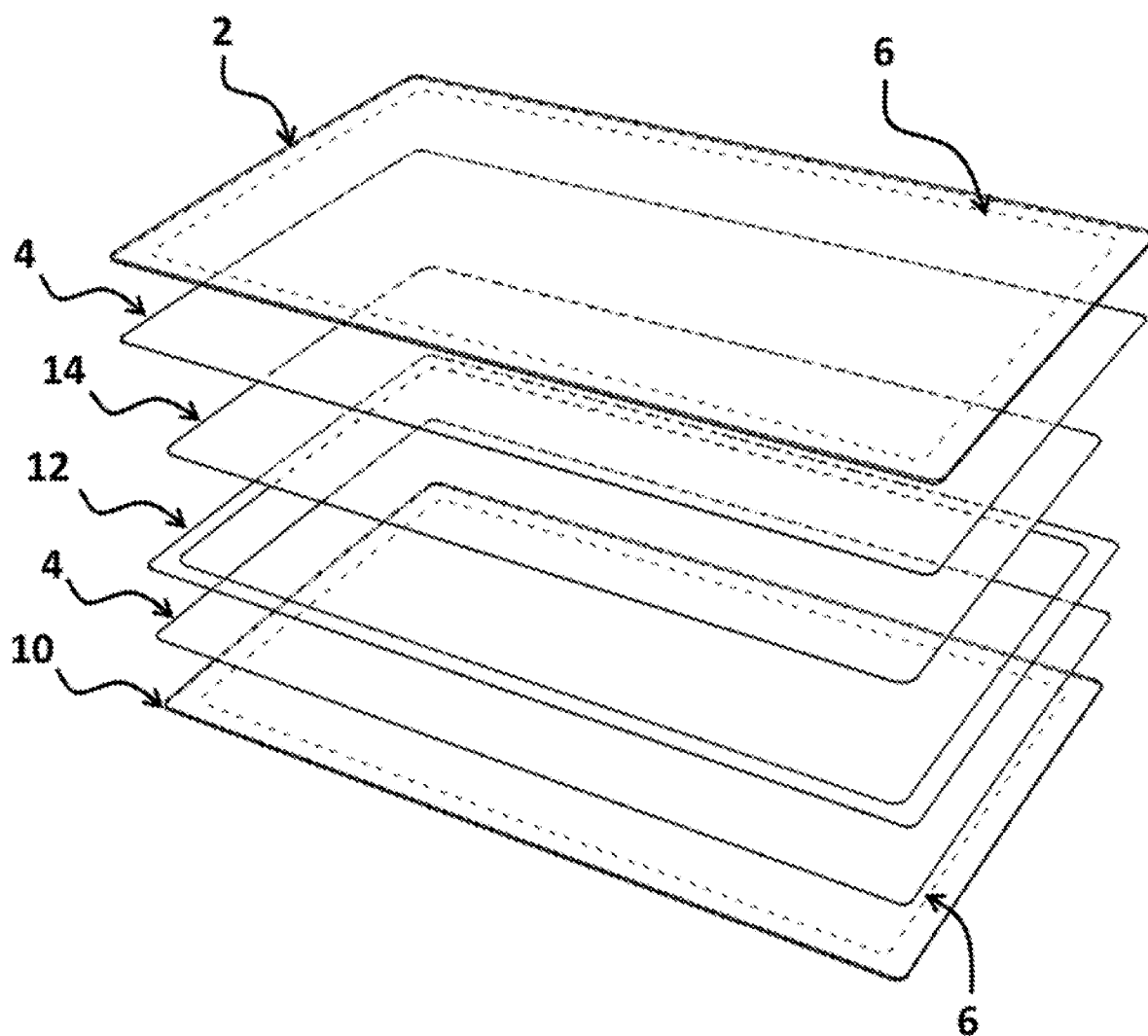


Fig. 1

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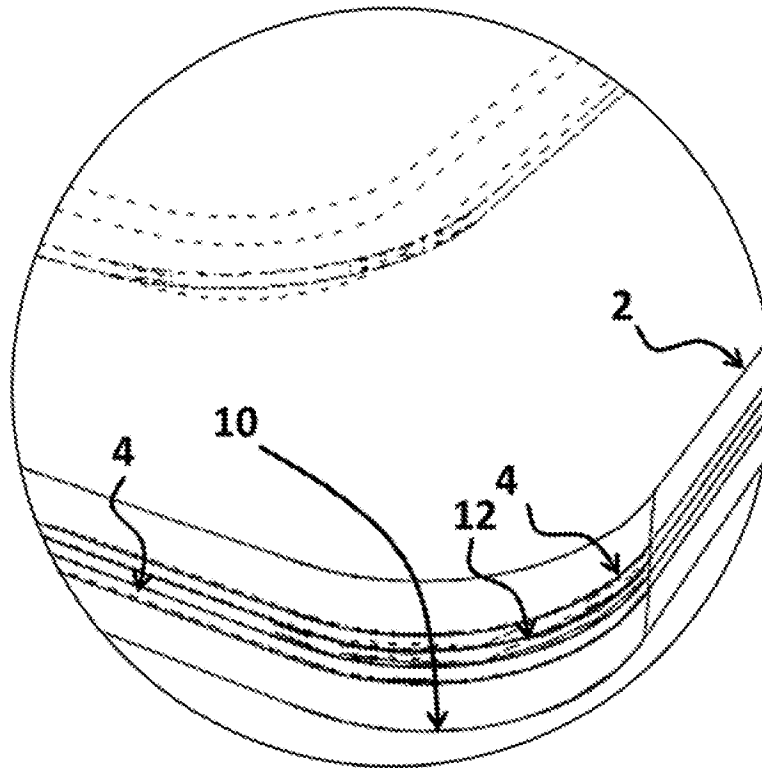


Fig. 2A

