

1) Family number: 8203003 (US4265650A)

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Title: Method of bending glass sheets in unison to complicated shapes

Abstract: In shaping a pair of glass sheets simultaneously to a complicated shape including a longitudinal component of bend and a complicated transverse component of bend such as one that is S-shaped in elevation or other complicated shapes, the pair is sag bent in unison on an outline mold to sag bend the sheets to a shape approximating their longitudinal component of bend, then the pair of sag bent sheets is lifted on a solid mold having a complicated shape including said complicated transverse component of bend to impress said transverse component of bend (into engagement with an upper pressing mold of complementary curvature, if needed) and supported on said solid mold for the minimum time sufficient to develop said complicated shape. The pair of glass sheets bent to said complicated shape is returned as rapidly as possible to said outline mold and cooled at a controlled rate while supported on said outline mold to a temperature below the strain point to insure that the pair of glass sheets retain their complicated conformed shapes so that they can be laminated subsequently with minimum difficulty. The viewing area of the bent glass is engaged with a solid mold while at an elevated temperature at which the glass surface is likely to be marred for a minimum time needed to impart the transverse component of bend thereon.

Classifications:

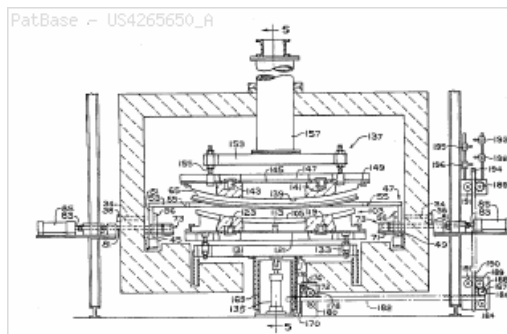
International (IPC 8-9): C03B23/025 C03B23/03 (Advanced/Invention)

International (IPC 1-7): C03B23/025 C03B23/03

CPC: C03B23/0256 C03B23/0302

European: C03B23/025C C03B23/03 C03B23/03B

US: 65/104 65/106 65/107 65/287



Family:

Publication number	Publication date	Application number	Application date
US4265650 A	19810505	US19790090819	19791102

Priority:

US19790090819 19791102

Probable Assignee: PPG INDUSTRIES INC

Assignee(s): (std): PPG IND INC ; PPG INDUSTRIES INC

Inventor(s): (std): THOMAS DEAN L ; REESE THOMAS J

2) Family number: 15160014 (US5383990A)

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Title: METHOD FOR BENDING AND LAMINATING A PAIR OF GLASS PLATES

Abstract: In a curved laminated glass comprising a plurality of glass plates which are bent in a substantially convex form, laminated and bonded together, an outer glass plate is softened faster than an inner glass plate when they are located in an atmosphere of high temperature which is higher than a temperature capable of bending glass.

Classifications:

International (IPC 8-9): B32B17/10 C03B23/025 C03B23/027

C03B23/03 (Advanced/Invention);

B32B17/06 (Core/Invention)

International (IPC 1-7): C03B23/023 C03B23/025 C03B23/027

C03B23/03 C03C27/10

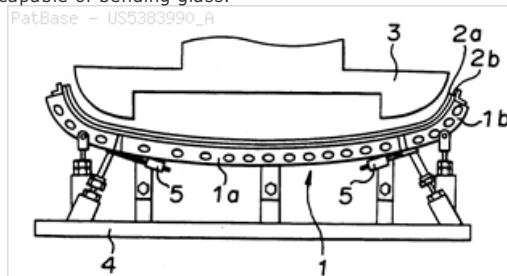
CPC: B32B17/10889 C03B23/0258 B32B17/10036 C03B23/027

C03B23/0305

European: B32B17/10C4 C03B23/025 C03B23/025D C03B23/027

C03B23/03 C03B23/03C

US: 156/102 65/106 65/107



Family:

Publication number	Publication date	Application number	Application date
DE69010112 D1	19940728	DE19906010112	19900822
DE69010112 T2	19950209	DE19906010112T	19900822
EP0414232 A1	19910227	EP19900116111	19900822
EP0414232 B1	19940622	EP19900116111	19900822
JP2727745 B2	19980318	JP19900218223	19900821
JP3205321 A2	19910906	JP19900218223	19900821
US5383990 A	19950124	US19930070058	19930601

Priority:

JP19890216053 19890824

US19900567733 19900815

US19920856888 19920325

Probable Assignee: ASAHI GLASS CO LTD**Assignee(s):** (std): ASAHI GLASS CO LTD**Assignee(s):** ASAHI GLASS CO LTD TOKIO TOKYO JP ; ASAHI GLASS COMPANY LTD ; ASAHI GARASU KK**Inventor(s):** (std): TSUJI HIROSHI**Inventor(s):** TSUJI HIROSHI TSURUMI KU YOKOHAMA SHI KANAGAWA KEN JP ; TSUJI HIROSHI TSURUMI KU YOKOHAMA SHI KANAGAWA... ; TSUJI HIROSHI TSURUMI KU YOKOHAMA SHI KANAGAWA KEN**Designated states:** BE DE FR GB IT**3) Family number: 59510023** (US2016303831A)

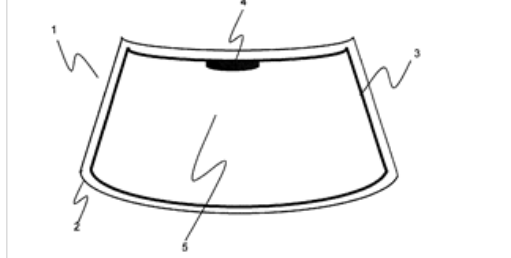
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Title: LAMINATED SAFETY GLASS**Abstract:** A method for producing laminated safety glass includes the steps of applying imagewise a thermally reducible composition including an organic metal salt on a glass surface or a thermoplastic polymeric surface, and heating at least the imagewise applied thermally reducible composition to form a metal from the organic metal salt.**Classifications:****International (IPC 8-9):** B32B17/10 B32B37/06 B60J1/00 B60J1/02 B60J3/00 C03C27/12 (Advanced/Invention)**CPC:** B60J3/007 B32B37/06 B32B2605/006 B32B2605/08

B32B17/10266 B32B17/10036

US: 428/426

PatBase - US2016303831_A9

**Family:**

Publication number	Publication date	Application number	Application date
BR112016013137 A2	20170808	BR20161113137	20141209
CN107073901 A	20170818	CN201480068329	20141209
EP2883694 A1	20150617	EP20130196873	20131212
IN201617019251 A	20160831	IN201617019251	20160603
JP2017500271 T2	20170105	JP20160549640T	20141209
JP6313861 B2	20180418	JP20160549640T	20141209
US2016303831 AA	20161020	US20140100671	20141209
WO15086564 A1	20150618	WO2014EP76982	20141209

Priority:

EP20130196873 20131212 WO2014EP76982 20141209

Probable Assignee: AGFA GEVAERT NV**Assignee(s):** (std): AGFA GEVAERT ; AGFA GEVAERT NV ; AGFA GRAPHICS NV**Assignee(s):** AGFA NV ; AGFA GRAPHICS N V**Inventor(s):** (std): LOCCUFIER JOHAN ; FRANSEN GUIDO ; CLOOTS TOM**Inventor(s):** GUIDO FRANSEN ; JOHAN LOCCUFIER ; TOM CLOOTS**Agent(s):** STRIJCKERS HANS LOUIS P; STRIJCKERS HANS**Designated states:** AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW**4) Family number: 29530040** (US5279635A)

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Title: Method and apparatus for controlling the temperature of glass sheets in press bending**Abstract:** A method of and apparatus for establishing a predetermined thermal profile in a glass sheet immediately prior to press bending outside the heating furnace. The press bending members are provided with arrays of heating elements that are individually or zone regulated to assist in establishing an optimum temperature profile in the glass sheet conducive to proper bending. The temperature profile established in the heated sheet by the arrays of heating elements is coordinated with that established in the furnace and subsequently, modified by heat dissipation as the glass sheet advances to the bending station to achieve the proper bending temperature. The heating elements can also be utilized to create a temperature profile in the glass sheet generally higher than that originally established in the furnace. The sheet can be held in contact with one or both of the heated press members for a brief period of time after bending to slow the cooling rate of the sheet and increase the edge strength of the marginal edge area thereof.**Classifications:****International (IPC 8-9):** C03B23/023 C03B23/03

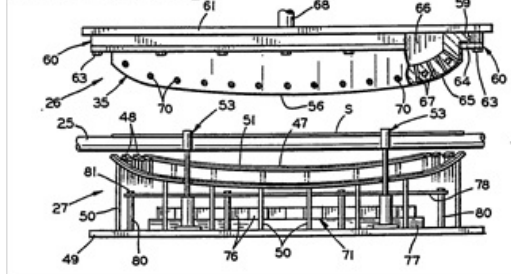
H01L33/00 (Advanced/Invention);

C03B23/02 H01L33/00 (Core/Invention);

C03B23/23 (Core/Non-invention)

International (IPC 1-7): C03B C03B23/03 C03B23/23 C03C**CPC:** C03B23/0307 C03B2225/02**European:** C03B23/03 C03B23/03D M03B225/02**US:** 65/103 65/104 65/106 65/273 65/288 65/355 65/356

PatBase - US5279635_A



Family:

Publication number	Publication date	Application number	Application date
AT172443 E	19981115	AT19920925449T	19921125
AU199331500 A1	19930803	AU19930031500	19921125
AU661536 B2	19950727	AU19930031500	19921125
CA2104101 AA	19930813	CA19922104101	19921125
CA2104101 C	20030211	CA19922104101	19921125
DE69227364 D1	19981126	DE19926027364	19921125
DE69227364 T2	19990602	DE19926027364T	19921125
EP0575573 A1	19931229	EP19920925449	19921125
EP0575573 A4	19940615	EP19920925449	19921125
EP0575573 B1	19981021	EP19920925449	19921125
ES2121877 T3	19981216	ES19920925449T	19921125
FI101696 B	19980814	FI19930003924	19930908
FI933924 A	19930908	FI19930003924	19930908
FI933924 A0	19930908	FI19930003924	19930908
JP3427357 B2	20030714	JP19930512426	19921125
JP6508097 T2	19940914	JP19930512426T	19921125
KR100229686 B1	19991115	KR19930702679	19921125
KR19947000297 A	19940221	KR19937002679	19901125
MX9207387 A1	19930701	MX19920007387	19921217
TW232000 B	19941011	TW19920109632	19921201
US5279635 A	19940118	US19920817784	19920108
US5346526 A	19940913	US19930108238	19930819
WO9314038 A1	19930722	WO1992US10266	19921125
ZA9209726 A	19930622	ZA19920009726	19921215

Priority:

WO1992US10266 19901125 US19920817784 19920108 WO1992US10266 19921125
US19930108238 19930819

Probable Assignee: LIBBEY OWENS FORD CO

Assignee(s): (std): LIBBEY OWENS FORD CO

Assignee(s): LIBBEY OWENS FORD CO TOLEDO OHIO US ; LIBBEY OWENS FORD COUS ; NISSEN TIMOTHY A ; PROCACCINI VINCENT N ; DEB SUGATO ; FLAUGHER JEFFREY R

Inventor(s): (std): JEFFREY R FLAUGHTER ; NISSEN TIMOTHY A ; PROCACCINI VINCENT N ; SUGATO DEB ; DEB SUGATO ; FLAUGHER JEFFREY R ; FLAUGHTER JEFFREY R ; NISSEN TIMOTHY ; PROCACCINI VINCENT ; FLAUGHER JEFFREY

Inventor(s): NISSEN TIMOTHY A WESTLAND MI 48185 US ; JEFFREY R FLAUGHER ; FLAUGHER JEFFREY R CARLTON MI 48117 US ; DEB SUGATO PERRYSBURG OH 43551 US ; TIMOTHY A NISSEN ; VINCENT N PROCACCINI ; PROCACCINI VINCENT N TOLEDO OH 43605 US

Agent(s): PHILLIPS ORMONDE FITZPATRICK; MACRAE AND CO

Designated states: AT AU BE CA CH DE DK ES FI FR GB GR IE IT JP KR LI LU MC NL PT SE

5) Family number: 22837086 (US2957277A)

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Title: APPARATUS FOR BENDING GLASS SHEETS

Abstract: (Claim 1) 'We claim: In apparatus for bending glass sheets the combination of a tunnel-type bending furnace having a heating zone and a cooling zone, a bending mold having a shaping surface and mounted for movement through said furnace, a plurality of fingers mounted for movement relative to said shaping surface from a position below said surface to a position above said surface and through the plane of a glass sheet bent into contact with said surface at spaced points Within the area of said sheet, means for moving said fingers simultaneously to cause them to lift a bent glass sheet from the shaping surface of the mold to a supported position above said surface, first actuating means located within the cooling zone of said furnace and in the path of travel of said mold for actuating the first mentioned means as the mold moves past said actuating means, a first conveyor in the cooling zone of said furnace arranged above the path of movement of said mold, a glass sheet supporting element, means for carrying the said element on the said conveyor, a second conveyor for delivering the said supporting element to an area adjoining the cooling zone of said furnace, transfer means for transferring said supporting element from the second mentioned conveyor to the first mentioned conveyor, second actuating means for initiating operation of the transfer means after the mold has moved past the said first actuating means, positioning means on said transfer means for positioning the supporting element to be received by said first conveyor for operating said positioning means after movement of the transfer means from the second to the first conveyor, and means for operating the said first conveyor after said supporting element has been positioned to engage the same and carry it forwardly to remove a bent glass sheet from its supported position above the shaping surface of a mold.

