

7646566



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

August 16, 2017

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

APPLICATION NUMBER: 62/477,997
FILING DATE: *March 28, 2017*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS US62/477,997



Certified by

Nichelle K. Lee

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

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.20500
		Application Number	
Title of Invention	LOW COST GLASS BENDING MOLD		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

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

Inventor Information:

Inventor	1				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Mario	Arturo	MANNHEIM ASTETE		
Residence Information (Select One) US Residency ● Non US Residency Active US Military Service					
City	Lima	Country of Residence ⁱ	PE		
Mailing Address of Inventor:					
Address 1	Av. Guillermo Dansey 1996				
Address 2	Cercado de Lima				
City	Lima	State/Province	PE		
Postal Code		Country ⁱ			
Inventor	2				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Juan	Carlos	CASAS		
Residence Information (Select One) US Residency ● Non US Residency Active US Military Service					
City	Bogotá	Country of Residence ⁱ	CO		
Mailing Address of Inventor:					
Address 1	Calle 15 No. 35-59				
Address 2					
City	Bogotá	State/Province			
Postal Code		Country ⁱ	CO		
Inventor	3				Remove
Legal Name					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.20500
		Application Number	
Title of Invention	LOW COST GLASS BENDING MOLD		

Prefix	Given Name	Middle Name	Family Name	Suffix
	Edwin		GONZALES	
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service				
City	Bogotá	Country of Residence ⁱ	CO	

Mailing Address of Inventor:

Address 1	Calle 15 No. 35-59			
Address 2				
City	Bogotá	State/Province		
Postal Code		Country ⁱ	CO	
Inventor	4			Remove
Legal Name				

Prefix	Given Name	Middle Name	Family Name	Suffix
	Eliecer		MONCADA	
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service				
City	Bogotá	Country of Residence ⁱ	CO	

Mailing Address of Inventor:

Address 1	Calle 15 No. 35 - 59			
Address 2				
City	Bogotá	State/Province		
Postal Code		Country ⁱ	CO	
Inventor	5			Remove
Legal Name				

Prefix	Given Name	Middle Name	Family Name	Suffix
	Tiago		RAMIRES	
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service				
City	Bogotá	Country of Residence ⁱ	CO	

Mailing Address of Inventor:

Address 1	Calle 15 No. 35 - 59			
Address 2				
City	Bogotá	State/Province		
Postal Code		Country ⁱ	CO	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.20500
		Application Number	
Title of Invention	LOW COST GLASS BENDING MOLD		

Inventor	6				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Jairton		POZZEBON		
Residence Information (Select One) US Residency ☒ Non US Residency Active US Military Service					
City	Parana	Country of Residence ⁱ		BR	

Mailing Address of Inventor:

Address 1	Alameda Arpo 2751, Bairro Costeira, Sao Jose				
Address 2	dos Pinhais				
City	Parana	State/Province			
Postal Code		Country ⁱ	BR		

Inventor	7				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Charles	Stephen	VOELTZEL		
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	Cerdado de Lima				
City	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	imorales@moralesq.com	Add Email	Remove Email

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.20500
		Application Number	
Title of Invention	LOW COST GLASS BENDING MOLD		

Application Information:

Title of the Invention	LOW COST GLASS BENDING MOLD		
Attorney Docket Number	1511.20500	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	13	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

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.											
<table border="1"> <tr> <td>Please Select One:</td> <td>☒ Customer Number</td> <td>☐ US Patent Practitioner</td> <td>☐ Limited Recognition (37 CFR 11.9)</td> </tr> <tr> <td>Customer Number</td> <td colspan="3">130961</td> </tr> </table>				Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)	Customer Number	130961		
Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)								
Customer Number	130961										

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.20500
		Application Number	
Title of Invention	LOW COST GLASS BENDING MOLD		

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 this 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 blank.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing 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 Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)	Remove
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	1511.20500
		Application Number	
Title of Invention	LOW COST GLASS BENDING MOLD		

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices
If 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 World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application. 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. In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

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.	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.20500
		Application Number	
Title of Invention	LOW COST GLASS BENDING MOLD		

Mailing Address Information For Applicant:			
Address 1	Edificio Mossfon		
Address 2	Segundo Piso Calle 54 Este		
City	Panamá	State/Province	
Country ⁱ	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.

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				

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1511.20500
		Application Number	
Title of Invention	LOW COST GLASS BENDING MOLD		

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.

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

Additional Signature may be generated within this form by selecting the Add button.

Add

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 ;
Mario	Arturo	MANNHEIM ASTE	Lima		PE

Inventor 2

Remove

Given Name	Middle Name	Family Name	City	State	Country ;
Juan	Carlos	CASAS	Bogotá		CO

Inventor 3

Remove

Given Name	Middle Name	Family Name	City	State	Country ;
Edwin		GONZALES	Bogotá		CO

Inventor 4

Remove

Given Name	Middle Name	Family Name	City	State	Country ;
Eliecer		MONCADA	Bogotá		CO

Inventor 5

Remove

Given Name	Middle Name	Family Name	City	State	Country ;
Tiago		RAMIRES	Bogotá		CO

Inventor 6

Remove

Given Name	Middle Name	Family Name	City	State	Country ;
Jairton		POZZEBON	Parana		BR

Inventor 7

Remove

Given Name	Middle Name	Family Name	City	State	Country ;
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	LOW COST GLASS BENDING MOLD
Attorney Docket Number (if applicable)	1511.20500
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)	2017-03-27
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.

LOW COST GLASS BENDING MOLD

Field of the invention

5 This invention relates to the field of bent laminated glass glazing.

Abstract of the disclosure

10 A large percentage of the bent glass laminates manufactured worldwide each year is produced using the gravity bending process. Inherent drawbacks to the process include the expense of the molds required, marking of the glass by the mold and the lack of precise surface control. By using an inexpensive ceramic mold to bend a sheet of glass having a higher bending temperature than the glass to be used in the fabricated product, a glass female is produced which is then provides the means to produce a full surface gravity bending mold which
15 produces parts having superior quality, optics and dimensional control.

Background of the invention

20 A large percentage of bent glass laminates manufactured worldwide each year is produced using the gravity bending process in which the glass, supported near the edges, is heated and allowed to sag to shape under the force of gravity acting on the mass of the glass. The process has been in use for many years and is well known in the art. Gravity bending is the typical method used to manufacture automotive windshields and other automotive laminated glazing.

25 The gravity bending process allows bending two or more flat sheets of glass at the same time. The tool used is known as a bending mold (Figures 1, 2 and 3).

A typical bending mold comprises a support structure connected to a female metal ring **that** supports the glass around the entire periphery. The ring is offset inboard from the edge of
30 glass, typically in a range of 6 mm to 12 mm. The ring is typically constructed of 3 mm - 6.3 5mm x 25 – 100 mm 304 stainless steel flat stock or sheet or equivalent.

Figure 1B shows an example of a bending mold (7) in which the orientation of the bent glass is such that the bottom and top corner points of the bent glass are level and horizontal. The flat

unbent cold glass (10) is loaded onto the mold (7) and supported at four contact points (9). The bending mold (7) and glass (10) are heated. At the glass transition temperature range, the glass is allowed to sag under its own weight (gravity bending) until the desired shape is obtained. The periphery support ring (8) provides the glass with the desired shape to fit in a vehicle opening. As contact is made with the surface of the glass only around the periphery, the shape in all other areas of the glass is controlled by means of temperature, heat sinks and heat shields. As can be expected, dimensional accuracy of the portions of the glass in direct contact with the periphery support ring (8), are much better than in other areas. Frequently, the inboard portions of the glass tend to remain relatively flat. This shape is known as a “bathtub” shape and is typical of many gravity bent windshields. If the glass gets too hot in the inboard portion, the glass may sag too far and fall off of the ring. This is one of the drawbacks of gravity bending.

Another drawback results from the contact points. While the cold glass will sometimes partially sag under its own weight to the contour of the periphery support ring (8) prior to heating, the contact and support is essentially point contact (rather than line or surface). The entire weight of the glass is initially supported only at the four contact points. As the glass softens, the contact points can leave marks on the glass surface. Also, as the glass sags and conforms to the shape of the ring, the glass surface moves relative to the periphery support ring (8) which can also leave marks on the glass. This results in a defect known as mold mark. In the past, mold mark was hidden by decorative trim and molding applied to the installed glass. More recent design trends have eliminated this, favoring a flush glazed look with an exposed edge of glass. This has required modifications to the bending mold such as applying a soft heat resistance material, such as fiberglass cloth to the ring and contact points, all of which are high maintenance items and add cost.

On some glass designs, when leveled at the corner points, the vertical centerline of the windshield may be too far from level to bend. If the bent centerline part does not also sit close to level on the bending mold, the glass will tend to move on the mold as the bending mold travels through the bending furnace. In these cases, the ring must be modified, including articulated movable sections. To do so, the bending mold is cut into three sections, the center section (8'), along the top and bottom edges and the two wings sections (18) in the pillar areas. The points where the cuts are made along the ring are selected such that the glass (10) will rest in the horizontal plane at the cut points. This allows the vertical centerline of the part to rest in horizontal position. The articulated outboard wing sections are connected to the inboard

stationary center sections of the ring by means of a hinge mechanism designed to rotate the wing sections to an open position, such that the corner points of the glass lie in the plane formed by the inboard cut points with the mold in the open position. In the open position, the flat glass is supported at eight points (9') which improves support.

