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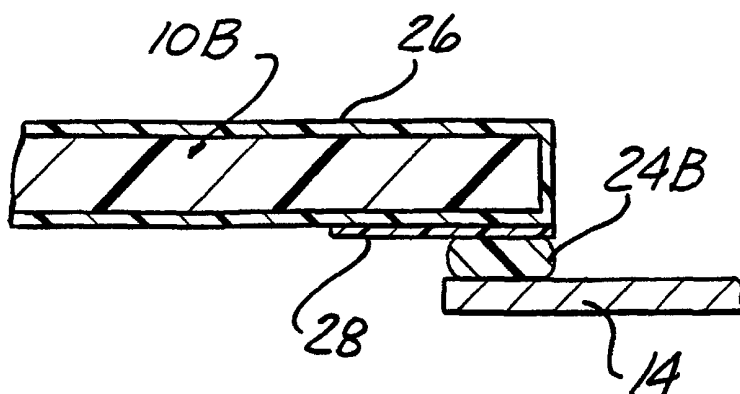
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: PROCESS AND PANEL FOR PROVIDING FIXED GLAZING FOR AN AUTOMOTIVE VEHICLE



(57) Abstract: A process and panel (10B) for fixed automotive glazing, the panel (10B) molded from polycarbonate, a UV radiation blocking hard coat (26) deposited thereon, and a pigmented primer (28) applied in a defined band extending about the perimeter. The hard coat (26) protects the pigmented primer coating (28) so that two separate coatings are not required.



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1 **PROCESS AND PANEL FOR PROVIDING FIXED GLAZING**
2 **FOR AN AUTOMOTIVE VEHICLE**
3
4

5 Cross Reference to Related Applications

6 This application claims the benefit of the filing date of provisional application
7 60/140,225, filed on June 22, 1999.

8
9 Background of the Invention

10 This invention concerns automotive glazing and more particularly glazing
11 panels of a molded synthetic resin, such as polycarbonate. Conventional glass panels have
12 been used for automotive glazing applications for many years.

13 In one type of automotive window construction currently in common use,
14 fixed glazing panels have been installed using an adhesive bonding of the perimeter of the
15 panels to a body structure defining a window opening.

16 This construction requires masking of the perimeter to conceal the bonded
17 joint for aesthetic purposes, and to prevent degrading of the adhesive by exposure to the
18 ultraviolet radiation present in sunlight. An effective masking which is in widespread use is a
19 black-out bond applied about the perimeter of the inside surface of the glazing panel. This
20 black-out band must be accurately applied in order to be aligned with the bonded glazing
21 joint to properly mask the same. In the case of glass glazing, a baked-on finish has typically
22 been utilized to produce a black border, since the glass panel is usually formed after being
23 heated in an oven, and the heating required for forming can be advantageously used to
24 achieve curing of the black-out ink.

25 The use of an adhesive joint also requires priming of the glazing surface to
26 achieve proper bonding of the adhesive to the surface of the glazing panel.

1 Thus, multiple coatings are required to be applied about the perimeter of the
2 glazing panel in order to practice this type of automotive window construction.

3 It has long been proposed to mold automotive glazing panels from a synthetic
4 resin, such as polycarbonate, in order to reduce vehicle weight, improve occupant protection,
5 and to allow greater body styling flexibility, due to the ease of producing markedly curved
6 panels.

7 Such molded panels are contemplated as being especially adapted for use in
8 fixed glazing installations where a black-out border is necessary.

9 It is the object of the present invention to provide a simplified process and
10 panel for creating a masked bonded joint for fixed automotive glazing panels of molded
11 synthetic resin of the type described above.

12

13 Summary of the Invention

14 The above recited object and others which will be understood upon a reading
15 of the following specification and claims are achieved by the step of applying an adhesive
16 primer coating to an inside perimeter surface of a polycarbonate panel, the primer also
17 containing a black-out pigmentation. The pigmented primer is applied in a band extending
18 about the panel perimeter in a defined pattern so as to produce an aesthetically suitable
19 masking border on the inside surface of the panel.

20 The molded polycarbonate panel is hard coated prior to applying the
21 pigmented primer to the panel inside surface to improve abrasion resistance. The hard coat
22 also has a UV blocking function which serves to protect the pigmented primer coating from
23 degradation by exposure to the UV radiation present in sunlight.