Classifications:

International (IPC 8-9): C03B23/027

C03B35/20 (Advanced/Invention);

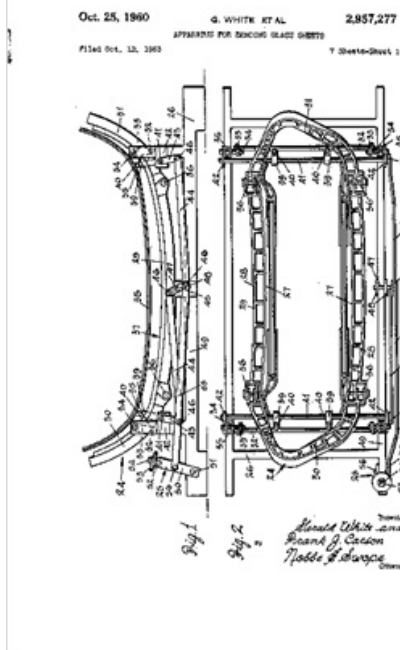
C03B23/02 C03B35/00 (Core/Invention)

International (IPC 1-7): C03B23/02 C03B23/027

CPC: C03B23/027 C03B35/202

European: C03B23/027 C03B35/20B

US: 271/69 414/564 414/592 65/273 65/290

**Family:**

Publication number	Publication date	Application number	Application date
BE532496 A	00000000		00000000
US2957277 A	19601025	US19530385534	19531012

Priority:

US19530385534 19531012

Probable Assignee:

LIBBEY OWENS FORD GLASS CO

Assignee(s): (std):

LIBBEY OWENS FORD GLASS CO

Assignee(s):

LIBBEY OWENS FORD GLASS COMPANY

Inventor(s): (std):

GERALD WHITE ; CARSON FRANK J

Inventor(s):

WHITE GERALD

6) Family number: 42769112 (US2009000334A)

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Title: GLASS BENDING PROCESS

Abstract: A glass bending line for quickly shaping a complex bent glass sheet is provided that includes moving a ring-type female mold, which has a heated glass sheet placed on it, and a full face heated male mold, toward one another. Upon making shaping contact between the glass sheet and the male mold, a vacuum is applied through holes extending through the male mold, for a time sufficient to form the glass sheet to a desired shape. When the glass sheet has been shaped, the vacuum is terminated and pressurized air is connected to the holes to release the bent glass sheet from the male mold. The bent glass sheet is then quickly transported to a quenching station or an annealing station on a continuous conveying device. Hence, the complex bent glass sheet is achieved without the use of a shuttle ring.

Classifications:

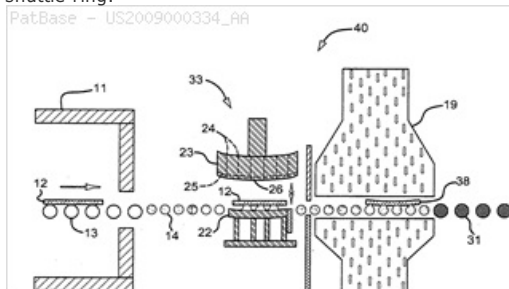
International (IPC 8-9): C03B11/00 C03B11/07 C03B23/03 C03B23/035 C03B25/00 C03B35/16 C03B40/00 (Advanced/Invention); C03B23/03 C03B23/035 C03B35/16 (Advanced/Non-invention); C03B23/02 C03B25/00 C03B35/00 (Core/Invention)

International (IPC 1-7): C03B23/03 C03B23/035 C03B35/16

CPC: C03B23/0352 C03B40/005 C03B225/02 C03B23/03 C03B35/16

European: C03B23/03 C03B23/035B C03B35/16 C03B40/00F M03B225/02

US: 65/104 65/104P 65/106 65/106S

**Family:**

Publication number	Publication date	Application number	Application date
BRPI0812974 A2	20150218	BR2008PI12974	20080407
BRPI0812974 B1	20190108	BR2008PI12974	20080407
CN101720308 A	20100602	CN200880022275	20080407
CN101720308 B	20130327	CN200880022275	20080407
EP2173675 A1	20100414	EP20080742613	20080407
EP2173675 B1	20181107	EP20080742613	20080407
IN00057KN2010 A	20100430	IN2010KN00057	20100105
IN274391 B	20160729	IN2010KN00057	20100105
JP2010531289 T2	20100924	JP20100514748T	20080407
JP5431317 B2	20140305	JP20100514748T	20080407

KR101474046 B1	20141217	KR20107001734	20080407
KR20100053517 A	20100520	KR20107001734	20080407
MY147562 A	20121231	MY20090005493	20080407
RU2010102136 A	20110810	RU20100102136	20080407
RU2466106 C2	20121110	RU20100102136	20080407
US2009000334 AA	20090101	US20070823409	20070627
US7975509 BB	20110712	US20070823409	20070627
WO09002375 A1	20081231	WO2008US04498	20080407

Priority:

US20070823409 20070627 WO2008US04498 20080407

Probable Assignee: PILKINGTON NORTH AMERICA INC

Assignee(s): (std): BOISSELLE ROBERT J ; KLEMAN THOMAS G ; LUBELSKI DANIEL P ; PILKINGTON NORT AMERIKA INK ; PILKINGTON NORTH AMERICA INC

Inventor(s): (std): BOJSSELL ROBERT DZH ; DANIEL P LUBELSKI ; KLEMAN TOMAS G ; LJUBEL SKI DANIEL P ; ROBERT J BOISSELLE ; THOMAS G KLEMAN ; LUBELSKI DANIEL P ; KLEMAN THOMAS G ; BOISSELLE ROBERT J

Inventor(s): BOISSELLE ROBERT ; LJUBEL'SKI DANIEL P. ; LUBELSKI DANIEL ; KLEMAN THOMAS

Agent(s): PFENNING MEINIG AND PARTNER GBR; PFENNING MEINIG AND PARTNER MBB; MARSHALL AND MELHORN LLC; SCHURR DONALD A ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

7) Family number: 71543136 (WO1818887A1)

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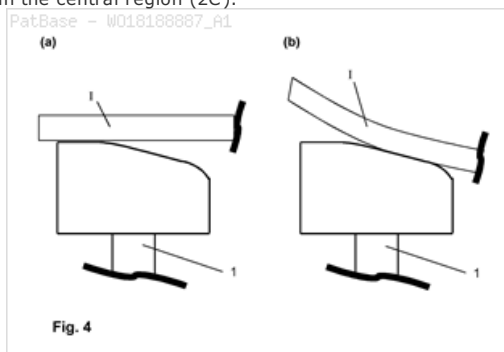
Title: GRAVITY BENDING MOULD FOR BENDING GLASS PANES HAVING A CURVED SUPPORT SURFACE

Abstract: The present invention relates to a gravity bending mould (1) for bending glass panes, comprising a frame-like support surface (2), which is suitable for arranging a glass pane (1) thereon, and which has an outer edge (3) and an inner edge (4), wherein the support surface (2) has an external region (2A) close to the outer edge (3), an internal region (2B) close to the inner edge (4), and a central region (2C) between the external region (2A) and the internal region (2B), and wherein the external region (2A) is planar and horizontal, the central region (2C) is inclined towards the inner edge (4) and is planar or curved, and the internal region (2B) has a curvature in the opposite direction to the curvature of the glass pane (1), and wherein the internal region (2B) is curved to a greater extent than the central region (2C).

Classifications:

International (IPC 8-9): C03B23/025 C03B23/03 (Advanced/Invention)

CPC: C03B23/0252 C03B23/03



Family:

Publication number	Publication date	Application number	Application date
CN109041574 A	20181218	CN201880000582	20180315
WO18188887 A1	20181018	WO2018EP56470	20180315

Priority:

EP20170165666 20170410 WO2018EP56470 20180315

Probable Assignee: SAINT GOBAIN

Assignee(s): (std): SAINT GOBAIN

Assignee(s): SAINT GOBAIN GLASS FRANCE

Inventor(s): (std): ZEICHNER ACHIM ; SCHILLINGS PETER ; PALMANTIER ARTHUR ; BORDERIOU ARNAUD

Agent(s): FEIST FLORIAN ARNO

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DJ DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JO JP KE KG KH KM KN KP KR KW KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

8) Family number: 3778137 (US4282026A)

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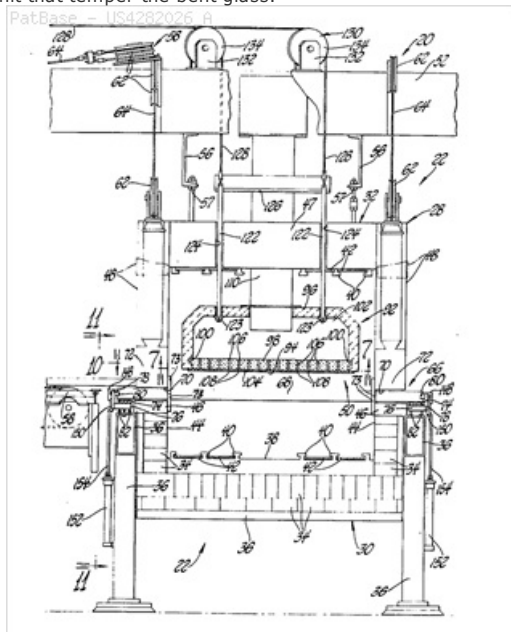
Title: Apparatus for bending and tempering glass

Abstract: Sheet glass is heated during conveyance on a conveyor within a furnace. A vacuum holder is positioned within the furnace housing above the conveyor and has a downwardly facing surface with spaced openings in which a vacuum is drawn to receive a glass sheet from the conveyor and support the sheet above the conveyor. The holder surface is disclosed as being both planar and curved and as having a porous cover of ceramic fibers so as to distribute the vacuum and prevent marring of the glass as it is supported. Auxiliary lifters positioned between the rolls or vertical movement of the vacuum holder facilitates glass pickup. A carrier mold ring moves under the supported glass and the vacuum is then terminated so the glass drops onto the ring and bends under the bias of gravity in a manner that allows thin glass to be accurately bent.

Subsequently the mold ring is moved from the furnace to a quench unit that temper the bent glass.

Classifications:

International (IPC 8-9): C03B23/02 C03B23/025 C03B23/03 C03B23/035 C03B27/00 C03B27/044 C03B27/048 C03B29/08 C03B35/14 C03B35/16 C03B35/20 C03B35/24 (Advanced/Invention); C03B27/00 (Advanced/Non-invention); C03B23/02 C03B27/00 C03B29/00 C03B35/00 (Core/Invention)
International (IPC 1-7): C03B11/00 C03B23/02 C03B23/023 C03B23/025 C03B23/035 C03B25/00 C03B27/00 C03B27/06 C03B29/00 C03B35/00 C03B35/14 C03B35/16 C03B35/20
CPC: C03B23/02 C03B23/0252 C03B23/03 C03B23/0357 C03B27/0417 C03B27/048 C03B29/08 C03B35/145 C03B35/164 C03B35/202 C03B35/24 C03B2225/02 C03B40/005
European: C03B23/02 C03B23/025B C03B23/03 C03B23/035B C03B23/035B3 C03B27/048 C03B27/04C C03B29/08 C03B35/14C C03B35/16 C03B35/16D2 C03B35/20B C03B35/24 C03B40/00F M03B225/02
US: 65/104 65/106 65/107 65/114 65/25.4 65/268 65/273 65/348 65/351



Family:

Publication number	Publication date	Application number	Application date
AU197943131 A1	19790802	AU19790043131	19790104
AU523213 B2	19820715	AU19790043131	19790104
BR7900437 A	19790821	BR19790000437	19790124
CA1120725 A1	19820330	CA19790318919	19790102
DE2965480 D1	19830707	DE19792965480	19790104
EP0003391 A1	19790808	EP19790300012	19790104
EP0003391 B1	19830525	EP19790300012	19790104
FI790218 A	19790726	FI19790000218	19790123
IN150716 A	19821120	IN1979CA00074	19790124
JP1368962 C3	19870311	JP19790007653	19790125
JP54110217 A2	19790829	JP19790007653	19790125
JP61032264 B4	19860725	JP19790007653	19790125
MX151961 A	19850522	MX19790176399	19790125
MY8501076 A	19851231	MY19850001076	19851230
US4282026 A	19810804	US19800118822	19800205
US4361432 A	19821130	US19810263436	19810514
US4364765 A	19821221	US19810263670	19810514
US4437871 A	19840320	US19810263626	19810514
US4437872 A	19840320	US19810268535	19810529
ZA7900039 A	19791227	ZA19790000039	19790104