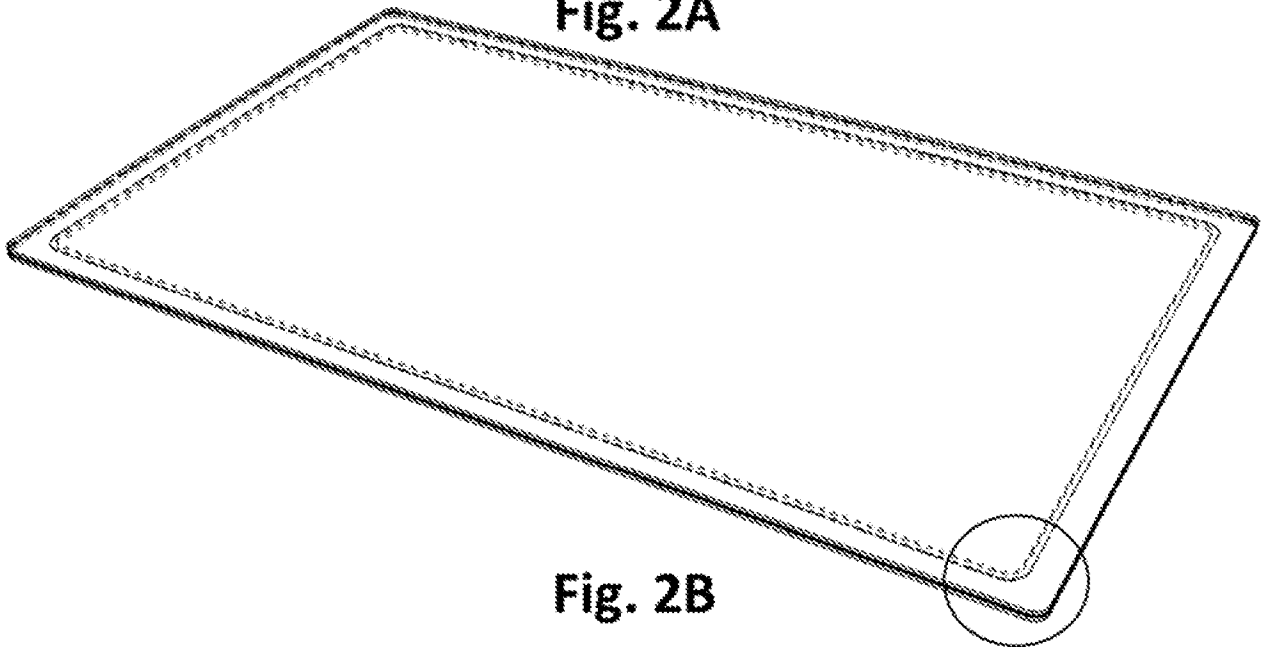


Fig. 2B

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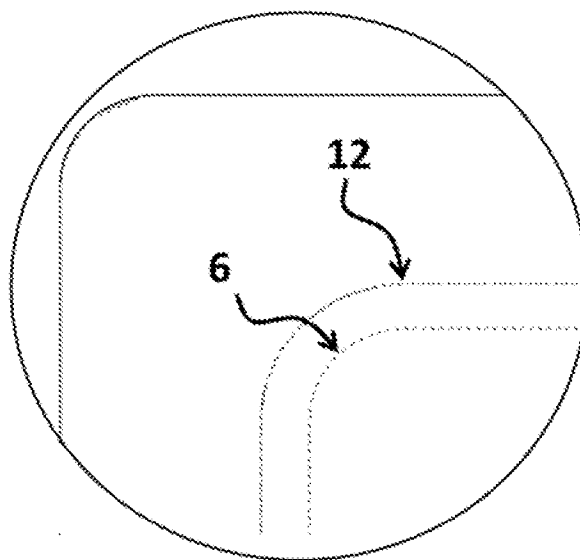