5

Figures 2 and 3 show an articulated bending mold in the full open (Figures 2A and 2B) and full close positions (Figures 3A and 3B). The flat glass (10) is loaded onto the open bending mold, with the mold supporting the glass at eight points (9') and then heated. As the glass softens and sags, the hinged portions of the bending mold move to the closed position.

10

Other drawbacks include the high initial cost of bending mold tooling and high cost of maintenance. The fabrication of a bending mold is labor intensive, requiring many hours of skilled craftsmanship to convert the flat sheet metal to the three dimensional shape of the glass. While a single mold can be used for extremely low volume production, fifty or more molds may be required to fill a bending furnace used to run a large volume operation.

15

Constant maintenance is required during production. The welded steel construction tends to be unstable over time due to repeated heating and cooling. This involves another unwanted source of variation in the final glass product where dimensional tolerances are challenging.

20

The molds must be checked for accuracy on a regular basis and adjusted as needed.

For many automotive designs, gravity bending does not have the capability of producing acceptable parts, due to lack of precision. While the glass may fit in the opening, the "bathtub" shape can lead to problems keeping the window clear of water, snow and ice, due to the inability of wiper blades to follow the contour of the surface and the abrupt rate of change in curvature. The shape is especially a problem when the glazing is to be used in conjunction with camera systems, heads up displays, and other devices which require a high level of optical clarity.

25

To meet these needs, laminates must be produced using a full or partial surface press bending process. This type of bending has superior dimensional control but higher cost, lower throughput and is not suitable for very thin glass as the glass is heated on rollers in some implementations.

30

Brief summary of the invention

- The limitations of the prior art are overcome through a novel method used to bend a sheet of high bending temperature glass (HBT) to the desired shape. A HBT mold replaces the metal periphery support ring of a conventional bending mold. This substantially lowers the initial cost of the bending mold, as the forming of the ring is labor intense. Routine maintenance is also substantially reduced, as the HBT mold is dimensionally stable and does not need to be periodically checked for accuracy and adjusted. If the HBT mold needs to be replaced, the mold can be quickly refurbished with a new HBT mold and returned to service.
- The HBT mold is formed by constructing a female sand mold to a male model of the surface to be bent. The sand mold is loaded with a sheet of flat HBT and placed in a furnace, which is then bent to the desired shape. The HBT then is checked, the bent HBT is mounted to a support structure and used to bend lower temperature glass. If needed, the HBT can be cut to make an articulated mold.
- This novel method allows obtaining bent glass without mold marks at reduced costs and wherein the tools used, including the molds, require low maintenance, being functional in manufacturing operations for long periods. Additionally, this method provides bent glass with precise full surface control and superior dimensional control.

Brief description of the drawings

1A	Prior Art: ring style bending iron corner section
1B	Prior Art: Isometric view of ring style bending mold with flat glass loaded.
2A	Prior Art: Front view of ring style bending mold with articulated wing sections and with flat glass loaded.
2B	Prior Art: Isometric view of ring style bending mold with articulated wing sections and with flat glass loaded.
3A	Prior Art: Front view of ring style bending mold with bent glass.
3B	Prior Art: Isometric view of ring style bending mold with bent glass.
4	Isometric view of male surface master tool
5	Isometric view of male surface master with sand mold box in place
6	Isometric view of filled mold box

7	Isometric view of cast female ceramic mold
8	Isometric view of cast female ceramic mold loaded with flat glass
9A	Isometric view of bent high bending temperature glass
9B	Isometric view of cast female ceramic mold loaded with bent glass
10A	High bending temperature glass full surface female bending mold loaded with flat low temperature glass: corner detail.
10B	High bending temperature glass full surface female bending mold loaded with flat low temperature glass.
11A	High bending temperature glass full surface female bending mold loaded with bent low temperature glass: corner detail.
11B	High bending temperature glass full surface female bending mold loaded with bent low temperature glass.
12A	High bending temperature glass full surface female bending mold: corner section.
12B	High bending temperature glass full surface female bending mold loaded with flat low temperature glass.
13A	Isometric view: high bending temperature glass articulated full surface female bending mold in closed position.
13B	Front view high bending temperature glass articulated full surface female bending mold in closed position.
14A	Isometric view: high bending temperature glass articulated full surface female bending mold in open position.
14B	Front view high bending temperature glass articulated full surface female bending mold in open position.

Detailed description of the invention

The instant invention provides a method for manufacturing a full surface female bending mold
5 to produce bent glass, by using a sand mold.

There are many materials that are classified as glass. Glass, as used in this document, includes but are not limited to: the common soda-lime variety typical of automotive glazing, as well as aluminosilicate, lithium aluminosilicate, borosilicate, glass ceramics, and other inorganic solid

amorphous compositions which undergo glass transition and are classified as glass, included those that are not transparent. The term glass also includes glass like ceramic materials.

5 The basic principle upon which the invention is based, is that different types of glass have different glass transition temperature ranges. In the first place, a HBT glass having a transition temperature range that is sufficiently higher than the transition temperature range of the glass that will be bent for the in the final product, is selected. At the lower transition temperature of the glass that will be bent, the HBT must retain its shape and strength. For example, in the case of bending operations of ordinary soda-lime glass or borosilicate glass, certain formulations of
10 lithium aluminosilicate glass meet the criteria of a HBT.

To provide the precisely desired shape to the HBT, a sand mold is firstly made. Sand molds have been used for well over 100 years in the foundry industry and are well known in the art. Numerous methods and materials for producing sand molds exist, any of which may be used.
15 As the operating temperature required to bend the glass is substantially lower than the typical mold used for metal castings, some methods and materials are more economical than others.

A male surface model (Figure 4) is cut from tooling board or any other suitable tooling material. The mold is enclosed in a box (2, Figure 5) having an open top and metal or wood sides of sufficient strength, in order to contain the sand that will be used to fill the box. The box is then
20 filled with the sand mix (3, Figure 6), tamped firmly into place to eliminate voids and then cured. The sand mold is inverted (Figure 7). The box and the male model are removed, leaving a female sand mold (4).

25 Other materials and processes can be used, including but not limited to castable ceramics, all of which can be used to produce equivalent bent HBT shapes.

A sheet of flat HBT (5) is loaded onto the mold (Figure 8). The mold is then heated to the transition temperature of the HBT, which is allowed to sag for a period of time sufficient to
30 allow the flat HBT to bend and adopt the shape of the sand mold. The glass is allowed to slowly cool and anneal.

The bent HBT (6) is removed (Figures 9A and 9B) and then used as a full surface bending mold, attached to a support structure (Figures 10A and 10B). The structure may be made of a

ring, similar to the bending mold of the prior art (Figure 11), or any other suitable structure, as shown in Figure 12. Figures 13 and 14 show an articulated ring type support with the HGT.

Example 1 –manufacturing of a 3D male surface model

5 A 3D male surface model is cut from wood, resin, tooling board or any other suitable tooling material, preferably though the use of a 5 axis mill. The surface of the model must have a very good smooth finish as a female sand mold will be directly cast from it.

The 3D model has the desired male glass surface shape that will be transferred to the sand.

10 Example 2 –manufacturing of a female sand mold

A box is built around the male 3D surface model to hold the sand. The box can be made of metal or wood as a low temperature process is used to cure the ceramic. The box should have the same high/thickness that is wanted for the sand mold.

15 A mixture comprising 85-95% silica sand and 5-15% of a 50/50 solution of water and sodium silicate is used to produce the female sand mold. Sodium silicate is a high strength binder used with silica molding sand. To cure the sodium silicate binder, carbon dioxide gas is used, which creates the following reaction: $\text{Na}_2\text{SiO}_3 + \text{CO}_2 = \text{Na}_2\text{CO}_3 + 2\text{SiO}_2 + \text{Heat}$

20 The sand used should have an adequate particle size for achieving a smooth surface but at the same time allowing the CO_2 gas to infiltrate in the sand and harden them.

After mixing the components, the sand mixture is poured over the 3D resin/wood model filling the frame box.

25

After homogeneously compacting the sand, the excess of sand is removed from the box by drawing a straight edge across the box.

30 CO_2 gas is applied to harden and cure the pre-mixed and compacted sand. The female sand mold is ready to use, after it is inverted and the box removed.

Example 3 –manufacturing of bent HBT

A flat HBT sheet is loaded over the female sand mold. The mold and HBT are placed in the bending furnace. In the case of lithium aluminosilicate glass, a temperature between 640°C

and 670°C, is used. The bending time needs to be sufficient for the glass to adopt the shape of the sand mold surface.

The bent HBT is then attached to a support frame to form the low cost bending mold of the invention, which is then used in the bending process for standard lower transition temperature glass. The support structure can comprise a ring type support or the HBT can be bonded to any other suitable structure. The HBT may need to be covered with a thin metallic or ceramic fabric to prevent sticking of the low temperature glass to the HBT during bending.