Priority:

US19780872201 19780125	CA19790318919 19790102	US19800118822 19800205
US19810263436 19810514	US19810263670 19810514	US19810263626 19810514
US19810268535 19810529		

Probable Assignee: GLASSTECH INC A DE CORP

Assignee(s): (std): MCMaster H A ; MCMaster HAROLD ; HARORUDO ATSUSHIYUREI MAKUMASU ; NITSCHKE N C ; NITSCHKE J S ; NITSCHKE JOHN STEPHEN ; NITSCHKE NORMAN CARL ; NITSCHKE N ; NITSCHKE J

Assignee(s): NORMAN CARL NITSCHKE ; NITSCHKE NORMAN C ; MCMaster NITSCHKE AND LARIMER ; BANK OF AMERICA NA ; FIRST NATIONAL BANK OF BOSTON ; FIRST NATIONAL BANK OF BOSTON AS COLLATERAL TRUST ; GLASSTECH INC ; GLASSTECH INC A DE CORP ; GLASSTECH INT ; GLASSTECH INT LP A PARTNERSHIP OF DE LTD ; MCMaster NITSCHKE AND LARIMER SYLVANIA OH A PARTNE ; NITSCHKE JOHN S ; NOOMAN KAARU NITSCHKE ; GLT CORP ; MCMaster HAROLD A ; JON SUCHIBUN NITSCHKE ; HARORUDO ATSUSHUREI MAKUMASUTAA ; MCMaster H ; HAROLD ASHLEY MCMaster ; JOHN STEPHEN NITSCHKE ; MCMaster HAROLD ASHLEY ; GLT CORP A CORP OF DE ; MCMaster H A NITSCHKE N C AND NITSCHKE J S ; MCMaster HA

Inventor(s): (std): CARL NITSCHKE NORMAN ; HARORUDO ATSUSHUREI MAKUMASUTA ; MCMaster HAROLD A ; MCMaster HAROLD ASHLEY ; NITSCHKE JOHN S ; NITSCHKE JOHN STEPHEN ; NITSCHKE NORMAN C ; NITSCHKE JOHN S ; STEPHEN NITSCHKE JOHN ; NOOMAN KAARU NITSCHKE ; JIYON SUCHIBUN NITSCHKE ; HARORUDO ATSUSHIYUREI MAKUMASU ; NITSCHKE N ; NITSCHKE J ; MCMaster H

Inventor(s): HARORUDO ATSUSHUREI MAKUMASUTAA ; JON SUCHIBUN NITSCHKE ; NORMAN CARL NITSCHKE ; JOHN STEPHEN NITSCHKE ; HAROLD ASHLEY MCMaster ; NOOMAN KAARU NITSCHKE

Agent(s): CLEMENT HACK AND CO; SMART AND BIGGAR

Designated states: BE CH DE FR GB IT LU NL SE

9) Family number: 71543137 (WO1818888A1)

© PatBase

Title: DEVICE AND METHOD FOR PRESS-BENDING GLASS SHEETS

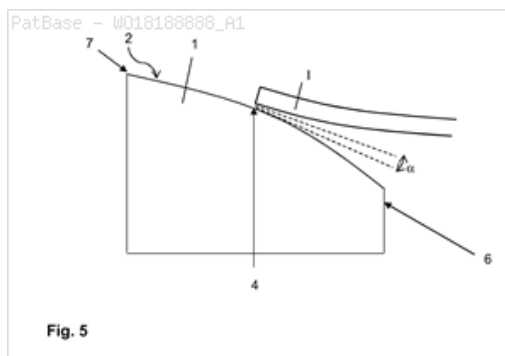
Abstract: The present invention relates to a device for bending glass sheets, comprising - a lower press-bending mould (1) with a frame-like contact surface (2), - an upper press-bending mould (3) arranged opposite the contact surface (2), wherein

the lower press-bending mould (1) and the upper press-bending mould (3) are suitable for deforming a glass sheet (I) located between them by pressing, wherein the side edge (S) of the glass sheet (I) lies on the contact surface (2) along a contact line (4), wherein during the pressing the contact line (4) migrates from a first contact line (4A) to a pressing line (4B), and wherein between the first contact line (4A) and the pressing line (4B) the contact surface (2) is formed as convexly curved.

Classifications:

International (IPC 8-9): C03B23/03 (Advanced/Invention)

CPC: C03B23/03



Family:

Publication number	Publication date	Application number	Application date
CN109071304 A	20181221	CN201880000591	20180315
WO18188888 A1	20181018	WO2018EP56471	20180315

Priority:

EP20170165667 20170410 WO2018EP56471 20180315

Probable Assignee: SAINT GOBAIN

Assignee(s): (std): SAINT GOBAIN

Assignee(s): SAINT GOBAIN GLASS FRANCE

Inventor(s): (std): ZEICHNER ACHIM ; SCHILLINGS PETER ; PALMANTIER ARTHUR ; BORDERIOU ARNAUD

Agent(s): FEIST FLORIAN ARNO

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DJ DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JO JP KE KG KH KM KN KP KR KW KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

10) Family number: 3467141 (US5071461A)

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Title: METHOD AND APPARATUS FOR BENDING OVERLAPPING GLASS PLATES TO FORM A LAMINATED GLASS STRUCTURE

Abstract: Glass plates for a laminated glass are bent and strengthened by provisionally shaping by heating two overlapping glass plates placed on a deadweight bending mold having a shaping surface by elevating the temperature to a temperature capable of bending glass and by locally heating said portions of the two overlapping glass plates to be deeply bent at a higher temperature in a heating/pressing stage so that the two overlapping glass plates are provisionally shaped by their own deadweight into a shape substantially corresponding to the shape of the shaping surface of the bending mold, pressing a portion of the two overlapping glass plates to be deeply bent from the top by a pressing member after the provisional shaping step in a heating/pressing stage, separating the two overlapping glass plates from the bending mold by pushing up the portion of the glass plates other than the deeply bent peripheral portion of the two overlapping glass plates thereby cooling the peripheral portion of the glass plates in a peripheral portion strengthening stage, and cooling the overlapping glass plates to atmospheric temperature.

Classifications:

International (IPC 8-9): B32B17/10 C03B23/02 C03B23/023

C03B23/025 C03B23/027 C03B23/03

C03C27/12 (Advanced/Invention);

B32B17/06 C03B23/02 C03C27/12 (Core/Invention)

International (IPC 1-7): C03B23/023 C03B23/025 C03B23/027

C03B23/03 C03B27/04 C03C27/12

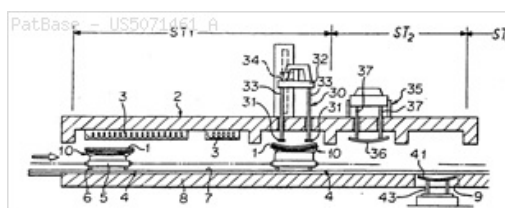
CPC: Y02P40/57 C03B23/0258 B32B17/10036 B32B17/10889

C03B23/023 C03B23/0235 C03B23/027 C03B23/0305 C03B23/0307

European: B32B17/10C4 B32B17/10L14 C03B23/023 C03B23/023D

C03B23/025 C03B23/025D C03B23/027 C03B23/03 C03B23/03C C03B23/03D

US: 65/104 65/106 65/107 65/268 65/273



Family:

Publication number	Publication date	Application number	Application date
DE68919931 D1	19950126	DE19896019931	19890714
DE68919931 T2	19950601	DE19896019931T	19890714
EP0351739 A2	19900124	EP19890112989	19890714
EP0351739 A3	19910109	EP19890112989	19890714
EP0351739 B1	19941214	EP19890112989	19890714
JP2007595 C3	19960111	JP19880178553	19880718
JP2030632 A2	19900201	JP19880178553	19880718
JP2038331 A2	19900207	JP19880187977	19880729
JP7029793 B4	19950405	JP19880178553	19880718
US5071461 A	19911210	US19890380080	19890714

Priority:

JP19880178553 19880718 JP19880187977 19880729

Probable Assignee: ASAHI GLASS CO LTD

Assignee(s): (std): ASAHI GLASS CO LTD

Assignee(s): ASAHI GLASS CO LTD TOKIO TOKYO JP ; ASAHI GLASS COMPANY LTD

Inventor(s): (std): HIROTSU TAKASHI ; MAEDA KENJI ; MORI YUKIYASU ; SUGIYAMA TATSUO ; TSUJI HIROSHI
Inventor(s): TSUJI HIROSHI YOKOHAMA SHI KANAGAWA KEN JP ; SUGIYAMA TATSUO YOKOHAMA SHI KANAGAWA KEN JP ; MORI YUKIYASU YOKOHAMA SHI KANAGAWA KEN JP ; MAEDA KENJI YOKOHAMA SHI KANAGAWA KEN JP ; HIROTSU TAKASHI YOKOHAMA SHI KANAGAWA KEN JP
Designated states: BE DE FR GB IT

11) Family number: 5001222 (US5108480A)

© PatBase

Title: Bend-shaping press mold, method of bend-shaping a glass plate and apparatus for bend-shaping a glass plate

Abstract: A bend-shaping press mold comprising a pair of pressing dies for bending a glass plate into a shape having a convex surface and a concave surface in a plane by pressing the glass plate with the pair of pressing dies, wherein each of the pressing dies has a convex surface portion to shape the glass plate by pressing it from each side which is finally shaped to have a concave surface portion, and the convex surface portion of one of the pressing dies is not substantially in contact with the glass plate in pressing operations when the convex surface portion of the other die is in contact with the glass plate.

Classifications:

International (IPC 8-9): C03B23/023 C03B23/025

C03B23/03 (Advanced/Invention);

C03B23/02 (Core/Invention)

International (IPC 1-7): C03B23/03

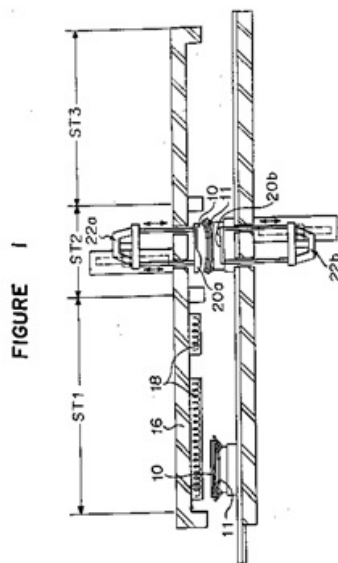
CPC: C03B23/0258 C03B23/0305

European: C03B23/023 C03B23/025B C03B23/025D C03B23/03 C03B23/03C

US: 65/106 65/107 65/273 65/287

PatBase - US5108480_R

U.S. Patent Apr. 26, 1992 Sheet 1 of 5 5,108,480



Family:

Publication number	Publication date	Application number	Application date
EP0423698 A1	19910424	EP19900119773	19901015
JP3131539 A2	19910605	JP19890268253	19891017
US5108480 A	19920428	US19900597874	19901012

Priority:

JP19890268253 19891017

Probable Assignee: ASAHI GLASS CO LTD
Assignee(s): (std): ASAHI GLASS CO LTD
Assignee(s): ASAHI GLASS COMPANY LTD
Inventor(s): (std): SUGIYAMA TATSUO
Designated states: BE DE FR GB IT

12) Family number: 3531226 (US4909820A)

© PatBase

Title: METHOD OF AND AN APPARATUS FOR BENDING GLASS PLATES FOR A LAMINATED GLASS

Abstract: Two glass plates on a bending mold are heated in a heating/bending furnace so that they are subjected to provisional deep-bending operations by their own deadweight, and the provisionally shaped deep-bent portion is pressed by an auxiliary pressing member to thereby form a laminated glass for, for instance, an automobile.