Fig. 3A

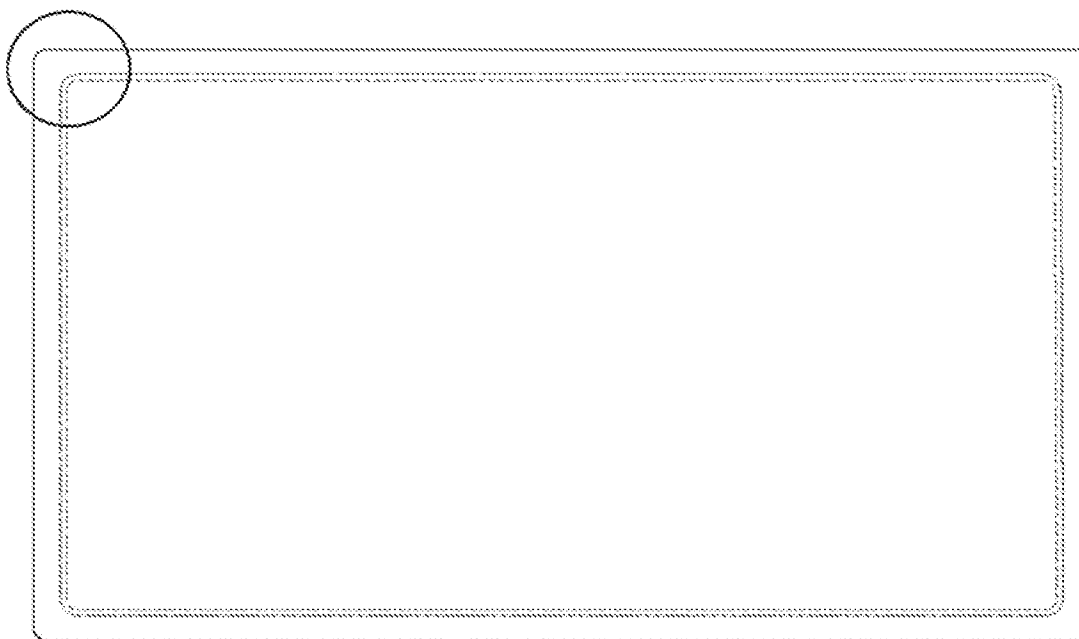


Fig. 3B