10 Example 4 –manufacturing of bent low transition temperature glass

A set of cut soda lime glass layers are loaded onto the female mold. The mold travels through a bending furnace where the glass and the mold are heated into the glass transition temperature range of soda lime glass. The soda lime glass sags to the shape of the HBT surface. The temperature profile and time is precisely controlled so as to achieve the optimum shape and optics. The glass is then slowly cooled to below the glass transition range so as to stress relieve and anneal the glass. The bent glass is removed from the HBT bending mold and the process is repeated with new flat soda lime glass.

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.

25

CLAIMS

1. A method for manufacturing a full surface bending mold comprising;
 - a. selecting a sheet of glass having a higher transition temperature range than the transition temperature range of the glass for the final product;
 - 5 b. producing a male surface model;
 - c. producing a female mold from the male surface model;
 - d. bending the a sheet of glass having a higher transition temperature range to the shape of said female mold.
- 10 2. The method of Claim 1, wherein a glass having a lower transition temperature range is bent over the bent sheet of glass having a higher transition temperature range.
3. A surface bending mold produced through the method of Claim 1.
- 15 4. The surface bending mold of Claim 3, mounted on a support comprising hinged articulated wing sections.
5. The surface bending mold of Claim 3, mounted on a support comprising a ring structure.
- 20 6. The method of Claim 1, wherein the glass having a higher transition temperature range is made of Lithium Aluminosilicate glass.
7. A laminate produced through the use of said bending mold of claim 2.
- 25 8. The laminate of claim 7 further comprising a borosilicate layer.
9. The laminate of claim 7 further comprising an aluminosilicate layer.
10. The laminate of claim 7 further comprising a glass layer in the range of about 0.4 mm to 1.0 mm.
- 30 11. A vehicle comprising the laminate of claim 6.