Classifications:

International (IPC 8-9): C03B23/02 C03B23/025 C03B23/027

C03B23/03 C03B35/20 C03C27/12 (Advanced/Invention);

C03B23/02 C03B35/00 C03C27/12 (Core/Invention)

International (IPC 1-7): C03B23/023 C03B23/025 C03B23/03 C03C27/12

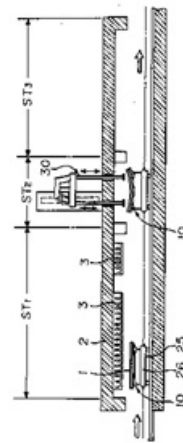
CPC: C03B23/0256 B32B17/10889 Y02P40/57 C03B23/0307

C03B23/027 C03B23/0305 C03B35/202

European: C03B23/025C C03B23/027 C03B23/03 C03B23/03C C03B23/03D C03B35/20B

US: 65/106 65/107 65/273 65/290 65/291

FIGURE 1

**Family:**

Publication number	Publication date	Application number	Application date
DE68919429 D1	19950105	DE19896019429	19890224
DE68919429 T2	19950511	DE19896019429T	19890224
EP0338216 A2	19891025	EP19890103298	19890224
EP0338216 A3	19910109	EP19890103298	19890224
EP0338216 B1	19941123	EP19890103298	19890224
JP1230439 A2	19890913	JP19880055019	19880310
JP1827225 C3	19940228	JP19880203086	19880817
JP1827230 C3	19940228	JP19890190559	19890725
JP2038332 A2	19900207	JP19880203086	19880817
JP2051435 A2	19900221	JP19890190559	19890725
JP2055239 A2	19900223	JP19890130175	19890525
JP2138156 C3	19980904	JP19880055019	19880310
JP5030770 B4	19930510	JP19880203086	19880817
JP5030771 B4	19930510	JP19890190559	19890725
JP7029792 B4	19950405	JP19880055019	19880310
US4909820 A	19900320	US19890314922	19890224
US5045101 A	19910903	US19890442523	19891128

Priority:

JP19880040721	19880225	JP19880055019	19880310	JP19880203086	19880817
US19890314922	19890224	JP19890130175	19890525	JP19890190559	19890725

Probable Assignee: ASAHI GLASS CO LTD**Assignee(s):** (std): ASAHI GLASS CO LTD**Assignee(s):** ASAHI GLASS CO LTD NO 1 2 MARUNOUCHI 2 CHOME CHIYODA KU ; ASAHI GLASS CO LTD NO 1 2 MARUNOUCHI 2 CHOME CHIYODA KU TOKYO JAPAN ; ASAHI GLASS CO LTD TOKIO TOKYO JP ; ASAHI GLASS COMPANY LTD**Inventor(s):** (std): SUGIYAMA TATSUO ; TSUJI HIROSHI ; WATANABE YOSHIHIRO ; MORI YUKIYASU ; MAEDA KENJI ; HIROTSU TAKASHI**Inventor(s):** HIROTSU TAKASHI YOKOHAMA SHI KANAGAWA KEN JP ; WATANABE YOSHIHIRO YOKOHAMA SHI KANAGAWA KEN JP ; TSUJI HIROSHI YOKOHAMA SHI KANAGAWA KEN JP ; SUGIYAMA TATSUO ; SUGIYAMA TATSUO YOKOHAMA SHI KANAGAWA KEN JP ; MORI YUKIYASU ; MORI YUKIYASU YOKOHAMA SHI KANAGAWA KEN JP**Designated states:** AT BE CH DE ES FR GB GR IT LI LU NL SE**13) Family number: 9265310 (US4778507A)**

© PatBase

Title: METHOD FOR BENDING GLASS PLATES

Abstract: A method for bending glass plates comprises a step of softening by heating at least two glass plates placed in an overlapping state on a bending ring mold to shape them in a curved form by their own deadweight in a processing zone of a heating oven, a step of pressing the at least two overlapped glass plates from the top, which are bent or being bent in a predetermined form by their deadweight on the bending ring mold, by a pressing mold in a pressing zone in the heating oven or in the pressing zone under heating condition which is connected to the heating oven, and a step of gradually cooling the at least two glass plates in a cooling zone outside the heating oven.

Classifications:**International (IPC 8-9):** C03B23/025 C03B23/03 C03B25/08

C03C27/12 (Advanced/Invention);

C03B23/02 C03B25/00 C03C27/12 (Core/Invention)

International (IPC 1-7): C03B23/025 C03B23/03 C03B25/08

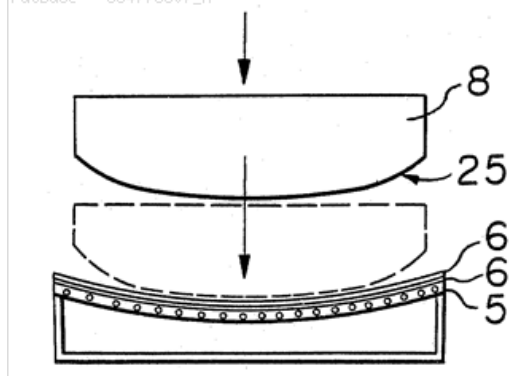
C03C27/12

CPC: C03B23/027 C03B23/0305 C03B23/0252 C03B23/03
B32B17/10889

European: C03B23/025B C03B23/03 C03B23/03C

US: 65/106 65/107 65/273 65/289 65/290

PatBase - US4778507_A



Family:

Publication number	Publication date	Application number	Application date
JP2137134 C3	19980703	JP19870198028	19870810
JP63156025 A2	19880629	JP19870198028	19870810
JP7029791 B4	19950405	JP19870198028	19870810
US4778507 A	19881018	US19870083974	19870811

Priority:

JP19860187873 19860812

Probable Assignee: ASAHI GLASS CO LTD

Assignee(s): (std): ASAHI GLASS CO LTD

Assignee(s): ASAHI GLASS CO LTD NO 1 2 MARUNOUCHI 2 CHOME CHIYODA KU TOKYO JAPAN ; ASAHI GLASS COMPANY LTD

Inventor(s): (std): ARIGA MASAO ; ARUGA CHIKAO ; WAKI TOSHIHIKO ; KOGA YOSHIO

14) Family number: 29068370 (US2004107729A)

© PatBase

Title: METHOD AND APPARATUS FOR BENDING A GLASS SHEET

Abstract: A heated and softened glass sheet is put on a bending surface of a frame unit to be preliminarily bent by gravity before the glass sheet is pressed by an upper mold and the frame unit. There are steps for using a certain means for controlling an amount of preliminary bending to control deformation of the glass sheet caused by the preliminary bending; and pressing the preliminarily bent glass sheet by the upper mold and the frame unit.

Classifications:

International (IPC 8-9): C03B23/00 C03B23/025 C03B23/027 C03B23/03 C03B23/035 C03B29/08 C03B35/14 C03B35/20

C03B35/24 (Advanced/Invention);

C03B23/03 (Advanced/Non-invention);

C03B23/00 C03B23/02 C03B29/00 C03B35/00 (Core/Invention)

International (IPC 1-7): C03B23/025 C03B23/027 C03B23/03 C03B23/035

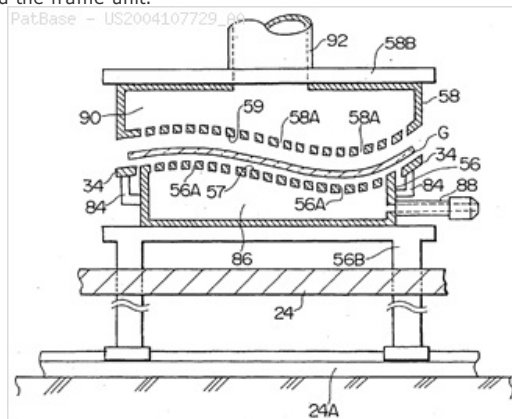
CPC: C03B23/0258 C03B23/027 C03B23/0305 C03B23/0352 C03B29/08 C03B35/145 C03B35/202 C03B35/24 C03B2225/02

European: C03B23/025 C03B23/025C C03B23/025D C03B23/027

C03B23/03 C03B23/035B C03B23/03C C03B29/08 C03B35/14C

C03B35/20B C03B35/24 M03B225/02

US: 65/106 65/106P 65/107 65/182.2 65/182.200S 65/25.4 65/254 65/273 65/273S 65/291



Family:

Publication number	Publication date	Application number	Application date
AT480505 E	20100915	AT20030710342T	20030313
AU2003221375 AA	20030922	AU20030221375	20030313
CN1275886 C	20060920	CN20038000661	20030313
CN1533365 A	20040929	CN20038000661	20030313
DE60334081 D1	20101021	DE20036034081	20030313
EP1484290 A1	20041208	EP20030710342	20030313
EP1484290 A4	20060607	EP20030710342	20030313
EP1484290 B1	20100908	EP20030710342	20030313
JP2003335534 A2	20031125	JP20030063069	20030310
KR100825699 B1	20080429	KR20037016477	20030313
KR20040093382 A	20041105	KR20037016477	20030313
MXPA04000233 A1	20040504	MX2004PA00233	20030313
US2004107729 AA	20040610	US20030724824	20031202
US2008000267 AA	20080103	US20070847650	20070830
US7401476 BB	20080722	US20030724824	20031202
US8387414 BB	20130305	US20070847650	20070830
WO03076353 A1	20030918	WO2003JP03015	20030313

Priority:

JP20020068608 20020313

JP20030063069 20030310

WO2003JP03015 20030313

Probable Assignee: ASAHI GLASS CO LTD**Assignee(s):** (std): ASAHI GLASS CO LTD ; FUKAMI MASAO ; OOTA SHINYA ; YAJIMA TATSUO ; KAJIKAWA TOMIO ; SASAKI MIKINAO**Assignee(s):** N A ; ASAHI GLASS COMPANY LIMITED ; ASAHI GLASS COMPANY LTD ; AGC INC ; ASAHI GLASS CO**Inventor(s):** (std): FUKAMI MASAO ; KAJIKAWA TOMIO ; KAJIKAWA TOMOO ; MASAO FUKAMI ; MASAO OOTA SHINYA YAJIMA TATSUO ; OOTA SHINYA ; SASAKI MIKIHISA ; SASAKI MIKINAO ; OOTA SHINYA ; SHINYA OOTA ; TATSUO YAJIMA ; YAJIMA TATSUO**Inventor(s):** YAJIMA TATSUO C O ASAHI GLASS COMPANY LTD ; TOMIO KAJIKAWA ; OOTA SHINYA C O ASAHI GLASS COMPANY LIMITED ; OOTA SHINYA YAJIMA TATSUO FUKAMI MASAO ; SASAKI MIKINAO C O ASAHI GLASS COMPANY LTD ; MIKINAO SASAKI ; KAJIKAWA TOMIO C O ASAHI GLASS COMPANY LTD ; FUKAMI MASAO C O ASAHI GLASS COMPANY LTD**Agent(s):** MUELLER BORE AND PARTNER PATENTANWALTE; OBLON SPIVAK MCCLELLAND MAIER AND NEUSTADT PC; OBLON SPIVAK MCCLELLAND MAIER AND NEUSTADT L L P; OBLON SPIVAK MCCLELLAND MAIER AND NEUSTADT LLP**Designated states:** AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT KE KG KR KZ LC LI LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NE NI NL NO NZ OM PH PL PT RO RU SC SD SE SG SI SK SL SN SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW**15) Family number: 2268379** (US4661141A)

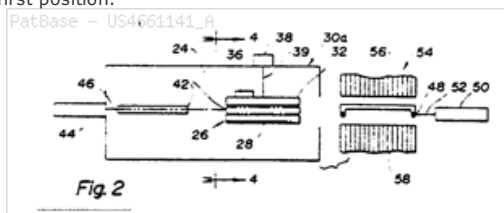
© PatBase

Title: GLASS SHEET PRESS BENDING SYSTEM

Abstract: A glass sheet press bending system (20) disclosed has a bending station (30a,30b,30c,30d) for providing press bending between upper and lower molds (32,42) without intrusion into or through a conveyor (26) on which glass sheets are heated prior to the bending. The upper mold (32) is positioned above the conveyor (26), while the lower mold (42) is movable horizontally at an elevation above the conveyor from a first position adjacent the upper mold to a second position below the upper mold whereupon vertical movement therebetween performs the press bending between the molds. A transfer mold (48) receives the bent glass sheet from the upper mold (32) for cooling. Two embodiments of the bending station (30a,30c) have the lower mold continuously positioned within a heated ambient to provide a relatively hot lower mold that reduces breakage, while two other embodiments of the bending station (30b,30d) have the lower mold (42) movable out of the heated ambient after the press bending to provide a cooler mold that does not mark the glass sheets. Two embodiments of the bending station (30a,30b) have a lower mold (42) with a fixed curved shape, while the other two embodiments of the bending station (30c,30d) have a lower mold with first and second mold portions (60,62) that are movable with respect to each other to provide initial and final stages of the press bending operation. Each embodiment of the bending station has particular utility when utilized with a quench station (54) located on the opposite side of the heating conveyor (26) and the upper mold (32) as the lower mold (42) in its first position.