1

2 Description of the Drawings

3 Figure 1 is a fragmentary side view of an automotive vehicle incorporating a
4 fixed glazing panel having masking a black-out border treatment.

5 Figure 2A is a fragmentary sectional view taken through a prior art bonded
6 joint of a fixed glazing panel with coating portions exaggerated for clarity.

7 Figure 2B is a fragmentary sectional view taken through a fixed glazing panel
8 bonded joint, as produced by a process according to the present invention, with the thickness
9 of the coatings exaggerated for clarity.

10

11 Detailed Description

12 In the following detailed description, certain specific terminology will be
13 employed for the sake of clarity and a particular embodiment described in accordance with
14 the requirements of 35 USC 112, but it is to be understood that the same is not intended to be
15 limiting and should not be so construed inasmuch as the invention is capable of taking many
16 forms and variations within the scope of the appended claims.

17 Referring to Figure 1, the present invention concerns a fixed glazing panel 10,
18 here shown as the rear side light of an automotive vehicle 12, disposed to the rear of a side
19 door 20 and the "B" pillar 14 of the body structure.

20 The panel 10 is fixedly mounted in a body structure opening 14 in
21 conventional fashion.

22 A black-out border 18 is provided, extending about the entire perimeter of the
23 inner surface of the panel 10 in the well known manner.

1 This black-out border comprises an opaque band concealing the joint between
2 the body structure and the glazing panel 10, to provide an attractive appearance at a relatively
3 low cost.

4 In a prior art glass panel installation, shown in simplified form in Figure 2A
5 omitting moldings and details of the body structure, the border 18A is a baked on finish,
6 cured when the panel 10A is heated for shaping of the panel 10A. The border 18A performs
7 an additional function in this environment, i.e., it acts to block UV radiation, protecting a
8 primer coating 22 and adhesive bead (or elastomeric seal) 24A from degradation which
9 would otherwise occur upon exposure to the UV radiation in sunlight.

10 Figure 2B shows a glazing panel 10B according to the present invention,
11 molded from a synthetic resin, here contemplated as being an injection molded
12 polycarbonate.

13 The entire glazing panel 10B is treated to deposit a hard coat 26 over the entire
14 surface of the panel 10B. This hard coating is of a known type and may comprise several
15 coating layers, including one or more dip coatings.

16 Such dip coatings improve the abrasion resistance of the molded
17 polycarbonate to some extent, but the scratch resistance of the dip coated panel 10B is still
18 insufficient for automotive use. Polycarbonate panels are not themselves sufficiently
19 resistant to weathering to be suitable for automotive glazing, since that material is subject to
20 yellowing when exposed to sunlight even for relatively short periods. This characteristic
21 requires that the dip coatings also provide UV blocking to improve weatherability of the
22 polycarbonate panel. See U.S. patent 4,842,941 for a description of suitable dip coatings.

23 To provide adequate abrasion resistance for automotive application, an
24 additional process has heretofore been developed involving a plasma enhanced chemical

1 vapor deposition (PECVD), often simply referred to as a plasma coating. In the PECVD
2 process, reactants such as organosilicone are activated by a plasma to form a coating on
3 panels disposed in a vacuum chamber into which the activated reactants are introduced.

4 Such plasma coatings are applied over the previously applied dip coatings
5 described above.

6 Reference is made to U.S. patents 5,298,587; 5,320,875; 5,433,786;
7 5,494,712; 5,718,967 and 5,900,284, which set forth further details of plasma coating
8 processes and apparatus which are hereby incorporated by reference.

9 An improved process and apparatus for production of plasma coated panels is
10 described in copending application U.S. serial no. ____, filed on _____, attorney docket no.
11 EXA-108.

12 The hard coat 26 also functions to block UV to protect the panel 10B, which
13 together with the dip coatings will also protect the adhesive bead or seal 24B from the effects
14 of sunlight.

15 The present invention takes advantage of the UV blocking coatings in
16 providing only a single coating 28 on the inner surface extending in a band about the
17 perimeter of the panel 10B, which coating functions both as a primer for the adhesive and as
18 a black-out border. The coating 28 is itself protected from UV radiation by the hard coat 26.

19 A suitable black-out primer for this use is BETASEAL (trademark) which,
20 while sold as a glass primer, will create a secure bond between the hard coat 26, and
21 polyurethane adhesives, seals, etc.