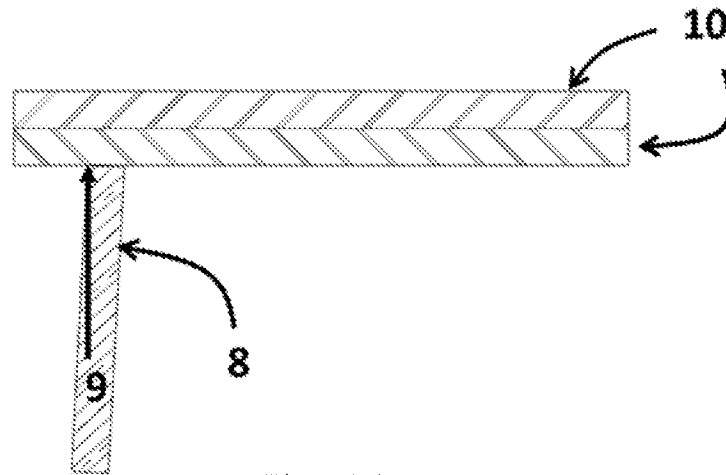


Fig. 1A

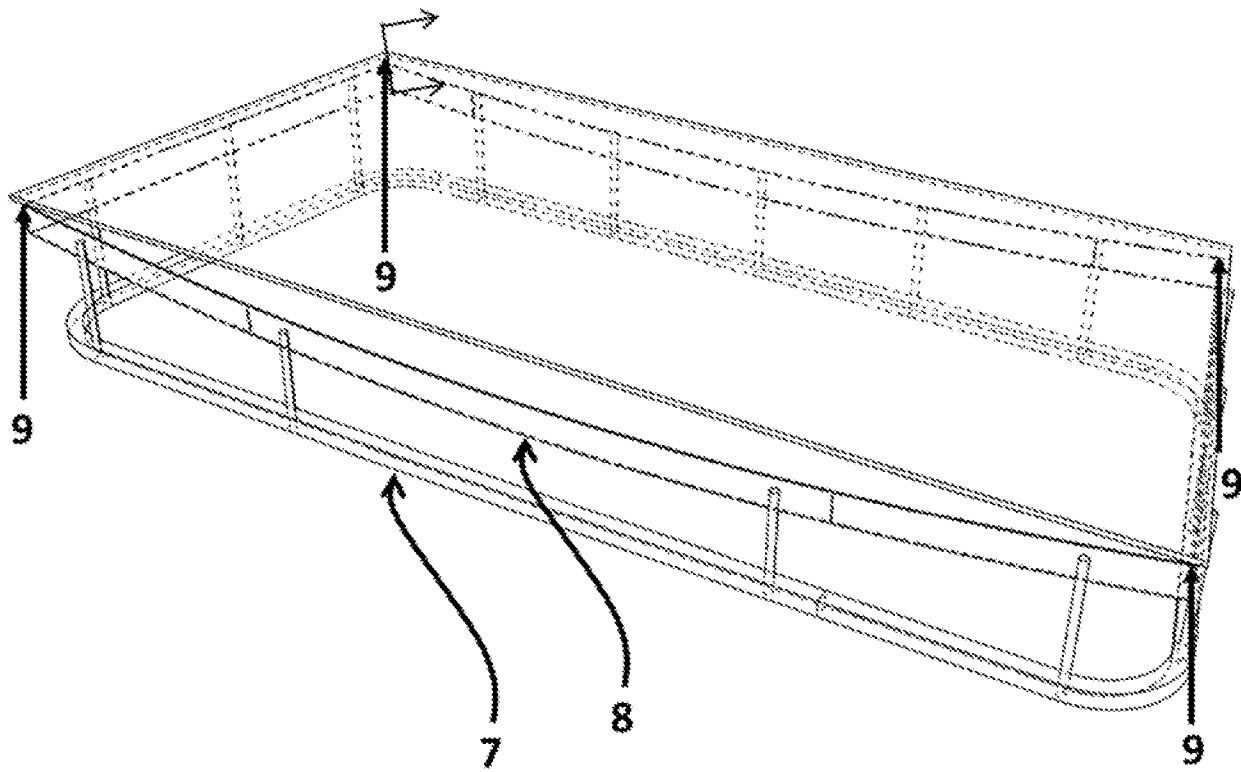


Fig. 1B

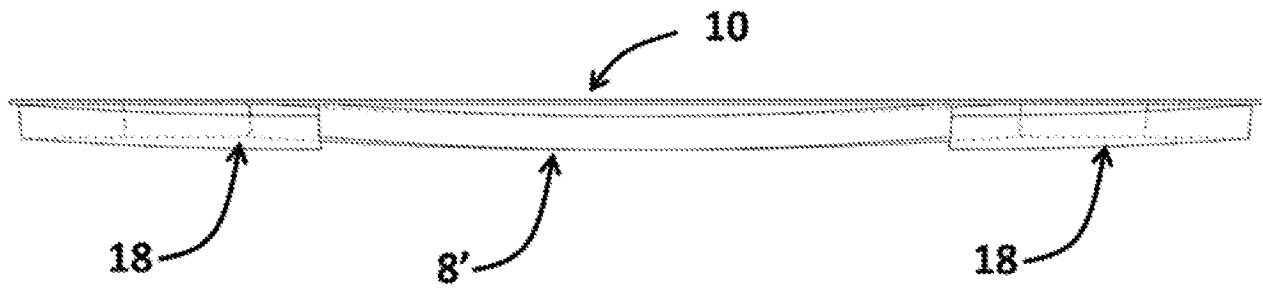


Fig. 2A

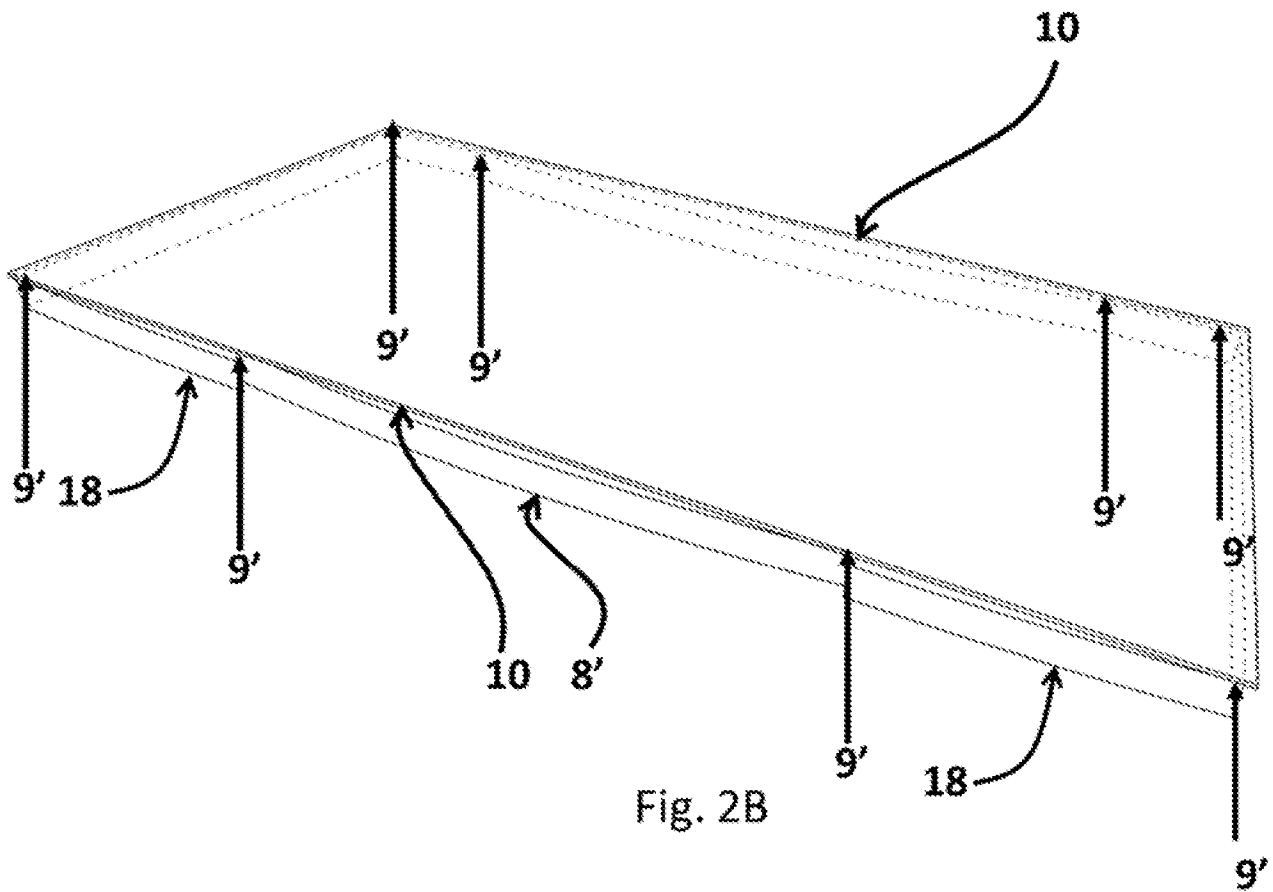


Fig. 2B

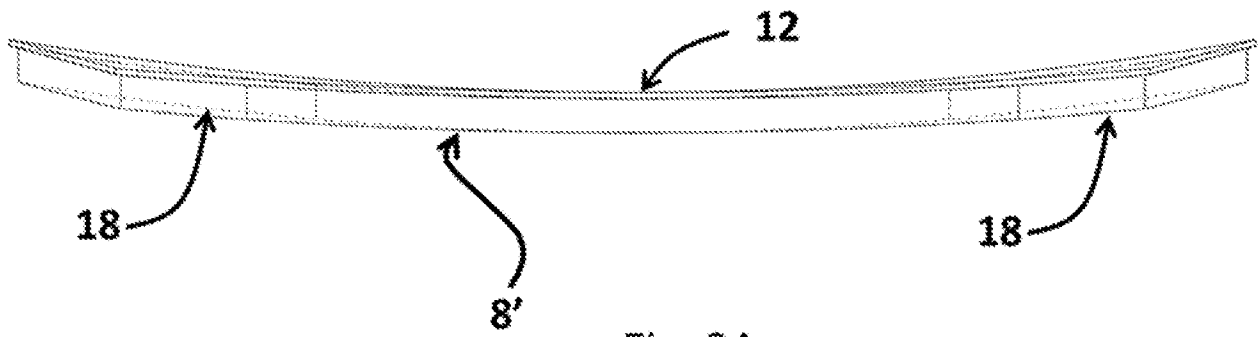