Classifications:**International (ipc 8-9):** B21D5/01 C03B23/03 C03B23/035 C03B27/04 C03B29/08 C03B35/20 (Advanced/Invention); B21D5/01 (Advanced/Non-invention);

B21D5/01 C03B23/02 C03B27/00 C03B35/00 (Core/Invention)

International (ipc 1-7): B21D5/01 B29C53/04 C03B11/00 C03B11/06 C03B23/00 C03B23/02 C03B23/023 C03B23/03 C03B23/035 C03B27/04 C03B27/044 C03B29/08 C03B35/20 C03C19/00**CPC:** C03B23/0305 C03B23/0302**European:** C03B23/03B C03B23/03C**US:** 65/104 65/107 65/273 65/287 65/290**Family:**

Publication number	Publication date	Application number	Application date
AR240893 A1	19910327	AR19870306999	19870302
AR240893 A2	19910327	AR19870306999	19870302
AT58515 E	19901215	AT19870301629T	19870225
AU198769242 A1	19870917	AU19870069242	19870225
AU576443 B2	19880825	AU19870069242	19870225
BRPI8701175 A	19880119	BR1987PI01175	19870313
CA1287215 A1	19910806	CA19870531968	19870313
CN1006885 B	19900221	CN19871001950	19870313
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DE3766271 D1	19910103	DE19873766271	19870225
EP0237231 A1	19870916	EP19870301629	19870225
EP0237231 B1	19901122	EP19870301629	19870225
ES2018541 B3	19910416	ES19870301629T	19870225
FI82829 B	19910115	FI19870001122	19870313
FI82829 C	19910425	FI19870001122	19870313
FI871122 A	19870915	FI19870001122	19870313
FI871122 A0	19870313	FI19870001122	19870313
GR3001146 T3	19920625	GR19900401011T	19901130
IE59803 B	19940406	IE19870000460	19870223
IE870460 L	19870914	IE19870000460	19870223
IN169402 A	19911012	IN1987MA00128	19870224
JP1939818 C3	19950609	JP19870058683	19870313
JP6067766 B4	19940831	JP19870058683	19870313
JP62270429 A2	19871124	JP19870058683	19870313
KR19870008803 A	19871021	KR19870002097	19870309
KR900005386 B1	19900728	KR19870002097	19870309
MX163755 B	19920619	MX19870005531	19870311
NZ219414 A	19880630	NZ19870219414	19870226
US4661141 A	19870428	US19860839797	19860314
YU46048 B	19921221	YU19870000740	19870423
YU74087 A	19890430	YU19870000740	19870423

Priority:

US19860839797 19860314 EP19870301629 19870225 CA19870531968 19870313
YU19870000740 19870423

Probable Assignee: GLASSTECH INC A DE CORP

Assignee(s): (std): GLASS TECH INC ; GLASSTECH INC

Assignee(s): GLASSTECH INT ; GLT CORP ; GLASSTECH INC PERRYSBURG OHIO US ; GURASUTEKU INC ; GLASSTECH INT LP A PARTNERSHIP OF DE LTD ; GLASS TECHNOLOGY CO ; GLASSTECH INC A DE CORP ; GLT CORP A CORP OF DE ; MCMASTER HAROLD A ; UPS CAPITAL CORP ; NITSCHKE JOHN S ; NITSCHKE DEAN M ; NITSCHKE DAVID B ; BANK OF AMERICA NA ; FIRST NATIONAL BANK OF BOSTON ; FIRST NATIONAL BANK OF BOSTON AS COLLATERAL TRUST ; FIRST NATIONAL BANK OF BOSTON AS COLLATERAL TRUSTE

Inventor(s): (std): DEAN M NITSCHKE ; DEIBUITSUDO BII NICHIEKE ; DEIN EMU NICHIEKE ; HAROLD A MCMASTER ; HARORUDO EI MAKUMASUTAA ; JIYON ESU NICHIEKE ; JOHN S NITSCHKE ; MCMASTER H A ; MCMASTER HAROLD A ; NEIKIRK DEAN M ; NITSCHKE D B ; NITSCHKE D M ; NITSCHKE DAVID B ; DAVID B NITSCHKE ; DEAN M NEIKIRK ; NITSCHKE DEAN M ; NITSCHKE J S ; NITSCHKE JOHN S ; SMASTER HAROLD A ; AL DEAN M NEIKIRK ET

Inventor(s): NITSCHKE JOHN S PERRYSBURG OHIO 43551 US ; MCMASTER HAROLD A WOODVILLE OHIO 43469 US ; NITSCHKE DEAN M MAUMEE OHIO 43537 US ; MCMASTER HAROLD ASHLEY ; NITSCHKE DM ; DEAN M NEIKIRK ET AL ; NITSCHKE DB ; MCMASTER HA ; ET AL

Agent(s): GRIFFITH HACK ; SMART AND BIGGAR

Designated states: AT BE CH DE ES FR GB GR IT LI LU NL SE

16) Family number: 22915445 (US3220822A)

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Title: APPARATUS FOR BENDING GLASS SHEETS OR PLATES

Abstract: (Claim 1) 1. Ivi apparatus for bending glass sheets or plates, a periphery type mol_d formed of a plurality of sections includin.- oppositely dis-osed end sections, means for hingedly connecting the sections togeth-r for movement from a closed to an open mold position, means for sup- porting the mold intermediate the ends thereof, a iveight, means mountin.- said weight for swin.-ing movement and connectin.a said wei.-ht to at least one of t-he stid end mold sections and means intereonnec-tin.- th-. said end sections to move the'same in substantial syr,:chronism from a coun- terbalanced relation in the Gpen mold position toward the closed mold position with pro._ressively increasing force.

Classifications:

International (ipc 8-9): C03B23/027 (Advanced/Invention);

C03B23/02 (Core/Invention)

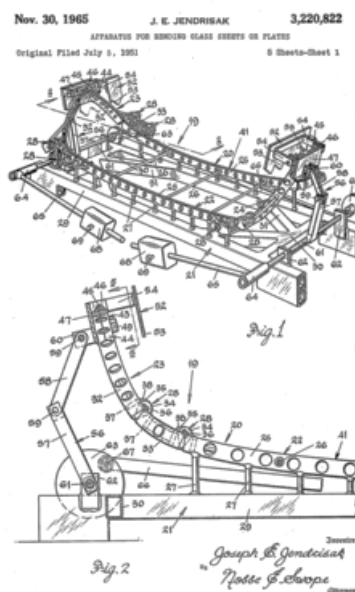
International (ipc 1-7): C03B23/027

CPC: C03B23/027

European: C03B23/027

US: 65/288 65/291

PatBase - US3220822_R



Family:

Publication number	Publication date	Application number	Application date
US3220822 A	19651130	US19640344156	19640207

Priority:

US19640344156 19640207

Probable Assignee: LIBBEY OWENS FORD GLASS CO

Assignee(s): (std): LIBBEY OWENS FORD GLASS CO

Assignee(s): LIBBEY OWENS FORD GLASS COMPANY

Inventor(s): (std): JENDRISAK JOSEPH E

17) Family number: 32451467 (US2005266247A)

© PatBase

Title: CURVED GLASS PLATE

Abstract: A carved glass plate has a curved peripheral spine portion where $R_1 \times R_2$ is $1,500,000 \text{ m}^2$ or less, R_1 being a radius of curvature determined in a direction parallel to an edge of the glass plate, R_2 being a radius of curvature determined in a direction normal to the direction. The curved peripheral surface portion includes a residual plane compressive stress zone and a residual plane tensile stress zone on the inner side of the residual plane compressive stress zone, the residual plane tensile stress zone having a tensile stress value below 8 MPa. The glass plate has also a central portion located on the inner side of the residual plane tensile stress zone. This entire central zone is a residual surface compressive stress zone having a residual surface compressive stress value ranging from 10 MPa to 30 MPa.

Classifications:

International (IPC 8-9): B32B17/00 B32B17/10 C03B23/025 C03B23/03 C03B27/04 C03B27/044 (Advanced/Invention); B32B17/00 B32B17/06 C03B23/02 C03B27/00 (Core/Invention)

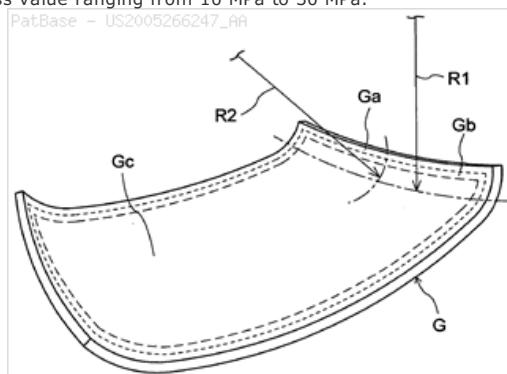
International (IPC 1-7): B32B17/00 C03B23/03

CPC: Y10T428/315 C03B23/0256 B32B17/10036 C03B23/0258 C03B27/0404 C03B27/0413 C03B27/0442

European: B32B17/10C4 C03B23/025C C03B23/025D

C03B27/044B C03B27/04A C03B27/04B

US: 428/410 428/410P 65/115 65/115S



Family:

Publication number	Publication date	Application number	Application date
JP2005343719 A2	20051215	JP20040163157	20040601
JP4557606 B2	20101006	JP20040163157	20040601
US2005266247 AA	20051201	US20050143796	20050601

Priority:

JP20040163157 20040601

Probable Assignee: NIPPON SHEET GLASS CO LTD

Assignee(s): (std): NIPPON SHEET GLASS CO LTD ; YOSHIZAWA HIDEO

Assignee(s): NIPPON SHEET GLASS COMPANY LIMITED

Inventor(s): (std): YOSHIZAWA HIDEO

Agent(s): KITAMURA SHUICHIRO; FULBRIGHT AND JAWORSKI LLP

18) Family number: 1466492 (US4199342A)

© PatBase

Title: Process of imparting a permanent curvature to a sheet of glass

Abstract: An untempered sheet of glass is given a predetermined curvature by means of pre-heated forming dies (3,4 in Fig. 1). The glass sheet (1) is not pre-heated or is heated only to a relatively low temperature prior to being inserted between the dies. Heat transfer from the dies to the glass prior to closure of the dies produces or assists in producing in the thickness of the glass sheet a transitory thermal stress gradient which gives resistance to breakage under bending forces. The absence of high temperature pre-heating of the sheet is conducive to a more predictable stress distribution pattern over the area of the sheet prior to bending. The process enables predetermined sheet curvatures to be achieved with higher degrees of accuracy.

Classifications:

International (IPC 8-9): C03B23/03

C03B27/004 (Advanced/Invention);

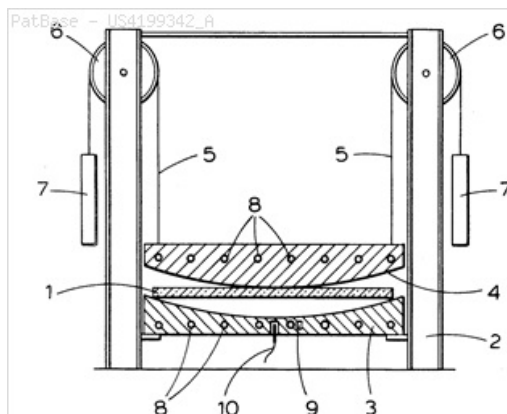
C03B23/02 C03B27/004 (Core/Invention)

International (IPC 1-7): C03B23/02 C03B23/03

CPC: C03B23/0307 C03B27/004

European: C03B23/03 C03B23/03D C03B27/004

US: 65/104 65/106



Family:

Publication number	Publication date	Application number	Application date
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BR7808642 A	19790710	BR19780008642	19781228
DE2855163 A1	19790712	DE19782855163	19781220
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FR2413334 A1	19790727	FR19780035311	19781213
FR2413334 B1	19821203	FR19780035311	19781213
GB2011377 A1	19790711	GB19780048723	19781215
GB2011377 B2	19820609	GB19780048723	19781215
JP54106526 A2	19790821	JP19780160973	19781222
JP61009258 B4	19860320	JP19780160973	19781222
US4199342 A	19800422	US19780967867	19781207

Priority:

Probable Assignee: BFG GLASSGROUP**Assignee(s):** (std): BFG GLASSGROUP**Inventor(s):** (std): ANRI PUREBUOSU ; MESTRE PIERRE ; PIEERU MESUTORU ; PREVOST HENRI ; PREVOST H ; MESTRE P**Inventor(s):** PIERRE MESTRE ET HENRI PREVOST ; ANRI PUREUOSU**19) Family number: 1981498** (US4290796A)

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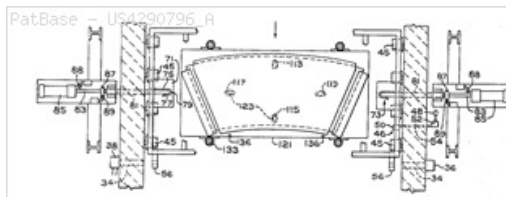
Title: Mold alignment means for glass sheet shaping apparatus

Abstract: Apparatus for shaping glass sheets to a complicated shape including a longitudinal component of bend and a complicated transverse component of bend within a tunnel-likelehr. An outline mold with guides for aligning one or more glass sheets for proper orientation and alignment thereon supports the glass while the glass is bent by gravity sagging to provide a longitudinal component of bend and to deliver the sag bent glass to a position between upper and lower pressing molds having complementary shaping surfaces conforming to a complicated bend including a complicated transverse bend component. Special alignment means are provided to orient and align the outline mold relative to said pressing molds so that the lower pressing mold can lift the sag bent glass off the outline mold into engagement with the upper pressing mold to impress the transverse bend component and return the glass with its complicated shape to the outline mold for controlled cooling and removal from thelehr. When two glass sheets are shaped simultaneously in this manner, they conform exactly to the shape of each other so closely that they can be laminated readily to form a laminated windshield of complicated shape for installation in exact registration with a shaped mounting frame of a vehicle. The upper pressing mold may be omitted in cases where thin glass sheets are bent to relatively shallow curvatures which may involve complicated shapes and/or outlines.