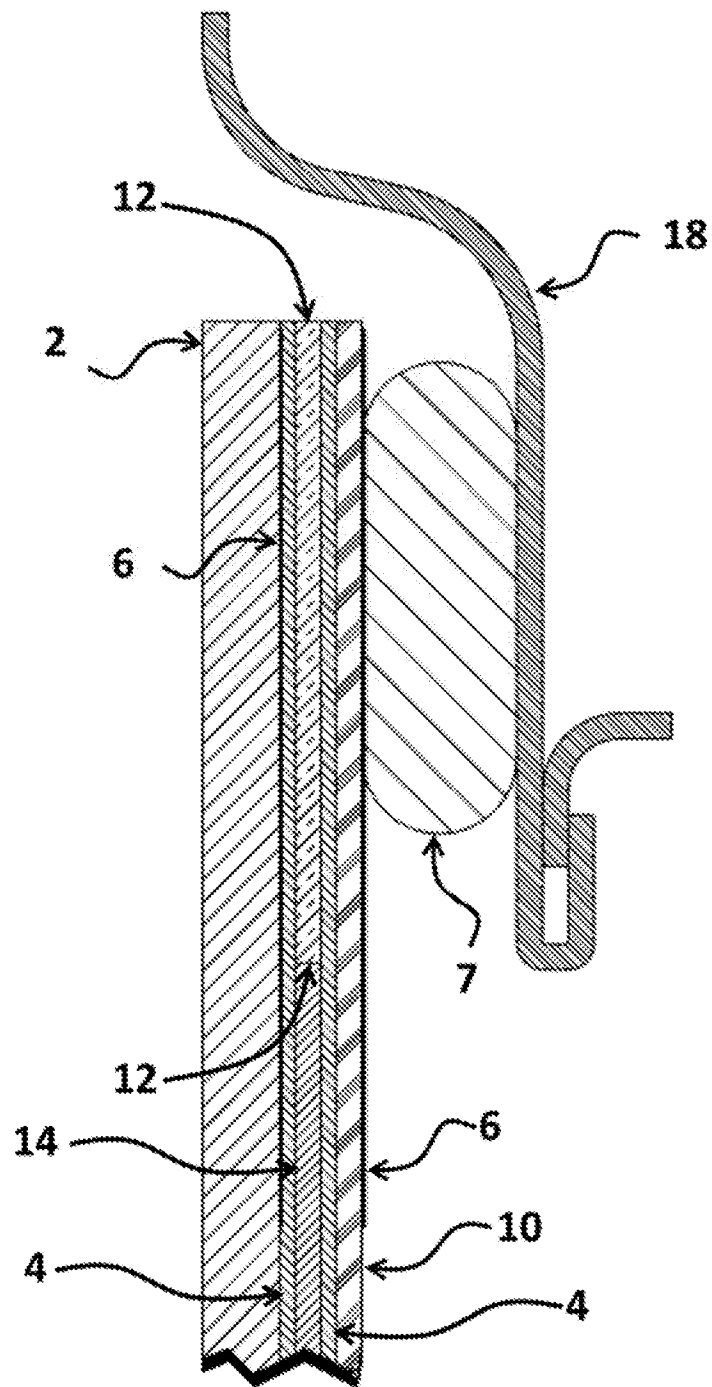


Fig. 4

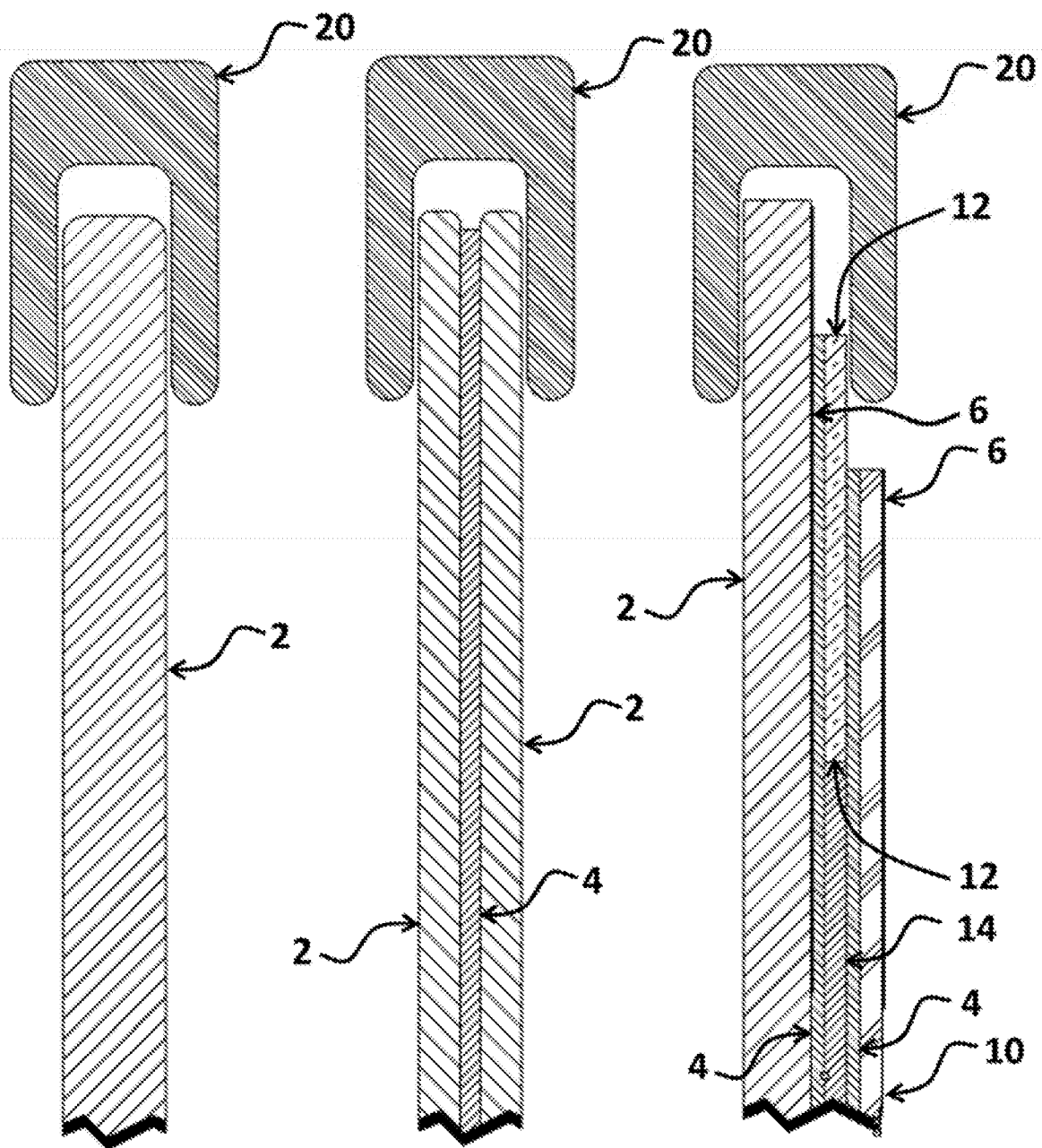