Fig. 3A

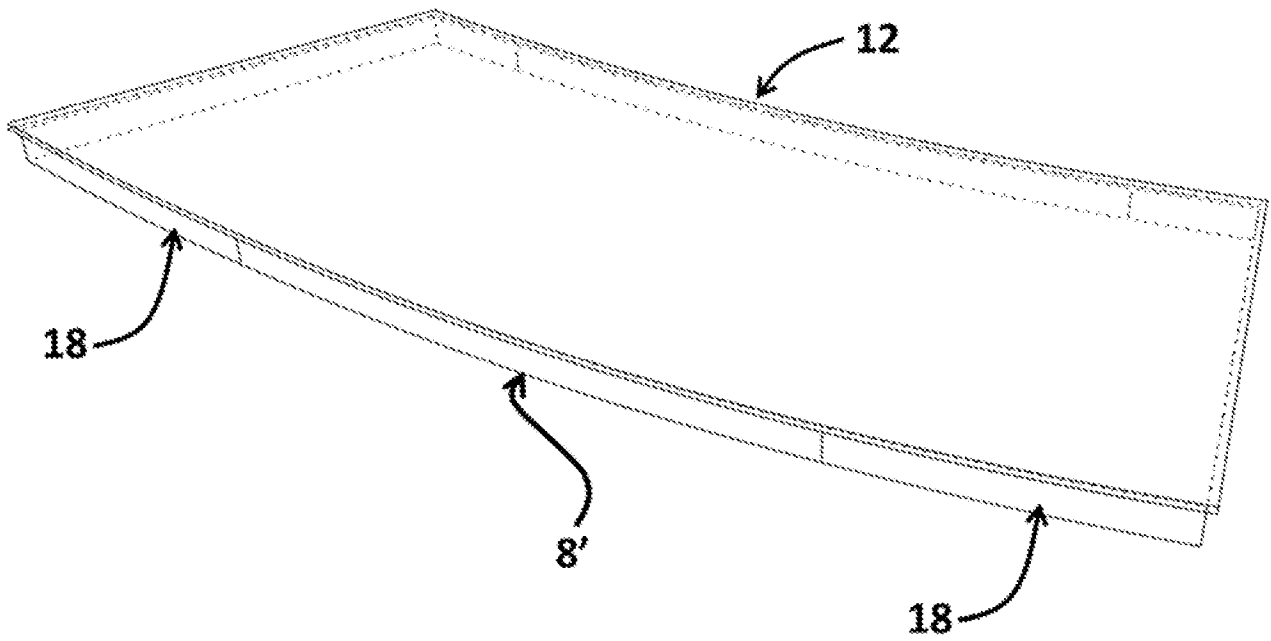


Fig. 3B

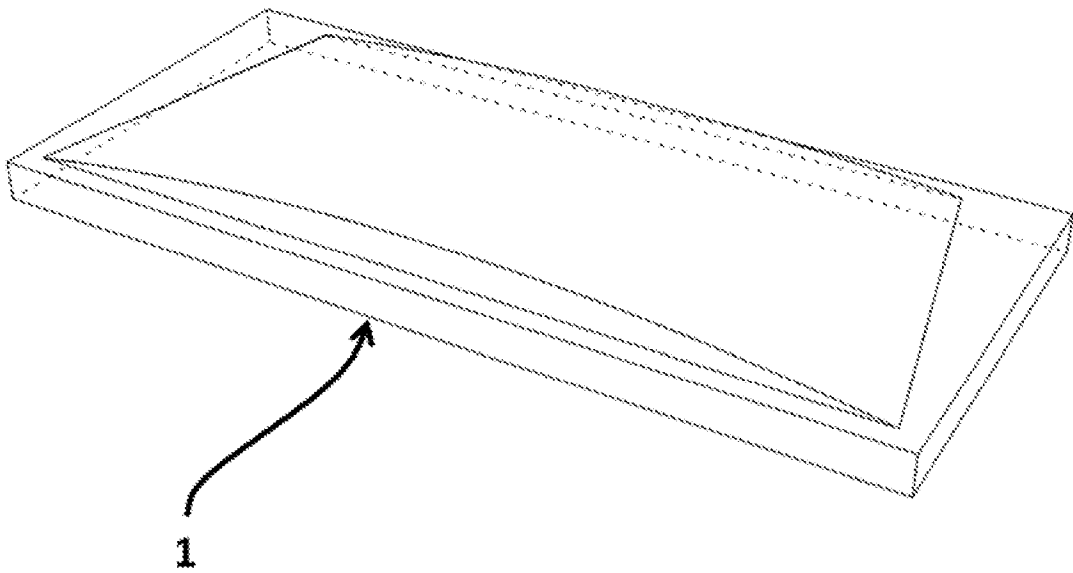


Fig. 4

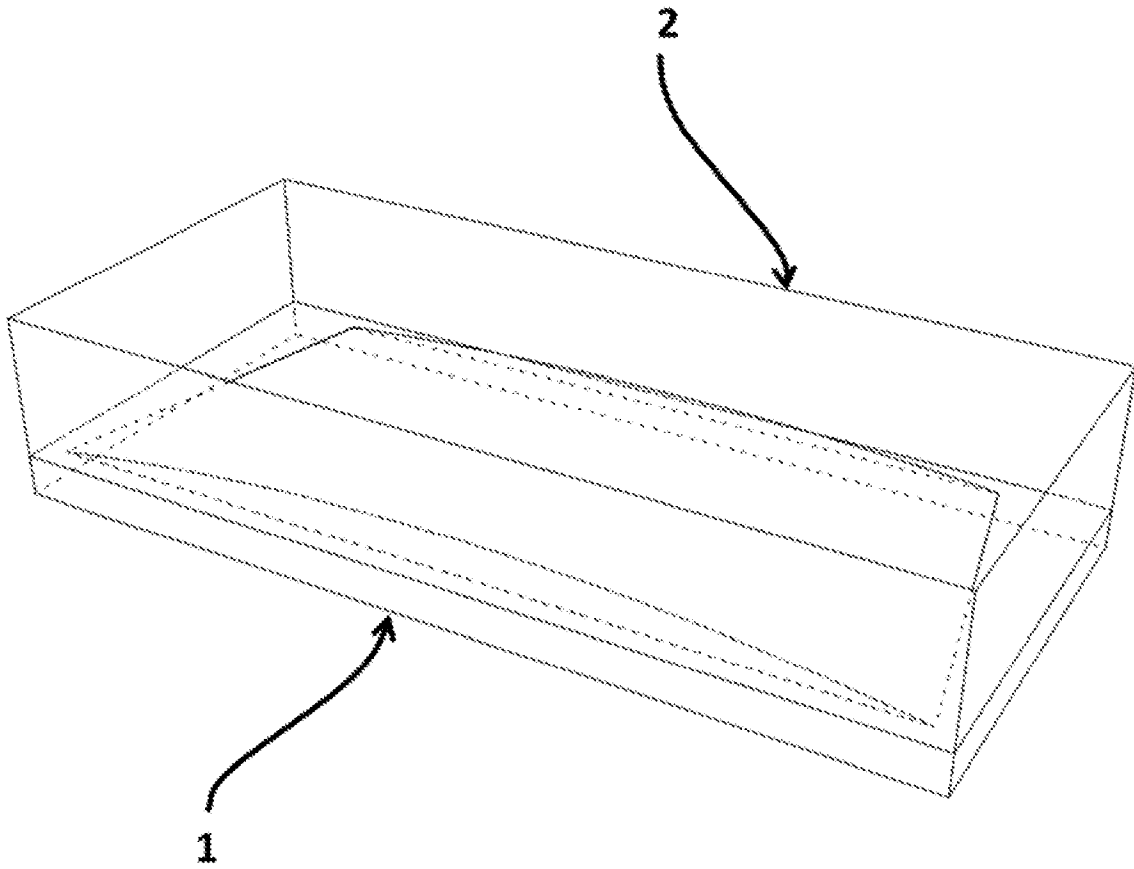


Fig. 5

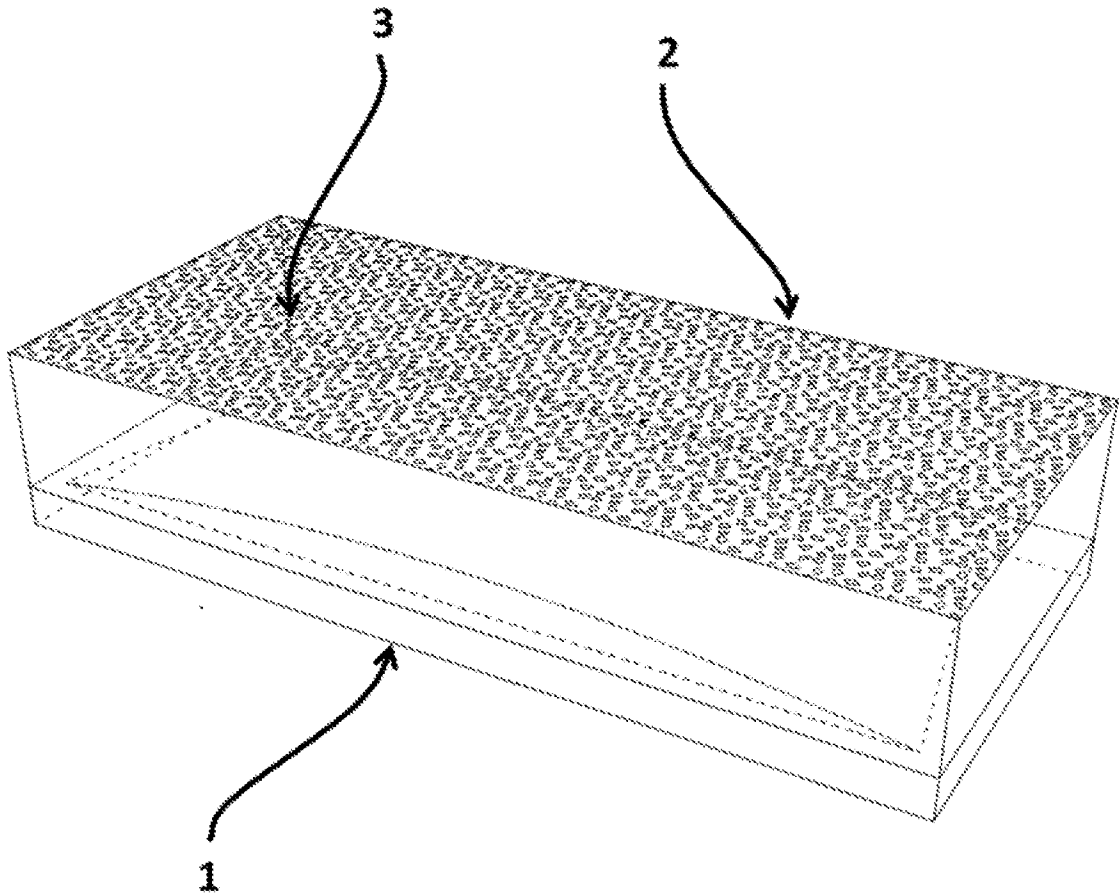


Fig. 6