Classifications:**International (IPC 8-9):** C03B23/025 C03B23/03

C03B35/20 (Advanced/Invention);

C03B23/02 C03B35/00 (Core/Invention)

International (IPC 1-7): C03B23/023 C03B23/025 C03B23/03 C03B35/14**CPC:** C03B23/0252 C03B23/0302 C03B2225/02**European:** C03B23/025B C03B23/03B M03B225/02**US:** 65/106 65/273 65/287

JP63190730 A2	19880808	JP19870021681	19870203
JP7055841 B4	19950614	JP19870021681	19870203
US4828598 A	19890509	US19880150298	19880129

Priority:

JP19870021681 19870203

Probable Assignee: ASAHI GLASS CO LTD

Assignee(s): (std): ASAHI GLASS CO LTD

Assignee(s): ASAHI GLASS COMPANY LTD

Inventor(s): (std): ARUGA CHIKAO ; IMAMURA TAKAHARU ; KAWATSURA TOHRU ; TSUJI HIROSHI ; KAWAOMO TORU ; IMAMURA KOJI ; ARIGA MASAO

21) Family number: 8456549 (US5437703A)

© PatBase

Title: Bending glass sheets

Abstract: A method is provided in which a glass sheet is bent on a mould having a movable end, comprising the steps of: heating the glass sheet to its bending temperature; subjecting the glass sheet to an initial gravity bending step; providing support to a portion of the glass sheet located on the movable end of the mould; while providing said support, lowering said movable end away from the glass sheet; subjecting the glass sheet to a press bending step; cooling the bent glass sheet. Support may be provided by a reduced pressure within an upper mould, a mechanical arm, or gas directed in a generally upwards direction. The invention may be used for bending glass for architectural or automotive purposes, e.g. for bending a pair of glass sheets, one on top of the other, for use in the manufacture of a laminated windscreen, to achieve deep and/or complex bent shapes.

Classifications:

International (IPC 8-9): C03B23/02 C03B23/025 C03B23/027 C03B23/03 C03B23/035 G02B1/10 G02F1/1335

G02F1/1343 (Advanced/Invention);

C03B23/02 G02B1/10 G02F1/13 (Core/Invention)

International (IPC 1-7): C03B C03B23/02 C03B23/023 C03B23/025 C03B23/027 C03B23/03 C03B23/035

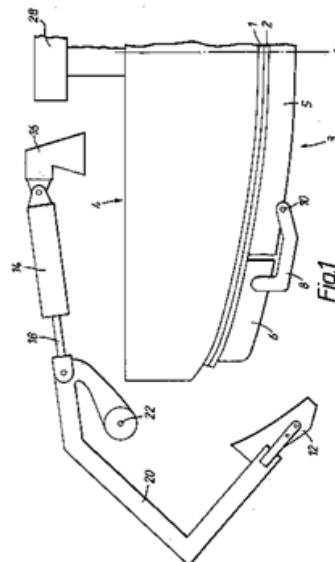
CPC: C03B23/027 C03B23/0305 C03B23/0307 C03B23/035 C03B23/0355 C03B23/0357

European: C03B23/027 C03B23/03 C03B23/035 C03B23/035B C03B23/035B2 C03B23/035B3 C03B23/03C C03B23/03D

US: 65/106 65/273 65/290 65/291

PatBase - US5437703_A

U.S. Patent Aug. 1, 1995 Sheet 1 of 11 5,437,703



Family:

Publication number	Publication date	Application number	Application date
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AU199456344 A1	19940908	AU19940056344	19940224
AU674557 B2	19970102	AU19940056344	19940224
BRPI9400758 A	19941011	BR1994PI00758	19940228
DE69418081 D1	19990602	DE19946018081	19940216
DE69418081 T2	19991028	DE19946018081T	19940216
EP0613864 A1	19940907	EP19940301105	19940216
EP0613864 B1	19990428	EP19940301105	19940216
FI940995 A	19940904	FI19940000995	19940302
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JP6305755 A2	19941101	JP19940024352	19940222
NZ250976 A	19950726	NZ19940250976	19940225
TR28100 A	19960102	TR19940000195	19940302
TW284746 B	19960901	TW19940101617	19940225
US5437703 A	19950801	US19940202367	19940225
ZA9401283 A	19941004	ZA19940001283	19940224

Priority:

GB19930004286 19930303

Probable Assignee: PILKINGTON GLASS LTD

Assignee(s): (std): PILKINGTON GLASS LTD ; PILKINGTON PLC ; PILKINGTON UK LTD

Assignee(s): PILKINGTON UNITED KINGDOM LTD ; PILKINGTON UNITED KINGDOM LTD ST HELENS MERSEYSIDE ; PILKINGTON UNITED KINGDOM LTD ST HELENS ; PILKINGTON UNITED KINGDOM LIMITED ;

PILKINGTON UNITED KINGDOM LTD ST HELENS MERSEYSIDE GB ; PILKINGTON GLASS CO LTD ;
PILKINGTON GLASS LIMITED

Inventor(s): (std): BOARDMAN JAMES ; DYKES DAVID ; JACQUES NEIL W ; JACQUES NEIL WILLIAM ; JIEEMUZU
BOODMAN ; NIIRU UIRIAMU YATSUKESU ; SYKES DAVID ; THOMAS BRIAN J ; THOMAS BRIAN JAMES
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Inventor(s): JACQUES NEIL WILLIAM BURSCOUGH LANCASHIRE L40 7RF GB ; THOMAS BRIAN JAMES WIGAN
LANCASHIRE WN8 7TT GB ; SYKES DAVID WIGAN GREATER MANCHESTER WN3 6AF GB ; NEIL
WILLIAM JACQUES ; JACQUES NEIL WILLIAM BURSCOUGH LANCASHIRE L40 7RF ; JAMES BOARDMAN ;
BOARDMAN JAMES BIRMINGHAM B38 8TA GB ; BRIAN JAMES THOMAS ; DAVID DYKES ; DAVID SYKES

Agent(s): GRIFFITH HACK

Designated states: AT BE DE ES FR GB IT LU NL PT SE

22) Family number: 1277598 (US4074996A)

© PatBase

Title: Method of and apparatus for bending glass sheets

Abstract: A method of and apparatus for bending glass sheets to relatively sharp angles. The apparatus includes a sectionalized primary press bending member having articulated end sections for sharply bending portions of a glass sheet about lines superheated by a radiant energy heat source located above the primary press member. A reciprocal brake bar is extended into engagement with the glass sheet along the heated focal line to assist the articulated press end sections in bending the glass. Clamping devices can be used in lieu of the brake bar to secure the heat-softened glass sheet to the press member shaping surface during bending. A supplemental press member, mounted above the primary press member, is provided with shaping elements having shaping surfaces complementary to the shaping surfaces of the primary press articulated end sections for pressing the glass end portions therebetween into conformity with these shaping surfaces.

Classifications:

International (IPC 8-9): C03B23/02 C03B23/025

C03B23/03 (Advanced/Invention);

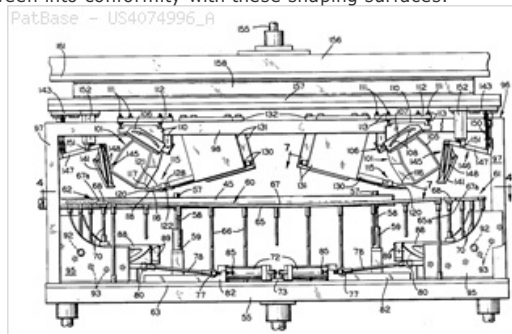
C03B23/02 (Core/Invention)

International (IPC 1-7): B60J1/02 B60J1/08 C03B23/02 C03B23/023
C03B23/03 C03B32/00 C03C

CPC: C03B23/0256 C03B23/0305 C03B2225/02

European: C03B23/025C C03B23/03 C03B23/03C M03B225/02

US: 65/106 65/273 65/274 65/275 65/290



Family:

Publication number	Publication date	Application number	Application date
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AU197727250 A1	19790125	AU19770027250	19770722
AU508839 B2	19800403	AU19770027250	19770722
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BR7704932 A	19780425	BR19770004932	19770727
CA1099514 A1	19810421	CA19770283532	19770726
DE2734419 A1	19780202	DE19772734419	19770728
DE2734419 C2	19881006	DE19772734419	19770728
ES461078 A1	19780601	ES19770461078	19770727
FI60694 B	19811130	FI19770002232	19770719
FI60694 C	19820310	FI19770002232	19770719
FI772232 A	19780129	FI19770002232	19770719
FR2359795 A1	19780224	FR19770023095	19770727
FR2359795 B1	19840525	FR19770023095	19770727
GB1548810 A	19790718	GB19770030763	19770721
IT1079407 A	19850513	IT19770050492	19770728
JP1408136 C3	19871027	JP19770090870	19770728
JP53019312 A2	19780222	JP19770090870	19770728
JP62007128 B4	19870216	JP19770090870	19770728
LU77863 A	19771024	LU19770077863	19770727
MX4608 U	19820629	MX19770100636U	19770727
NL7708363 A	19780131	NL19770008363	19770728
NZ184756 A	19800305	NZ19770184756	19770727
SE427746 B	19830502	SE19770008609	19770727
SE427746 C	19830811	SE19770008609	19770727
SE7708609 A	19780129	SE19770008609	19770727
SE7708609 L	19780129	SE19770008609	19770727
US4074996 A	19780221	US19760709332	19760728
ZA7704449 A	19780628	ZA19770004449	19770722

Priority:

US19760709332 19760728 CA19770283532 19770726

Probable Assignee: LOF GLASS INC

Assignee(s): (std): LIBBEY OWENS FORD CO

Assignee(s): LIBBEY OWENS FORD COMPANY ; LIBBEY OWENS FORD COMPANY TE TOLEDO OHIO VER ST V ; LIBBEY
OWENS FORD COMPANY TE TOLEDO OHIO VER ST V AM ; LIBBEY OWENS FORD CY ; LOF GLASS INC ;
RAHRIG DONALD D ; REVELLS ROBERT G ; ROFU GURASU INC ; HAGEDORN FLOYD T ; L O F GLASS
INC TOLEDO OHIO US

Inventor(s): (std): DONARUDO DEERU RAARIGU ; FUROIDO SEODOA HAGADOON ; RAHRIG D ; RAHRIG D D ; RAHRIG
DONAL DALE ; RAHRIG DONALD D ; RAHRIG DONALD DALE ; REVELLS R ; REVELLS R G ; REVELLS
ROBERT G ; REVELLS ROBERT GENE ; HAGEDORN F ; HAGEDORN F T ; HAGEDORN FLOYD T ;

HAGEDORN FLOYD THEODORE ; REVELUS ROBERT GANE ; ROBAATO JIIN REBUERUZU ; HAGEDORN T ;
HAHRIG D

Inventor(s): R G REVELLS ; ROBAATO JIIN REUERUZU ; ROBERT GENE REVELLS ; THEODORE HAGEDORN FLOYD ;
HAGEDORN FLOYD THEODORE OREGON OHIO US ; REVELLS ROBERT GENE TOLEDO OHIO US ; GENE
REVELLS ROBERT ; F T HAGEDORN ; FLOYD THEODORE HAGEDORN ; 1 F T HAGEDORN ; 2 D D RAHRIG
; 3 R G REVELLS ; D D RAHRIG ; DALE RAHRIG DONALD ; DONALD DALE RAHRIG

Agent(s): MACRAE AND CO

23) Family number: 4816613 (US5059235A)

© PatBase

Title: Apparatus for bending glass panes

Abstract: In an apparatus for bending glass panes in a horizontal position, comprising an upper bending mold and a lower frame-shaped mold, the bending force exerted by the bending mold is determined by the self-weight of the bending mold. In order that a uniform pressure shall be exerted by the upper bending mold on the entire periphery of the lower frame-shaped mold, the upper bending is mounted displaceable on its guide rods relative to them in a vertical direction and variable in its angular position relative to the guide rods. To achieve the desired relief of weight of the bending mold, the guide rods are suspended by cables from a frame which can be lowered. On the frame, hydraulic or pneumatic cylinders are disposed, which each exert, via a pulling cable acting on a guide rod, an adjustable force in the opposite direction to the self-weight of the bending mold.