Fig. 5B

Fig. 5C

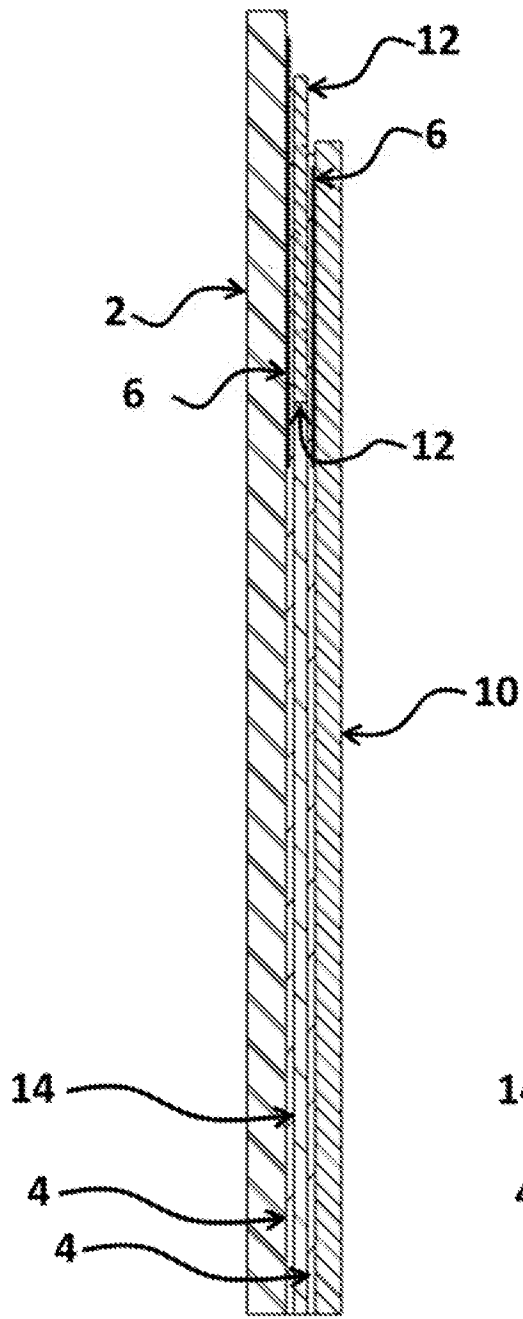


Fig. 6A