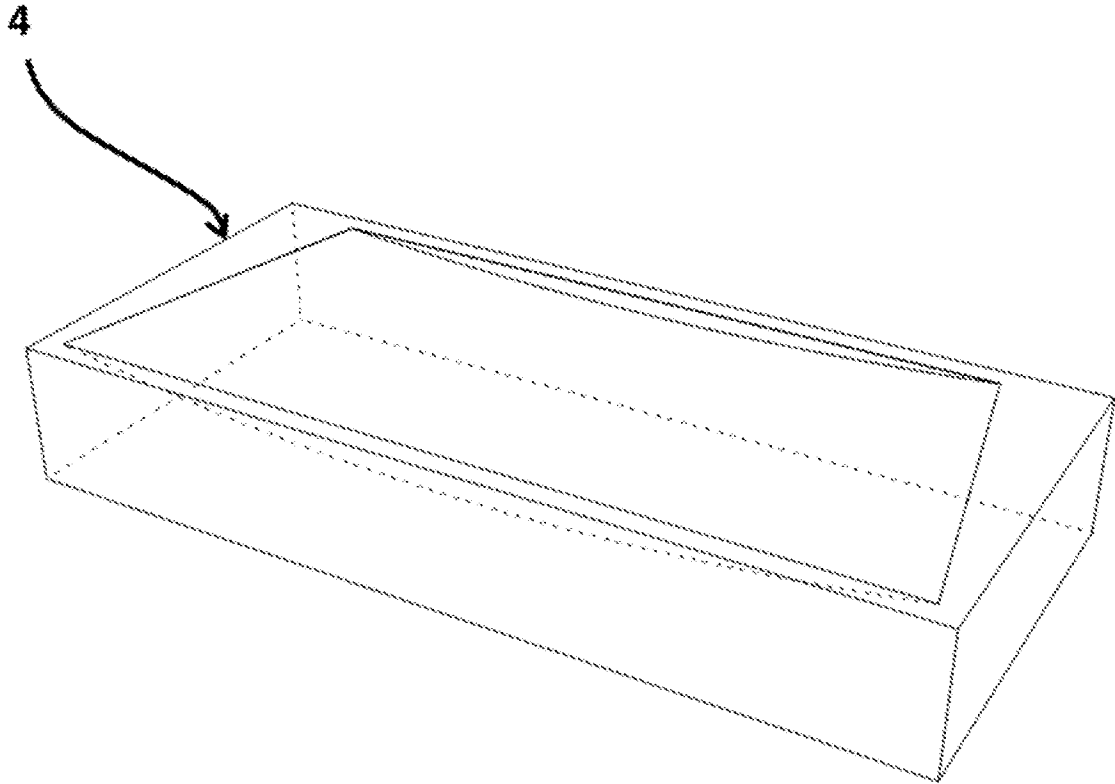


Fig. 7

5

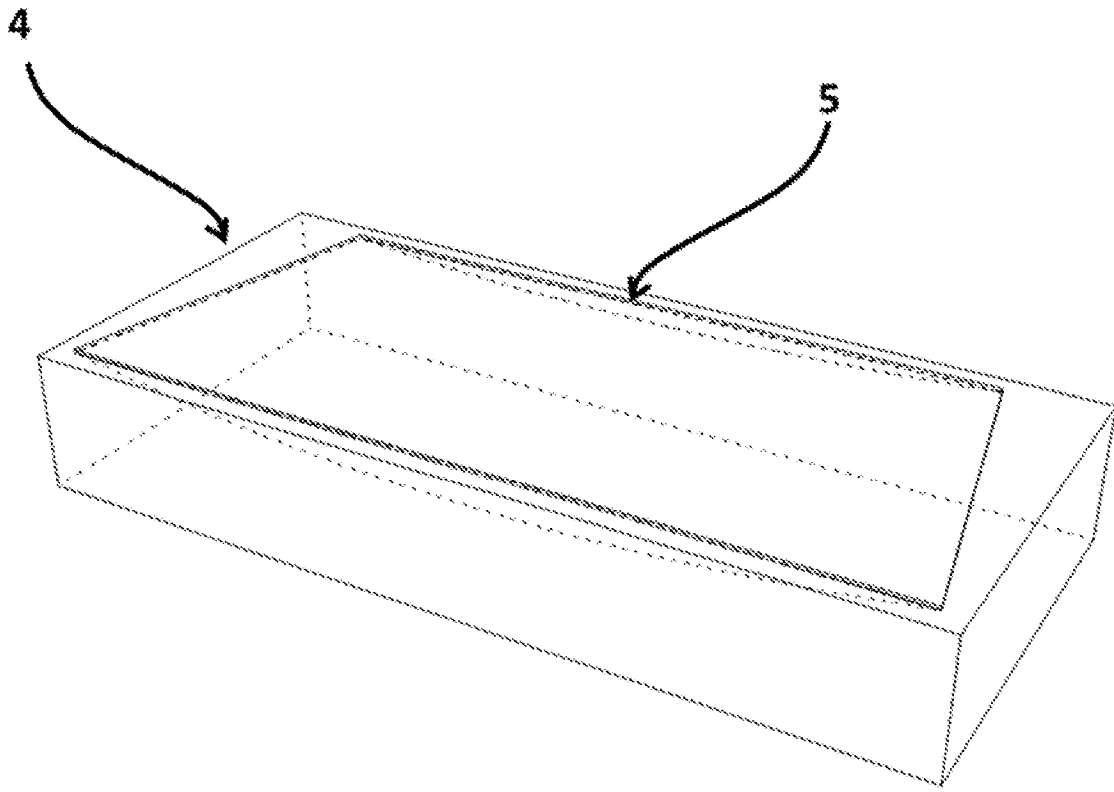


Fig. 8

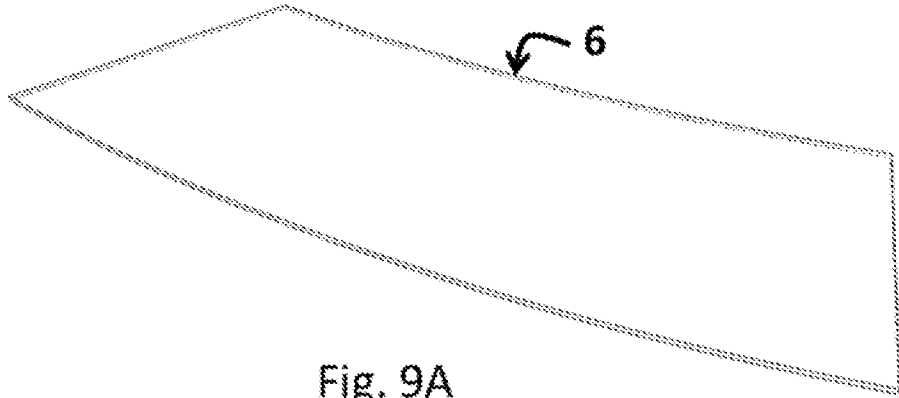


Fig. 9A

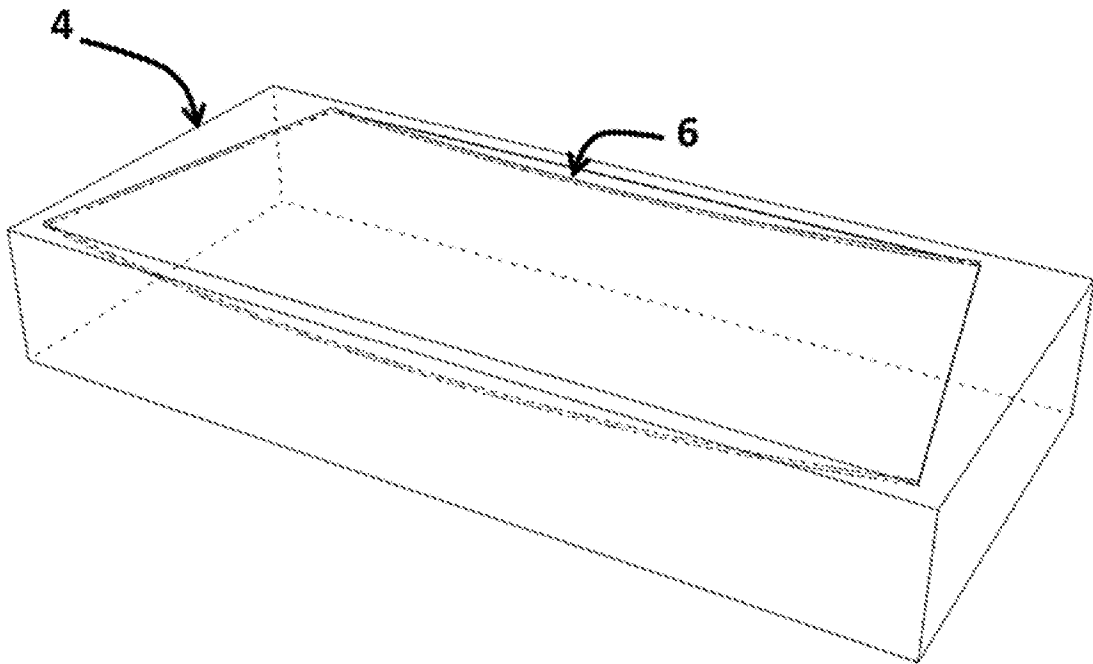


Fig. 9B

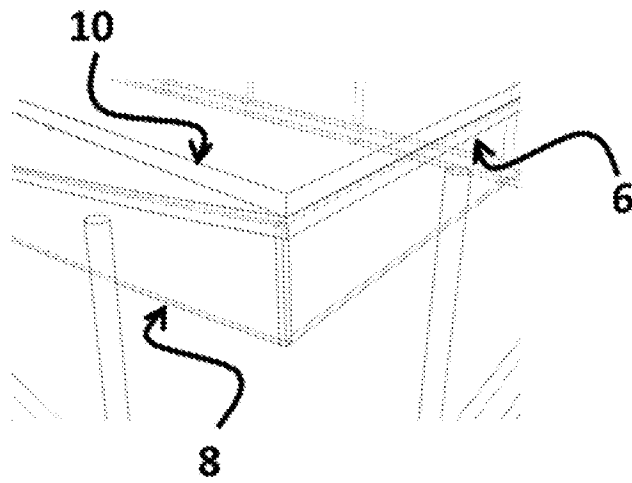