22 BETASEAL (trademark) is available from Essex Specialty Products, Inc.,
23 under product code 15969, that company having a place of business at 1250 Harmon Road,
24 Auburn Hills, Michigan 48326.

1 The BETASEAL material is a liquid including toluene (5-15%), methyl ethyl
2 keytone (40-50%), n-butyl acetate (710%) having a suspended pigment comprised of carbon
3 black (5-15% by weight), having sufficiently low viscosity such as to be able to be sprayed
4 on to the panel 10B for coating the panel perimeter as described.

5 The pigmented primer coating 28 must be applied in a band accurately located
6 with respect to the panel edge so as to ensure that the coating 28 thereby suitably masks the
7 bonded joint. In addition, a neat edge should be maintained as the black-out border is
8 prominently visible and thus comprises an aesthetic feature. A frosting treatment can be used
9 on the opposite panel surface to lessen the need for a neat edge.

10 Suitable application techniques for the combined primer and black-out
11 material include first masking the regions of the panel adjacent the perimeter of the panel, as
12 by use of a well known hinged masking screen, and then spray coating the unmasked border
13 with the material to form a black band extending around the panel inside surface.

14 Other suitable techniques could be utilized adapted to the particular flow
15 characteristics of the primer-blackout material, such as ink jet printing, screen printing, flow
16 coating, etc.

17 The resulting band border has been found to successfully perform the
18 functions as described.

19 Handling of the panels 10B during these steps is facilitated by molding in one
20 or more tabs, as described in detail in copending U.S. patent application serial no.
21 09/227,888, filed on March 29, 1999, attorney docket no. EXA-101. The tab or tabs are
22 trimmed off after the panel process is completed, as described in that application.

23 The black-out border can take various forms in addition to a simple band,
24 including a fade-out, or combined with additional treatments such frosting as described

- 1 above, as long as it produces a defined aesthetic feature which effectively masks the adhesive
- 2 joint.
- 3

1 Claims

2

3 1. A process for manufacturing a fixed automotive glazing panel adapted
4 to be mounted in an opening in a automotive body structure, comprising the steps of:

5 molding a glazing panel from a synthetic resin;

6 depositing a UV radiation-blocking hard coat onto said molded panel;

7 applying a pigmented primer coating material onto the perimeter of an inside
8 surface of said hard coated molded panel which is capable of bonding to the hard coat and to
9 an adhesive sealant for mounting said glazing panel to said body structure, and provides a
10 masking of the bonded joint between said glazing panel and said body structure.

11

12 2. The process according to claim 1 wherein said glazing panel is molded
13 from polycarbonate.

14

15 3. The process according to claim 1 wherein said application step
16 includes the step of producing a defined border pattern extending about said perimeter of said
17 hard coated panel.

18

19 4. The process according to claim 3 wherein said application step
20 comprises the step of masking said panel in regions adjacent said panel perimeter, and
21 spraying said pigmented primer coating material onto said panel perimeter.

22

23 5. A process according to claim 1 wherein said pigmented primer coating
24 material comprises a hydrocarbon keytone liquid with a carbon block pigment suspension.

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6. A panel for use as a fixed glazing in an automotive vehicle, comprising a panel of clear molded polycarbonate;

said panel having a UV radiation blocking hard coat deposited thereon;

a pigmented primer material applied over said hard coat in a band extending about a perimeter of said panel.

7. A panel according to claim 6 wherein said pigmented primer comprises a hydrocarbon ketone liquid with a carbon black pigment suspension.