Classifications:

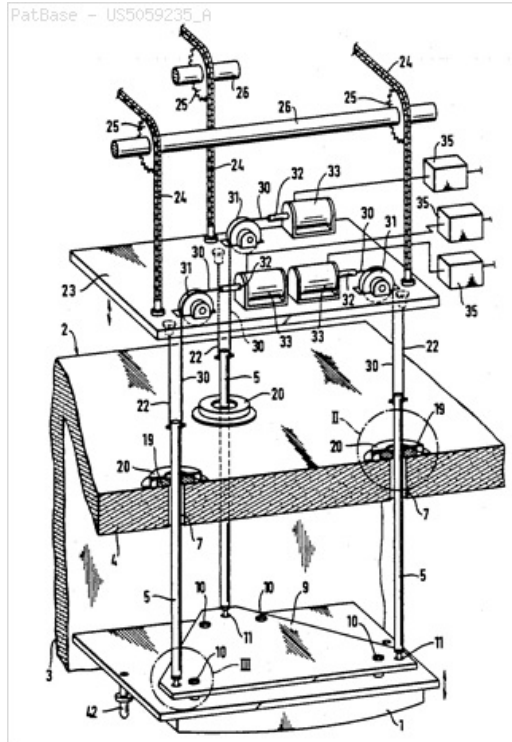
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C03B23/03 (Advanced/Invention)

International (IPC 1-7): C03B23/03 C03B23/23 C03B23/25
C07D213/16 C07D227/04

CPC: C03B23/0256 C03B23/03

European: C03B23/025C C03B23/03

US: 65/287 65/323



Family:

Publication number	Publication date	Application number	Application date
DE3929042 C1	19910110	DE19893929042	19890901
DE69008800 D1	19940616	DE19906008800	19900823
DE69008800 T2	19941124	DE19906008800T	19900823
EP0415827 A1	19910306	EP19900402346	19900823
EP0415827 B1	19940511	EP19900402346	19900823
ES2055369 T3	19940816	ES19900402346T	19900823
FI904307 A0	19900831	FI19900004307	19900831
FI91246 B	19940228	FI19900004307	19900831
FI91246 C	19940610	FI19900004307	19900831
US5059235 A	19911022	US19900575487	19900830

Priority:

DE19893929042 19890901 DE19906008800 19900823

Probable Assignee: VEGLA VEREINIGTE GLASWERKE GMBH 5100 AACHEN DE

Assignee(s): (std): GLASWERKE GMBH VER ; SAINT GOBAIN VITRAGE ; VER GLASWERKE GMBH

Assignee(s): VEGLA VEREINIGTE GLASWERKE GMBH 5100 AACHEN DE ; VEGLA VEREINIGTE GLASWERKE GMBH
52066 AACHEN ; VEGLA VEREINIGTE GLASWERKE GMBH 52066 AACHEN DE ; SAINT GOBAIN VITRAGE
INT ; SAINT GOBAIN VITRAGE INTERNATIONAL ; VEGLA VEREINIGTE GLASWERKE GMBH

Inventor(s): (std): KUSTER HANS WERNER ; PROEMPER HANS JOSEF ; PROMPER HANS JOSEF ; VANASCHEN LUC ; D
IRIBARNE BENOIT ; KUSTER HANS WERNER DR

Inventor(s): D IRIBARNE BENOIT LAIDON PASILDON ESSEX SS 15 6 EE ; VANASCHEN LUC B 4700 EUPEN ;
VANASCHEN LUC B 4700 EUPEN BE ; VANASCHEN LUC EUPEN BE ; PROMPER HANS JOSEF D 5100
AACHEN ; PROMPER HANS JOSEF D 5100 AACHEN DE ; KUSTER HANS WERNER D 5100 AACHEN ;
KUSTER HANS WERNER D 5100 AACHEN DE ; KUSTER HANS WERNER DR 5100 AACHEN DE

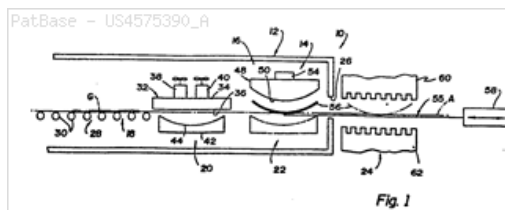
Designated states: BE CH DE ES FR GB IT LI LU SE

Title: Apparatus for forming glass sheets

Abstract: An apparatus capable of accurately forming a heated glass sheet to a deep, abrupt, or complex curvature are disclosed as utilizing a first curved mold (42) that initially forms the glass sheet at a first forming station (20) preferably by the operation of gravity. The initially formed glass sheet is moved horizontally preferably by movement on the first curved mold (42) to a second forming station (22). A second curved mold (48) of the second forming station (22) engages the initially formed glass sheet to provide accurate forming preferably by downward movement of the second curved mold that provides the engagement thereof with the glass sheet. In the preferred construction disclosed, the heated glass sheet is transferred from a furnace conveyor (28) to a topside conveyor (32) for depositing onto the first curved mold (42), and a transfer conveyor (55) transfers the formed glass sheet from the second curved mold (48) to a quench station (24) for tempering.

Classifications:

International (IPC 8-9): C03B23/025 C03B23/03 C03B23/04 C03B27/02 C03B27/04 C03B27/044 C03B35/14 C03B35/20 C03B35/24 (Advanced/Invention); C03B23/00 C03B23/02 C03B27/00 C03B35/00 (Core/Invention)
International (IPC 1-7): C03B C03B17/06 C03B23/02 C03B23/023 C03B23/025 C03B23/03 C03B23/04 C03B27/00 C03B27/02 C03B27/04 C03B35/14 C03B35/16 C03B35/20 C03B35/24
CPC: C03B23/0252 C03B23/0302 C03B23/0307 C03B35/147 C03B35/202 C03B23/03
European: C03B23/025B C03B23/03 C03B23/03B C03B23/03D C03B35/14C2 C03B35/20B
US: 65/104 65/106 65/107 65/268 65/273



Family:

Publication number	Publication date	Application number	Application date
AR240692 A1	19900928	AR19850303341	19851121
AT49952 E	19900215	AT19850308147T	19851108
AU198549987 A1	19860529	AU19850049987	19851118
AU563681 B2	19870716	AU19850049987	19851118
BRPI8505817 A	19860812	BR1985PI05817	19851120
CA1287214 A1	19910806	CA19850493044	19851016
DE3575710 D1	19900308	DE19853575710	19851108
EP0183418 A1	19860604	EP19850308147	19851108
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ES549179 A0	19860901	ES19850549179	19851122
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JP1557988 C3	19900516	JP19850262339	19851121
JP61132529 A2	19860620	JP19850262339	19851121
KR19860003983 A	19860616	KR19850008364	19851108
KR900000753 B1	19900215	KR19850008364	19851108
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NZ213907 A	19870123	NZ19850213907	19851021
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ZA8508092 A	19860625	ZA19850008092	19851021

Priority:

US19840674039 19841123 US19850779873 19850925 CA19850493044 19851016
 EP19850308147 19851108

Probable Assignee: GLASSTECH INC A DE CORP

Assignee(s): (std): GLASSTECH INC

Assignee(s): GLASSTECH INC A DE CORP ; GLASSTECH INC PERRYSBURG OHIO US ; GLASSTECH INT ; GLT CORP ; UPS CAPITAL CORP ; GURASUTEKU INC ; GLASSTECH INT LP A PARTNERSHIP OF DE LTD ; GLT CORP A CORP OF DE ; MCMaster HAROLD A ; BANK OF AMERICA NA ; FIRST NATIONAL BANK OF BOSTON ; FIRST NATIONAL BANK OF BOSTON AS COLLATERAL TRUST

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Inventor(s): HAROLD A MCMaster ; MCMaster HAROLD A WOODVILLE OHIO 43469 US ; MCMaster HAROLD ASHLEY

Agent(s): GRIFFITH HACK; SMART AND BIGGAR

Designated states: AT BE CH DE FR GB IT LI LU NL SE

Title: GLASS BENDING MOLD

Abstract: (Claim 1) 1. A ring-type glass bending mold comprising an intermediate fixed section and a pair of longitudinally curved, wing sections pivotally mounted on the opposite ends of said fixed section and arranged to swing about transversely directed, horizontally extending pivot axes between depressed open positions and elevated closed positions to form with said fixed section a longitudinally 2g concave, ring-type, shaping surface when said wing sections are in their closed mold positions, a lever means at each end of said fixed section disconnected from the adjacent wing section and extending longitudinally of the mold with each lever means pivotally supported interme-30 diate its ends on the fixed mold section for vertical rocking movement, link means pivotally connected to and de-pending from the inwardly directed, opposed ends of the lever means for the spaced wing sections, a weighted connector bar pivotally connected to and extending be-35 tween

the longitudinally spaced link means, and a cam and follower connection between the outwardly disposed end of each lever means and portion of the adjacent mold wing section.

Classifications:

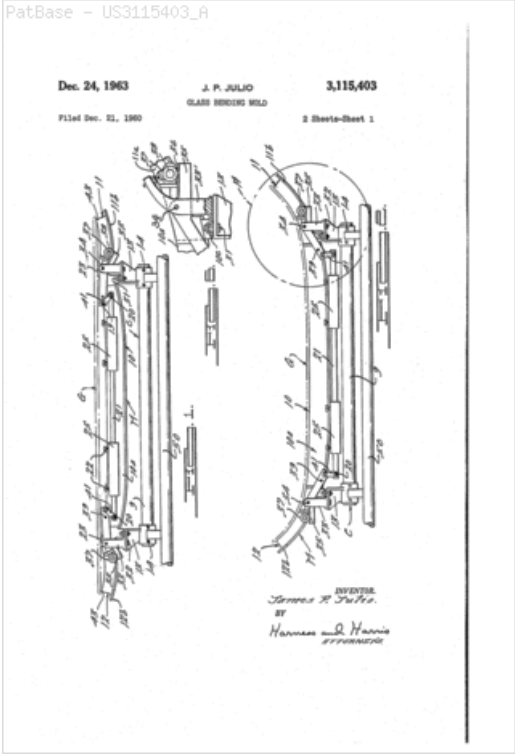
International (IPC 8-9): C03B23/027 (Advanced/Invention);
C03B23/02 (Core/Invention)

International (IPC 1-7): C03B23/027

CPC: C03B23/027

European: C03B23/027

US: 65/290 65/291



Family:

Publication number	Publication date	Application number	Application date
US3115403 A	19631224	US19600077375	19601221

Priority:

US19600077375 19601221

Probable Assignee: CHRYSLER CORP

Assignee(s): (std): CHRYSLER CORP

Assignee(s): FIDELITY UNION TRUST CO ; FIDELITY UNION TRUST CO TRUSTEE

Inventor(s): (std): JULIO JAMES P

26) Family number: 2875756 (US4756735A) © PatBase

Title: IN-LEHR PRESS BENDING

Abstract: Glass sheets are positioned on the shaping rail of an outline shaping mold for movement through a heating lehr and subsequent preliminary sag bending. The mold with the glass sheet supported thereon is then positioned between a pair of vertically aligned full surface pressing molds. The mold includes selected press surface areas that extend outside the perimeter of the outline mold. As the lower mold raises to lift the glass sheet off the outline mold, selected portions of the shaping rail move outwardly to allow the lower mold to pass through the outline mold. The glass sheet is then pressed between the upper and lower pressing molds.

Classifications:

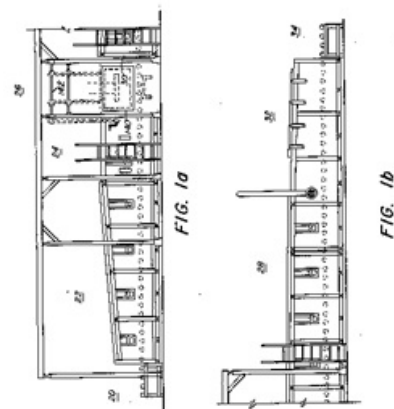
International (IPC 8-9): C03B23/023 C03B23/025
C03B23/03 (Advanced/Invention);
C03B23/02 (Core/Invention)

International (IPC 1-7): C03B23/023 C03B23/025 C03B23/03
C03B23/23

CPC: C03B23/027 C03B23/0305 C03B23/023 C03B23/0252

European: C03B23/023 C03B23/025B C03B23/03 C03B23/03C

US: 65/106 65/107 65/273 65/289 65/290

**Family:**

Publication number	Publication date	Application number	Application date
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JP1919755 C3	19950407	JP19880183381	19880722
JP6047474 B4	19940622	JP19880183381	19880722
JP64051341 A2	19890227	JP19880183381	19880722
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KR900006112 B1	19900822	KR19880009323	19880723
US4756735 A	19880712	US19870077152	19870724

Priority:

US19870077152 19870724 CA19880572807 19880722

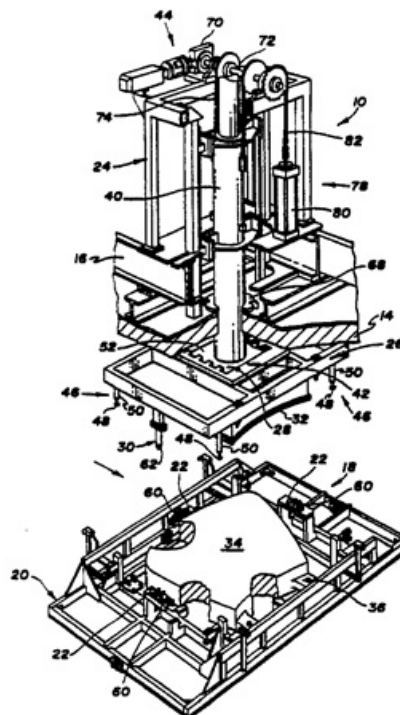
Probable Assignee: PPG IND OHIO INC**Assignee(s):** (std): PPG IND INC ; PPG INDUSTRIES INC**Assignee(s):** PPG INDUSTRIES INC PITTSBURGH PA US ; REESE THOMAS JONAH ; WEISS RICHARD BRISBEN ; PPG IND OHIO INC ; CATHERS WILLIAM PRESSLEY ; PPG IND**Inventor(s):** (std): CATHERS WILLIAM P ; REESE THOMAS J ; WEISS RICHARD B ; WEISS RICHARD BRISBIN ; UIRIAMU PURESURII KIYASAAZU ; TOOMASU JIYONA RIISU ; RICHIAADO BURISUBIN UEISU ; REESE THOMAS JONAH ; CATHERS WILLIAM PRESSLEY**Inventor(s):** WEISS RICHARD BRISBEN ; WEISS RICHARD BRISBIN LOWER BURREL PENNSYLVANIA 15 ; WEISS RICHARD BRISBIN LOWER BURREL PENNSYLVANIA 15068 US ; WEISS RICHARD BRISBIN LOWER BURREL... ; WILLIAM PRESSLEY CATHERS ; REESE THOMAS JONAH SARVER PENNSYLVANIA 16055 US ; RICHARD BRISBIN WEISS ; THOMAS JONAH REESE ; CATHERS WILLIAM PRESSLEY ALLISON PARK PENNSYLVANIA ; CATHERS WILLIAM PRESSLEY ALLISON PARK PENNSYLVANIA 16055 US ; CATHERS WILLIAM PRESSLEY ALLISON PARK...**Agent(s):** BORDEN LADNER GERVAIS LLP**Designated states:** DE FR GB IT**27) Family number: 3499791** (US5092916A)

© PatBase

Title: GLASS SHEET BENDING APPARATUS WITH THERMALLY STABLE REFERENCE

Abstract: A glass sheet bending apparatus (10) for bending glass sheets about a thermally stable reference is disclosed as including a mold shuttle (20) having a receptical member (22) providing a thermally stable reference point or center with respect to a glass sheet heating furnace (14) and an upper mold support including pin (62) cooperable with the first receptical member (22) so that a glass sheet can be accurately bent between molds (34, 32) mounted on the mold shuttle (20) and upper mold support (26) respectively. An upper mold support actuator (40) includes a second registering member (42) engaging a first registering member (28) of the upper mold support (26) for raising and lowering the upper mold support (26) and disengaging the upper mold support to allow relative movement between the actuator (40) and upper mold support (26) so that the same thereby realign and engage in a newly established registration during subsequent lifting of the upper mold support (26).

Classifications:**International (IPC 8-9):** C03B23/03 (Advanced/Invention); C03B23/02 (Core/Invention)**International (IPC 1-7):** C03B23/03**CPC:** C03B23/0302



Family:

Publication number	Publication date	Application number	Application date
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US5092916 A	19920303	US19900556129	19900720
WO9201640 A1	19920206	WO1991US05049	19910717

Priority:

US19900556129 19900720 WO1991US05049 19910717

Probable Assignee: GLASSTECH INC

Assignee(s): (std): GLASSTECH INC

Assignee(s): GLASSTECH INC PERRYSBURG OHIO US ; UPS CAPITAL CORP ; BANK OF AMERICA NA ; FIRST NATIONAL BANK OF BOSTON ; FIRST NATIONAL BANK OF BOSTON AS COLLATERAL TRUST

Inventor(s): (std): MCMASTER HAROLD ; MCMASTER HAROLD A ; MCMASTER RONALD A

Inventor(s): HAROLD A MCMASTER ; MAKUMASUTAA HARORUDO EI ; MCMASTER HAROLD A PERRYSBURG OH 43551 US

Designated states: AT AU BB BE BF BG BJ BR CA CF CG CH CI CM DE DK ES FI FR GA GB GN GR HU IT JP KP KR LI LK LU MC MG ML MR MW NL NO RO SD SE SN SU TD TG

28) Family number: 29331917 (US5178659A)

© PatBase

Title: METHOD OF AN APPARATUS FOR BEND-SHAPING A GLASS PLATE AND BENDING MOLD USED FOR THEM

Abstract: The method and the apparatus for bend-shaping a glass plate of the present invention a bending mold which includes a fixed split mold portion having a bend-shaping surface which corresponds to an intermediate curved portion of the glass plate and movable split mold portions each of which has a bend-shaping surface corresponding to the side portions of the glass plate having the predetermined shape and which are respectively placed at the sides of the fixed split mold portion so that the bend-shaping surfaces are movable around pivotal shafts for movement into alignment with the bend-shaping surface of the fixed split mold portion. The method includes a press-shaping step including heating the glass plate placed on the bending mold in a heating furnace and pressing from via an auxiliary pressing member the portion to be deeply bent of the glass plate while the glass plate is placed on the bending mold. The position of the pivotal shafts of the bending mold are positioned further from said fixed split mold portion than is said bend-shaping surface of said movable split mold portion, such that a moment of force at each of the pivotal shafts which acts on each of the movable split mold portions at the time of press-shaping prevents the bending mold from developing during press shaping.

Classifications:

International (IPC 8-9): C03B23/02 C03B23/023 C03B23/025
C03B23/027 C03B23/03 C03B40/02 C03C27/12 (Advanced/Invention);

C03B23/02 C03B40/00 C03C27/12 (Core/Invention)
International (IPC 1-7): C03B23/023 C03B23/027 C03B23/03
C03B40/02 C03C27/12
CPC: C03B23/0235 C03B23/0256 C03B23/0258 C03B23/027
C03B23/0305 C03B23/0307
European: C03B23/023 C03B23/023D C03B23/025C C03B23/025D
C03B23/027 C03B23/03 C03B23/03C C03B23/03D
US: 65/106 65/107 65/287 65/291

PatBase - US5178659_A

U.S. Patent

Jan. 12, 1993

Sheet 1 of 9

5,178,659

FIGURE 1a

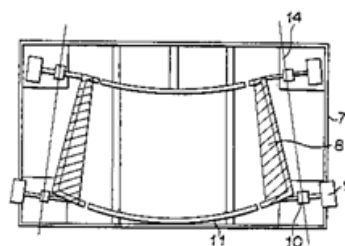
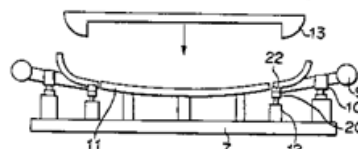


FIGURE 1b



Family:

Publication number	Publication date	Application number	Application date
DE69126458 D1	19970717	DE19916026458	19910301
DE69126458 T2	19971002	DE19916026458T	19910301
EP0445672 A1	19910911	EP19910103132	19910301
EP0445672 B1	19970611	EP19910103132	19910301
JP3027211 B2	20000327	JP19910053173	19910226
JP4214039 A2	19920805	JP19910053173	19910226
US5178659 A	19930112	US19910663174	19910301

Priority:

JP19900047139 19900301 JP19910053173 19910226

Probable Assignee: ASAHI GLASS CO LTD

Assignee(s): (std): ASAHI GLASS CO LTD

Assignee(s): ASAHI GLASS CO LTD TOKIO TOKYO JP ; ASAHI GLASS COMPANY LIMITED ; ASAHI GLASS COMPANY LTD ; N A

Inventor(s): (std): WATANABE YOSHIHIRO ; MAEDA KENJI

Inventor(s): WATANABE YOSHIHIRO YOKOHAMA SHI KANAGAWA KEN JP ; MAEDA KENJI CHITA GUN AICHI KEN JP

Designated states: BE DE FR GB IT

29) Family number: 8840939 (US5302176A)

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Title: Method of and apparatus for bending sheet glass

Abstract: A furnace for heating a glass sheet therein has a gravity bending zone for bending the glass sheet due to gravity, a press bending zone for bending the glass sheet under pressure, and an annealing zone for annealing the bent glass sheet. In the gravity bending zone, the glass sheet on a ring mold is preliminarily bent due to gravity. After the preliminarily bent glass sheet has been fed from the gravity bending zone into the press bending zone, the glass sheet is transferred from the ring mold to a movable lower mold assembly. The lower mold assembly is lifted to press the glass sheet against a fixed upper mold for finally bending the glass sheet. Thereafter, the lower mold with the finally bent glass sheet is lowered until the glass sheet is placed on the ring mold. Then, the glass sheet is fed with the ring mold into the annealing zone in which the glass sheet is annealed.

Classifications:

International (IPC 8-9): C03B23/027

C03B23/03 (Advanced/Invention);

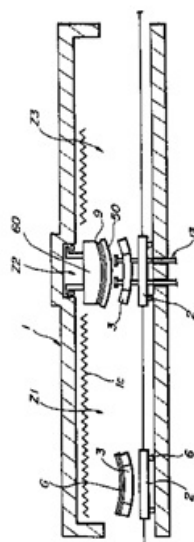
C03B23/02 (Core/Invention)

International (IPC 1-7): C03B23/023 C03B23/27 C03B23/3
C03B25/8

CPC: C03B23/027 C03B23/0305

European: C03B23/027 C03B23/03 C03B23/03C

US: 65/106 65/273 65/289



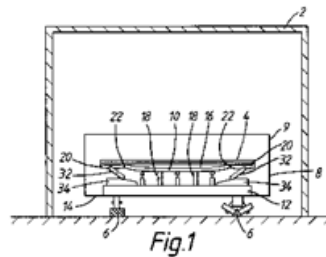


Fig.1

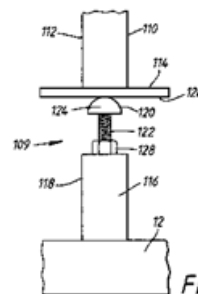


Fig.7

Family:

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AU199655078 A1	19961230	AU19960055078	19960501
BRPI9609409 A	19990511	BR1996PI09409	19960501
CA2222173 AA	19971125	CA19962222173	19960501
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CN1187173 A	19980708	CN19961094619	19960501
CZ293088 B6	20040218	CZ19970003856	19960501
CZ9703856 A3	19980513	CZ19970003856	19960501
DE69601267 D1	19990211	DE19966001267	19960501
DE69601267 T2	19990708	DE19966001267T	19960501
EP0830322 A1	19980325	EP19960912136	19960501
EP0830322 B1	19981230	EP19960912136	19960501
ES2127015 T3	19990401	ES19960912136T	19960501
GB9511555 A0	19950802	GB19950011555	19950607
JP2001508386 T2	20010626	JP19970500204T	19960501
JP4264132 B2	20090513	JP19970500204T	19960501
KR100355917 B1	20030129	KR19970708802	19960501
KR19990022322 A	19990325	KR19970708802	19960501
MX9709500 A1	19980329	MX19970009500	19960501
MX9709500 A1	19980331	MX19970009500	19960501
PL182069 B1	20011031	PL19960327996	19960501
PL327996 A1	19990104	PL19960327996	19960501
TR9701523 T1	19980221	TR19960001523T	19960501
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TW432022 B	20010501	TW19960106723	19960605
US5882370 A	19990316	US19950477271	19950607
WO9640594 A1	19961219	WO1996GB01050	19960501
ZA9604450 A	19960829	ZA19960004450	19960530

Priority:

GB19950011555 19950607 US19950477271 19950607 WO1996GB01050 19960501

Probable Assignee: PILKINGTON GLASS LTD

Assignee(s): (std): PILKINGTON GLASS LTD ; PILKINGTON UK LTD ; TRIPLEX SAFETY GLASS CO

Assignee(s): TRIPLEX SAFETY GLASS COMPANY LIMITED ; PILKINGTON UNITED KINGDOM LTD ; PILKINGTON UNITED KINGDOM LTD ST HELENS MERSEYSIDE ; PILKINGTON UNITED KINGDOM LTD ST HELENS MERSEYSIDE GB ; TETLOW IAN ; PILKINGTON UNITED KINGDOM LIMITED ; GARNER JEFFREY ; PILKINGTON GLASS LIMITED

Inventor(s): (std): IAN TETLOW ; JEFFREY GARNER ; TETLOW IAN ; GARNER JEFFREY ; TETLOW IAN NICHOLAS

Inventor(s): GARNER JEFFREY WIGAN WN6 8DW GB ; TETLOW IAN COVENTRY CV5 6DF GB

Agent(s): SMART AND BIGGAR

Designated states: AL AM AT AU AZ BB BE BF BG BJ BR BY CA CF CG CH CI CM CN CZ DE DK EE ES FI FR GA GB GE GN GR HU IE IS IT JP KE KG KP KR KZ LI LK LR LS LT LU LV MC MD MG MK ML MN MW MX NL NO NZ PL PT RO RU SD SE SG SI SK SZ TJ TM TR TT UA UG UZ VN