Fig. 10A

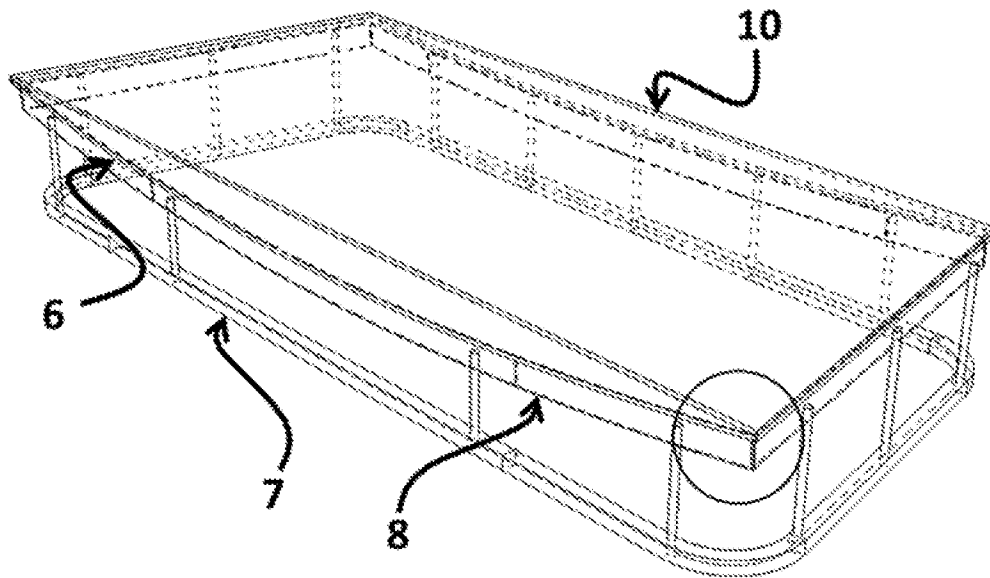


Fig. 10B

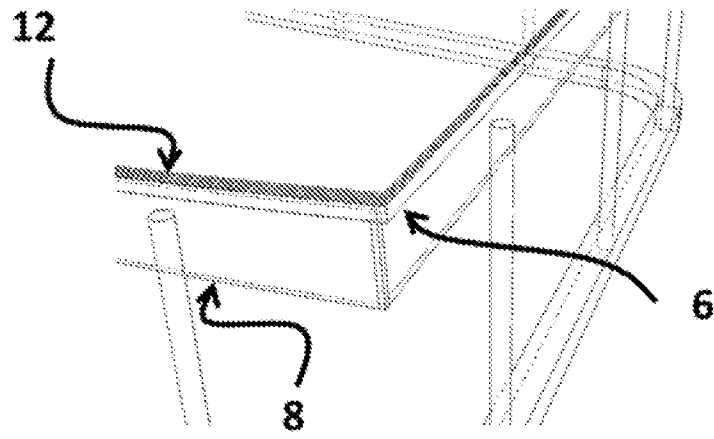


Fig. 11A

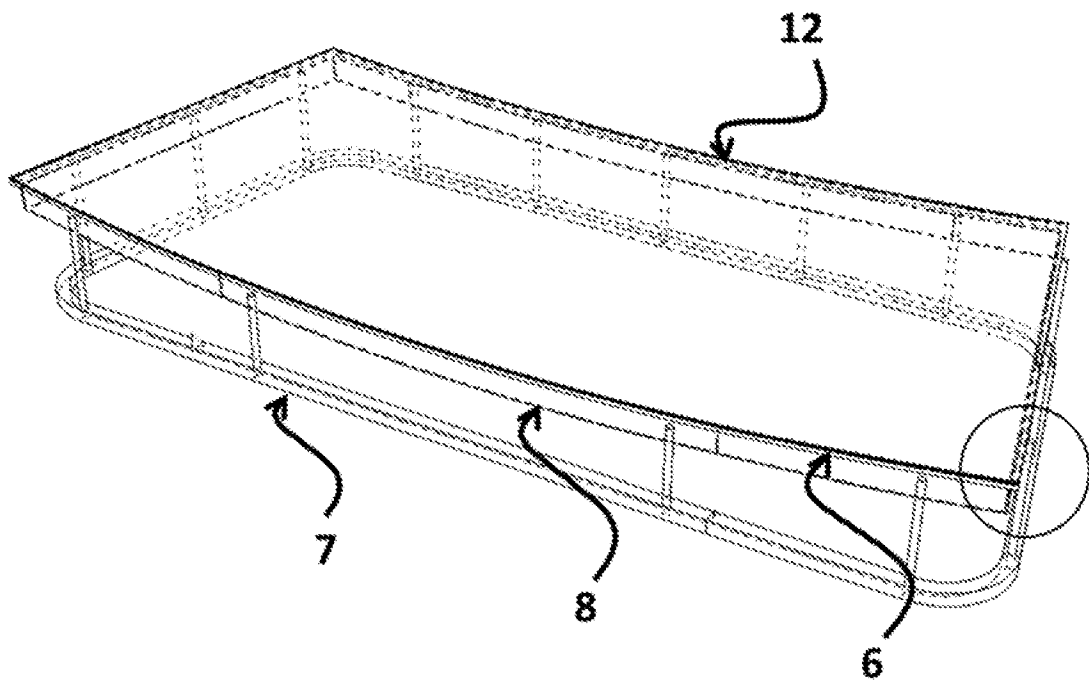
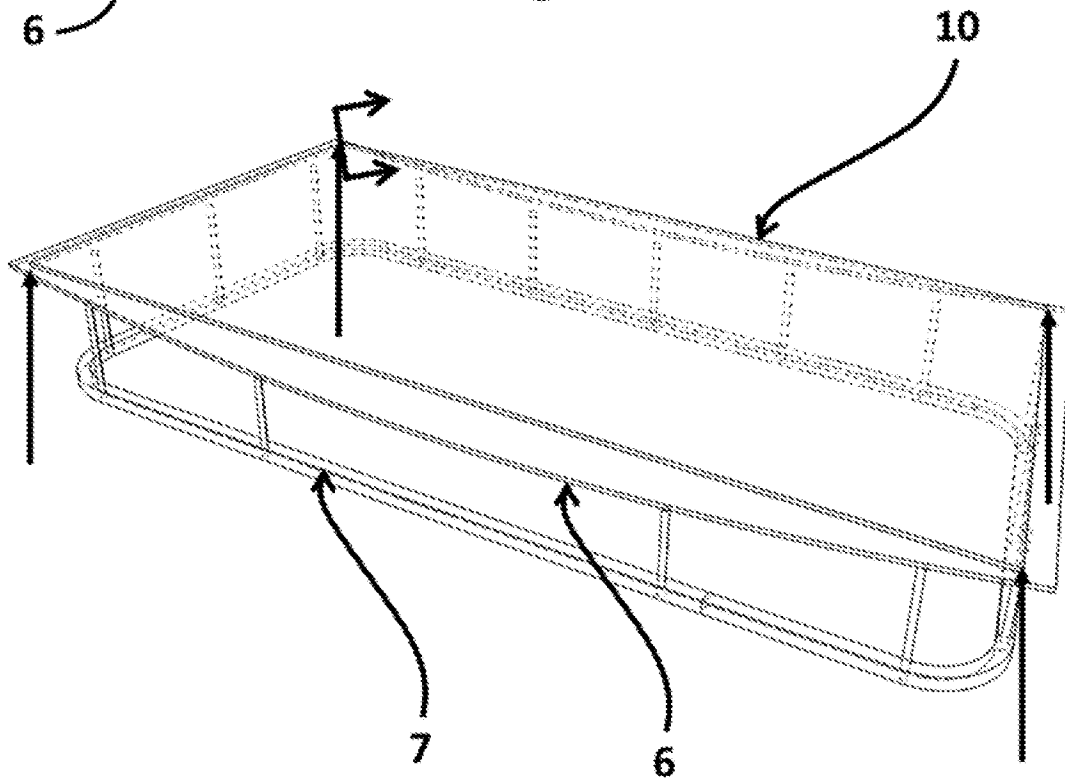
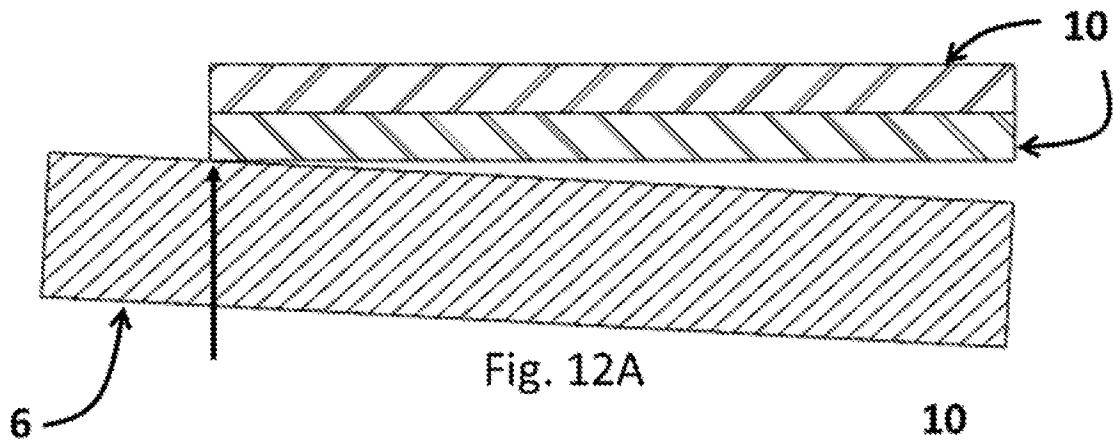