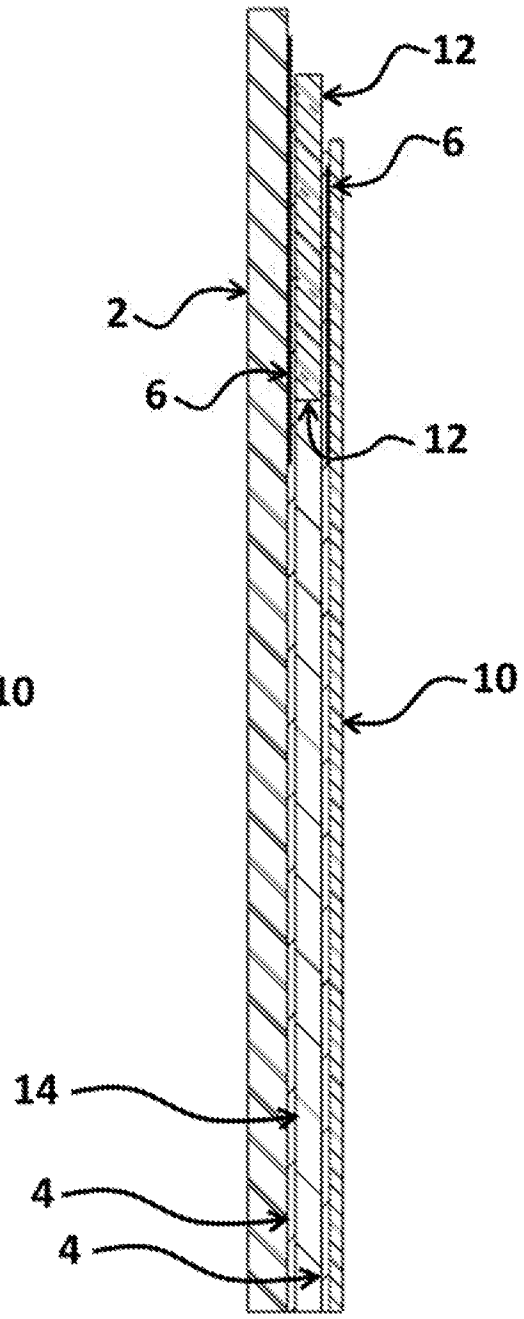
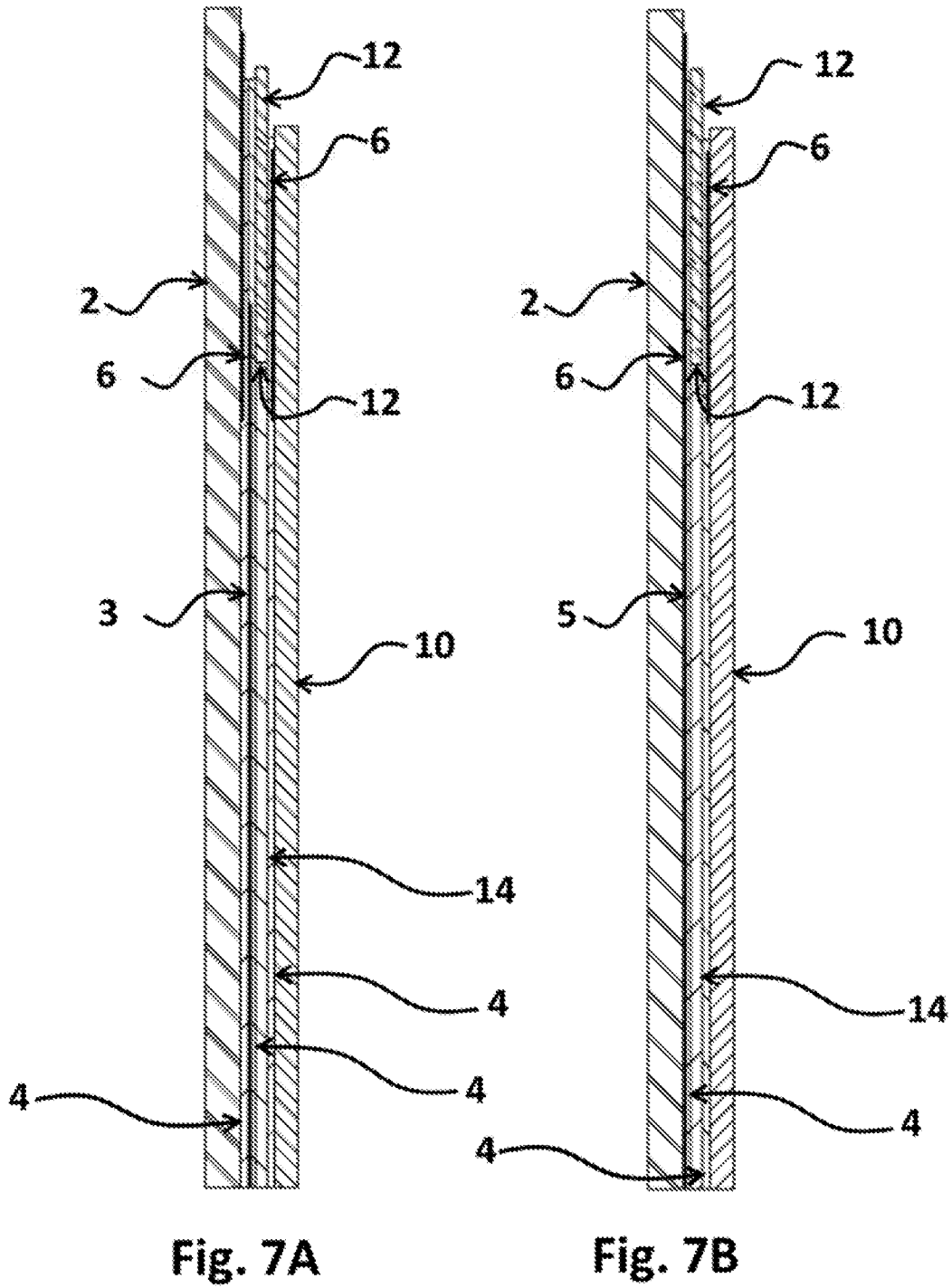