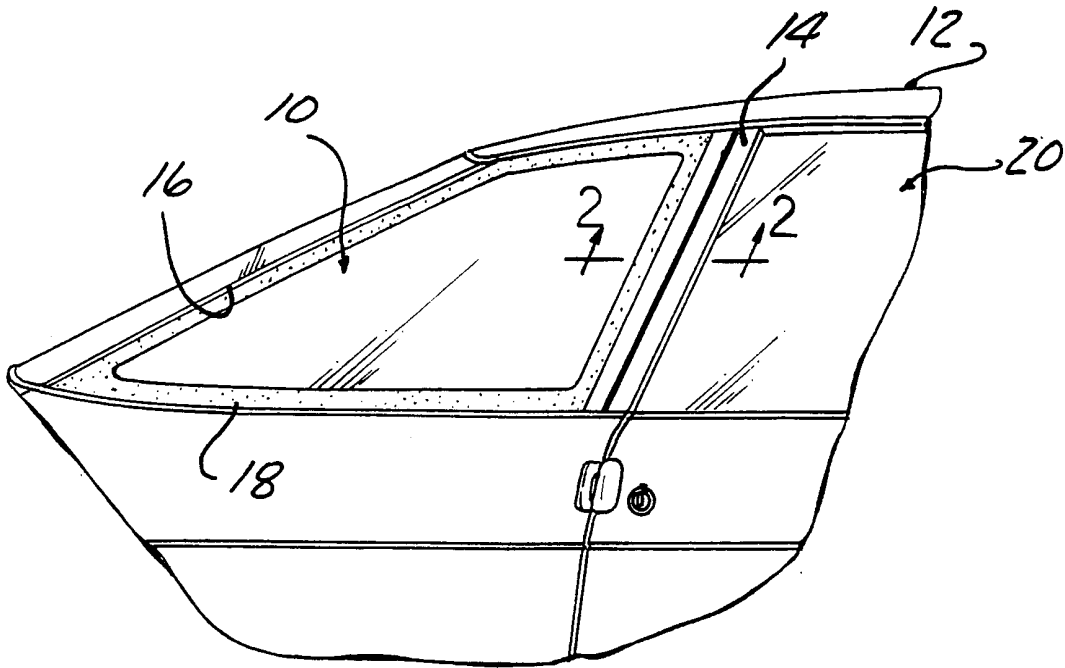


FIG. 1

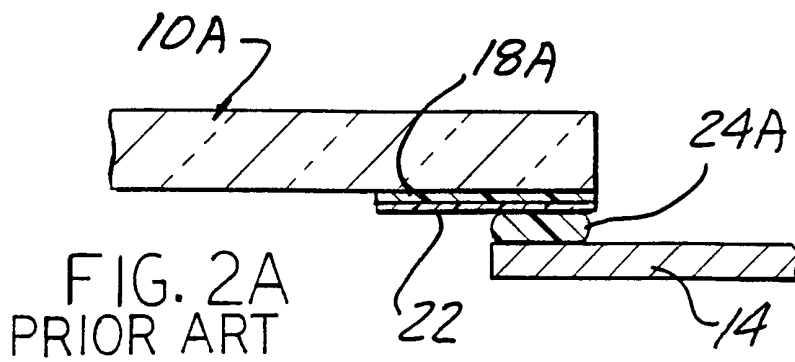


FIG. 2A
PRIOR ART

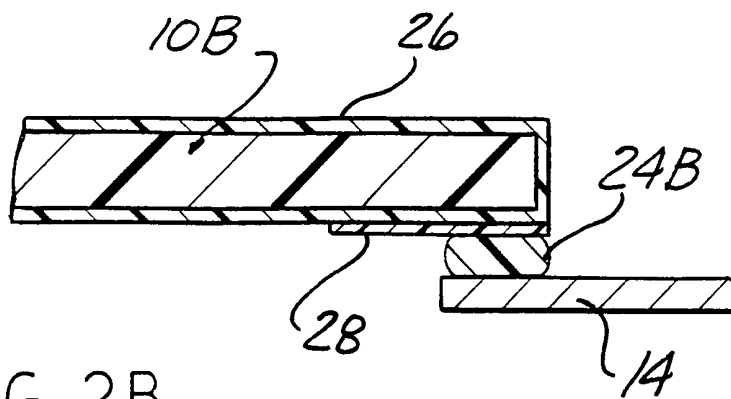


FIG. 2B

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US00/16398

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :B05D 5/10, 5/06

US CL : 427/163.1, 164, 284

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 427/163.1, 164, 284, 162, 165, 168

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

BRS search terms: polycarbonate, molded, primer, pigment, glazing panel, window, windshield, hard coat

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,008,305 A (WANG et al) 28 December 1999, col. 2, lines 36-44; col. 7-8; Examples 3 and 6.	1-7
Y	US 6,000,814 A (NESTELL et al) 14 December 1999, Abstract, col. 6, col. 11.	1-7
A	US 4,407,847 A (BOAZ) 04 October 1983, col. 4, lines 43-60.	1-7

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

29 AUGUST 2000

Date of mailing of the international search report

19 SEP 2000

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