Fig. 11B



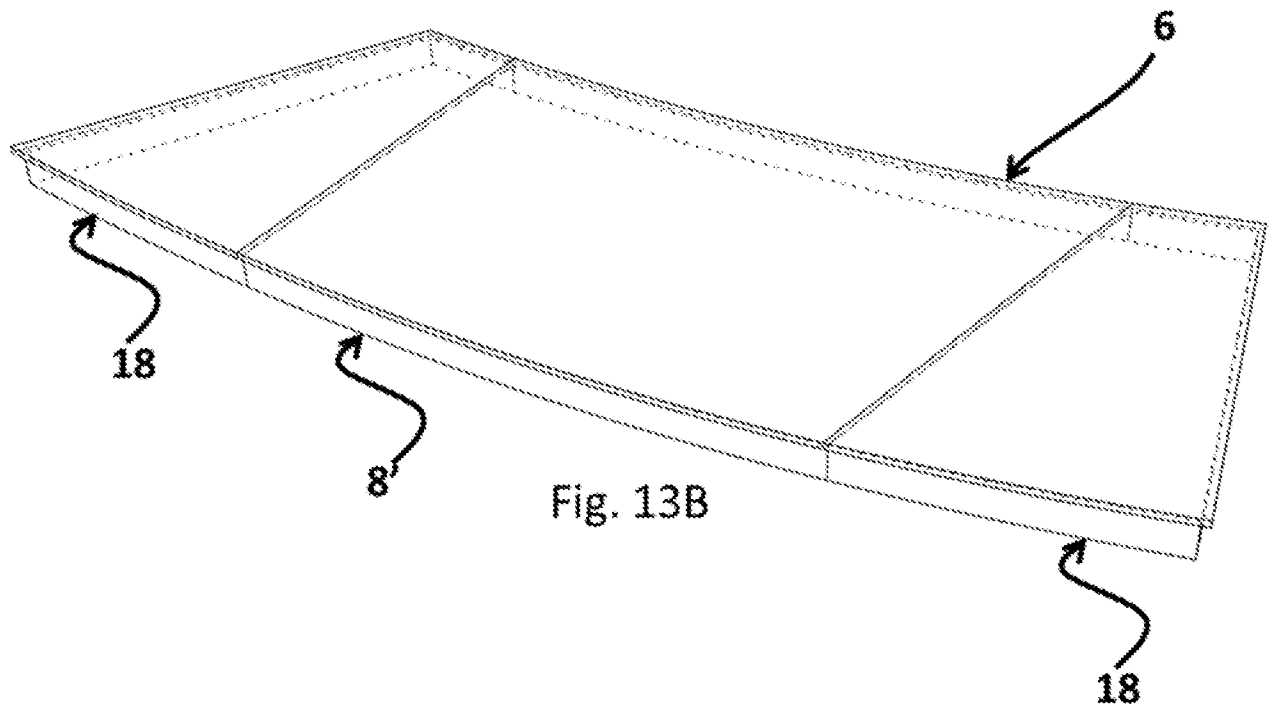


Fig. 13B

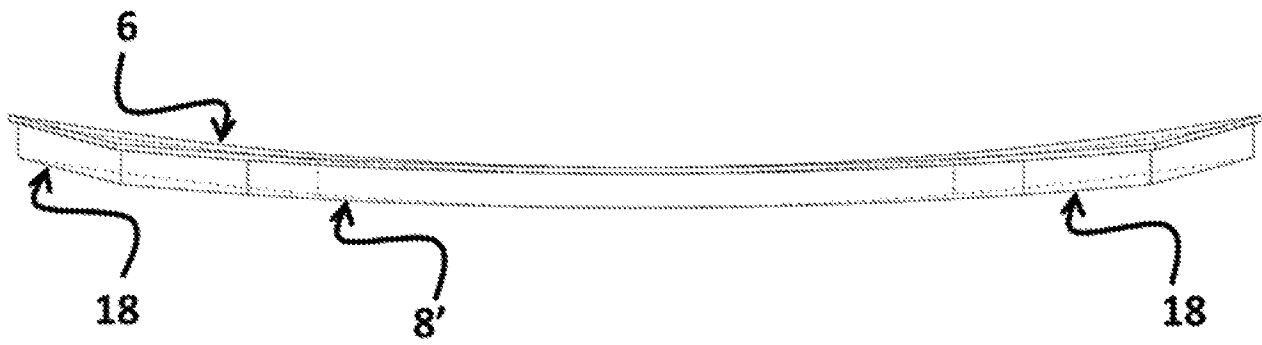
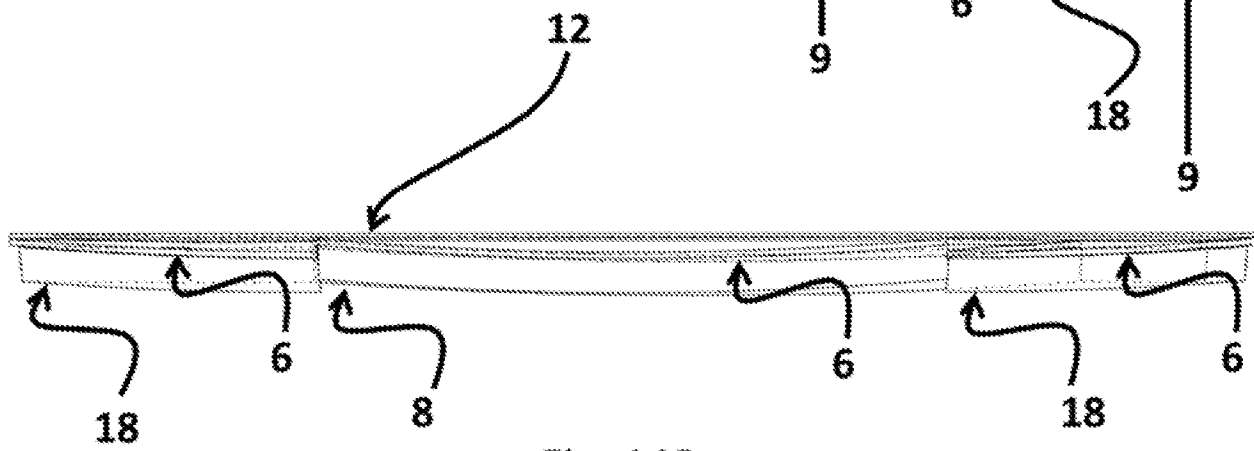
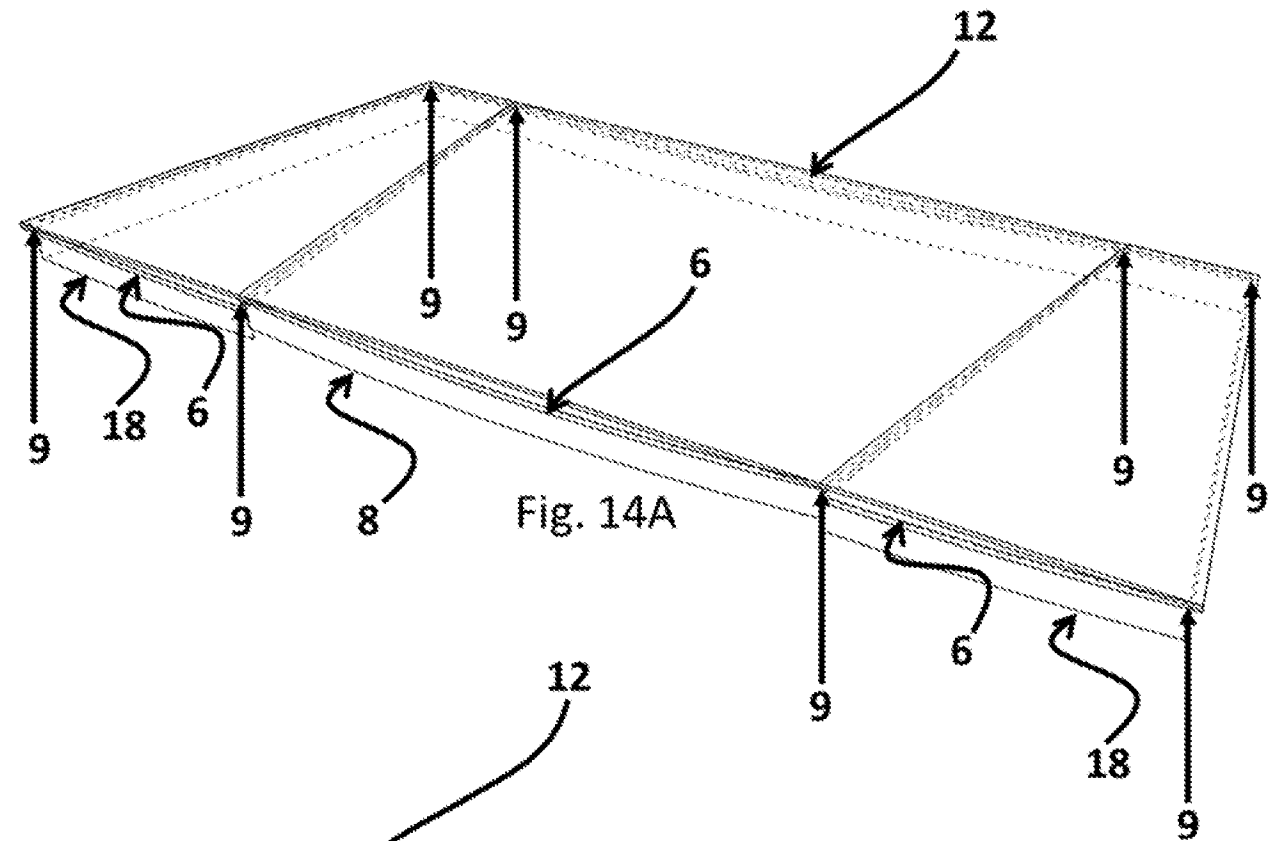


Fig. 13B



Electronic Acknowledgement Receipt

EFS ID:	28766337
Application Number:	62477997
International Application Number:	
Confirmation Number:	8695
Title of Invention:	LOW COST GLASS BENDING MOLD
First Named Inventor/Applicant Name:	Mario Arturo MANNHEIM ASTETE
Customer Number:	130961
Filer:	Joseph L. Morales
Filer Authorized By:	
Attorney Docket Number:	1511.20500
Receipt Date:	28-MAR-2017
Filing Date:	
Time Stamp:	22:10:48
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 260
RAM confirmation Number	032917INTEFSW22123400
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	12084.PDF	1819517	no	9
			2288fb51696dd0e8486efb89d926d69ea44b61e7		
Warnings:					
Information:					
2	Provisional Cover Sheet (SB16)	12086.PDF	1477321	no	4
			55042f97178db866f70083108b5c64b4b92cc9c0		
Warnings:					
Information:					
3		12111.PDF	1267488	yes	23
			fc135a6a694a681c7129bc5267066e82eab23787		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	8	
	Claims		9	9	
	Drawings-only black and white line drawings		10	23	
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	29646	no	2
			63182767cb1c18dce44854d62018566c7e3a7c9e		
Warnings:					
Information:					
Total Files Size (in bytes):			4593972		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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. NC2017/0007433

Solicitud de Patente de Invención titulada: “MOLDE DE CURVADO DE
VIDRIO DE BAJO COSTO”

Solicitante: AGP AMERICA S.A.

Nuestra Ref.: P2017/000098

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 62/477,997 de fecha 28 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