Fig. 6B



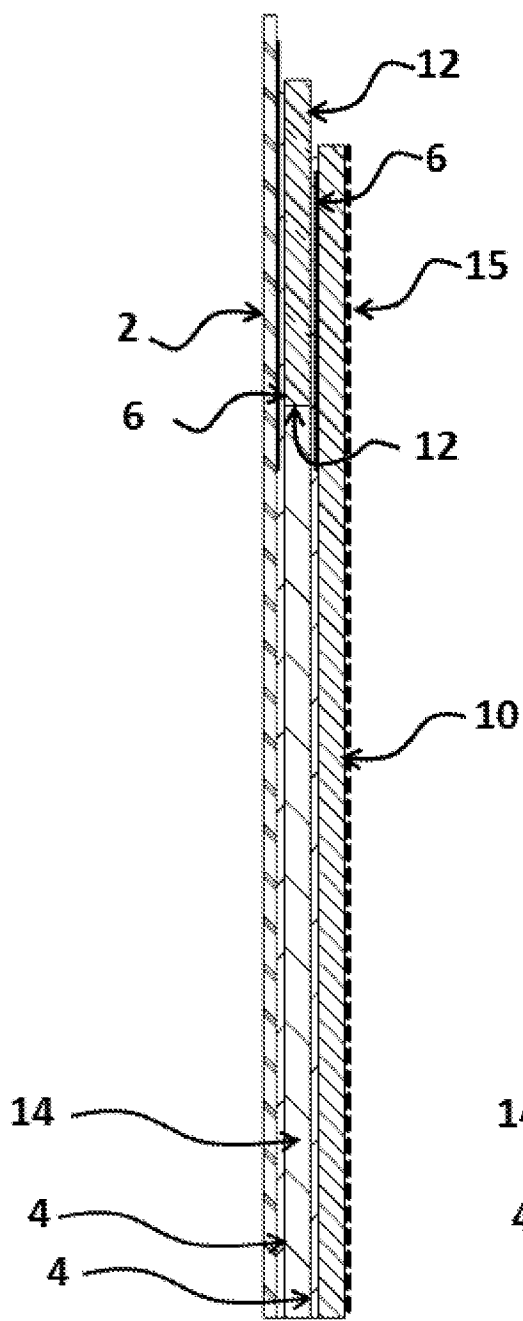


Fig. 8A

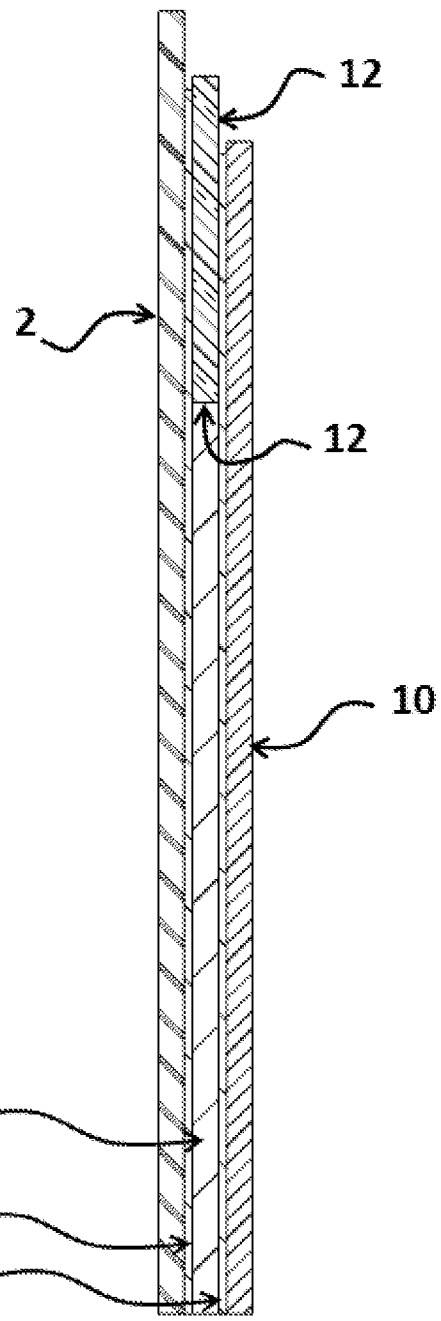


Fig. 8B

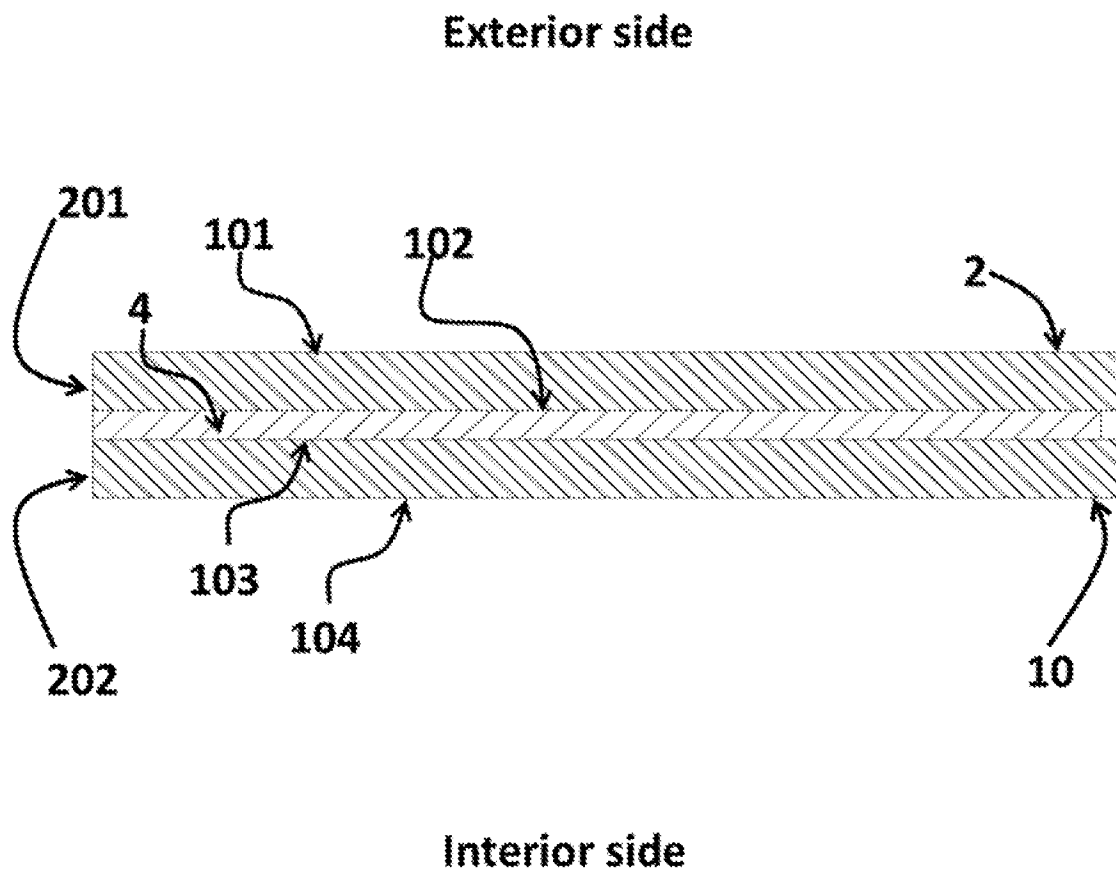


Fig. 9

Electronic Acknowledgement Receipt

EFS ID:	28752920
Application Number:	62477399
International Application Number:	
Confirmation Number:	5702
Title of Invention:	INTRUSION RESISTANT LAMINATED AUTOMOTIVE GLAZING
First Named Inventor/Applicant Name:	Mario Arturo MANNHEIM ASTETE
Customer Number:	130961
Filer:	Joseph L. Morales
Filer Authorized By:	
Attorney Docket Number:	1511.20600
Receipt Date:	27-MAR-2017
Filing Date:	
Time Stamp:	22:24:14
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 260
RAM confirmation Number	032817INTEFSW22261100
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	12091.PDF	1819309	no	7
			a466dd1c76ced938cae113271d34e1e72cc88117		
Warnings:					
Information:					
2	Provisional Cover Sheet (SB16)	12089.PDF	1477238	no	3
			e6a1af39554ef4003bec729515633e99040ffe6a1af39554ef4003bec729515633e99040ff2c9		
Warnings:					
Information:					
3	Specification	12092.PDF	1067814	no	21
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Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	29539	no	2
			3d22585c440e28515b281f598fd12d505da9fccd8		
Warnings:					
Information:					
Total Files Size (in bytes):			4393900		

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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.

Señores

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIRECCIÓN DE NUEVAS CREACIONES

E. S. D.

Re: Expediente No. NC2017/0007432

Solicitud de Patente de Invención titulada: “CRISTAL AUTOMOTRIZ
LAMINADO RESISTENTE A LA INTRUSIÓN”

Solicitante: AGP AMERICA S.A.

Nuestra Ref.: P2017/000097

MEMORIAL DE ALCANCE

CARLOS R. OLARTE, mayor de edad y vecino de Bogotá, D.C., identificado tal como aparece al pie de mi firma, en mi carácter de apoderado de la sociedad en referencia, me permito aportar el documento de prioridad número US 62/477,399 de fecha 27 de marzo de 2017.

Rogamos tomar atenta nota y proceder de conformidad.

Atentamente,



CARLOS R. OLARTE
CC. No.79.782.747 de Bogotá
T.P. 74.295