

Brigard & Castro

Abogados

SUPERINTENDENCIA Y COMERCIO
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Trámite: 002 PATENTES 0 1 REGISTRO/ 444 REPUESTA
Dependencia: 2000 DIVISION DE NUEVAS CREACIONES

AS: 88.303

Apartado 3892

Cra. 7 16-56
Bogotá - Colombia S.A.

Tel. Conm. 3802200
Tel./Fax: (57.1) 2827978
(57.1) 3802700

E.Mail: bricas@brigardycastro.com.co

Señores

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

DIVISION DE NUEVAS CREACIONES

E. S. D.

REF: Expediente No.02 049.640 - Solicitud de Patente
a favor de OWENS - BROCKWAY GLASS CONTAINER INC.

**Titulada: MOLDE DE FORMACIÓN DE ARTÍCULOS DE VIDRIO Y
MÉTODO DE FABRICACIÓN**

RAMIRO CASTRO DUQUE, vecino de Bogotá, portador de la tarjeta profesional No. 1003, obrando como apoderado de la Sociedad OWENS - BROCKWAY GLASS CONTAINER INC., según lo acredita el documento de poder presentado en esa División, para dar cumplimiento al requerimiento notificado por fijación en lista de fecha 11 de Julio de 2002, y de acuerdo con el Artículo 39 de la Decisión 486 de la Comunidad Andina, me permito anexar al presente escrito los siguientes documentos:

1. Documento donde consta la cesión del derecho a la patente otorgado por los inventores al solicitante, debidamente apostillado.
2. Extracto para Publicación y Tarjeta de Archivo Temático.
3. Copia certificada por la Oficina de Patentes de los Estados Unidos de la primera solicitud presentada para la misma invención, de la cual REIVINDICAMOS PRIORIDAD, junto con su correspondiente traducción del inglés al castellano.

Del señor Jefe atentamente,



RAMIRO CASTRO DUQUE
C.C. No. 170.322 de Bogotá
Código 340
Cra 7a. No. 16-56 Piso 9

Bogotá, Septiembre 04, 2002
CPB/hsr.

FOL 21: MASEN 1ACH- REATROO
FOL 22: EXTERIOR PUBLICATION

APOSTILLE

(Convention de la Haye du 5 octobre 1961)

1. Country: United States of America

This public document

2. has been signed by J. BERNIE QUILTER

3. acting in the capacity of Clerk of Court of Common Pleas

4. bears the seal/stamp of Court of Common Pleas, Lucas County

CERTIFIED

5. at Columbus, Ohio

6. July 24, 2002

7. by the Secretary of State of Ohio.

8. No. 099553

9. Seal/Stamp:

10. Signature:

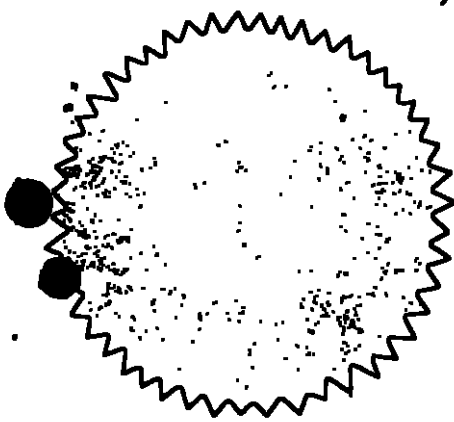


J. Kenneth Blackwell
J. Kenneth Blackwell
Secretary of State of Ohio

NOTARY CERTIFICATE

THE STATE OF OHIO
COUNTY OF LUCAS

ss.



21 21
J. Bernie Quilter, Clerk of the Common Pleas Court and Court of Appeals for the County of Lucas and State of Ohio, the same being a court of record, and having by LAW a Seal, do hereby certify that

JUDITH M SCHREINER

whose name is subscribed to the certificate of the proof of acknowledgment of the annexed instrument and thereon written, was, at the time of taking such proof and acknowledgment, a Notary Public, duly commissioned and sworn, and authorized by the laws of said State to take the acknowledgments and proofs of deeds or conveyances for lands, tenements or hereditaments in said State, to be recorded therein. And further, that I am well acquainted with the handwriting of such Notary Public, and verily believe that the signature to said certificate of proof or acknowledgment is genuine, that impression of seal of such officer is not required by law to be filed in my office, and the commission expires on the 2nd day of FEBRUARY 2006

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seal of the said Court and County, at Toledo, Ohio, JULY 11th 2002

(Date)

J. Bernie Quilter, Clerk of Courts



J. Bernie Quilter, Clerk

22

17489 COLO

**CERTIFIED COPY
OF
ASSIGNMENT**

I, JUDITH M. SCHREINER, a Notary Public in and for the State of Ohio, U.S.A., hereby certify that the attached document is a true copy of the Assignment made of an Improvement Invention for GLASSWARE FORMING MOLD AND METHOD OF MANUFACTURE by Its Inventor:

DAVID L. LEWIS

to Owens-Brockway Glass Container Inc., as executed on June 7, 2001, and recorded in the United States Patent and Trademark Office on June 12, 2001 (as evidenced by the Notice of Recordation of Assignment Document also attached), and that the aforesaid Improvement invention is the subject of United States Patent Application Serial No. 09/879,495 filed June 12, 2001.

Dated: May 24, 2002

Judith M. Schreiner
Notary Public



**JUDITH M. SCHREINER
Notary Public, State of Ohio
Commission Expires 2/2/08**



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UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

AUGUST 29, 2001

Owens-Illinois, Inc



101756549A

OWENS-ILLINOIS
H. G. BRUSS
ONE SEAGATE
25-LDP
TOLEDO, OHIO 43666

SEP 4 2001

INTELLECTUAL
PROPERTY SECTION

UNITED STATES PATENT AND TRADEMARK OFFICE
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, CG-4, 1213 JEFFERSON DAVIS HWY, SUITE 320, WASHINGTON, D.C. 20231.

RECORDATION DATE: 06/12/2001

REEL/FRAME: 011905/0817
NUMBER OF PAGES: 2

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:

LEWIS, DAVID L.

DOC DATE: 06/07/2001

ASSIGNEE:

OWENS-BROCKWAY GLASS CONTAINER
INC.
ONE SEAGATE
TOLEDO, OHIO 43666

SERIAL NUMBER: 09879495
PATENT NUMBER:

FILING DATE: 06/12/2001
ISSUE DATE:

TONYA LEE, EXAMINER
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS

ASSIGNMENT

WHEREAS, I, DAVID L. LEWIS, of
3731 Wild Pheasant Lane, Sylvania, Ohio 43560 U.S.A., have invented
an improvement in "GLASSWARE FORMING MOLD AND METHOD OF MANUFACTURE"
and

WHEREAS, I have executed an Application for United States Patent based
thereon, on the 7th day of June, 2001; and

WHEREAS, OWENS-BROCKWAY GLASS CONTAINER INC., a Delaware
corporation, is desirous of acquiring certain rights thereunder;

NOW, THEREFORE, for One Dollar (\$1.00) and other valuable considerations,
receipt of all of which is hereby acknowledged, I have agreed to and do hereby
sell, assign, and transfer unto said corporation my entire right, title, and
interest in and throughout the United States of America (including its terri-
tories and dependencies) and all countries foreign thereto, in and to said
invention, said application and any and all patents (including extensions
thereof) of any country, which have been or may be granted on said invention
or any part thereof, or on said application or any divisional, continuing,
renewal, reissue, or other patent application, based in whole or in part
thereon, or based upon said invention.

TO BE HELD AND ENJOYED by said corporation, its successors and assigns,
to the full ends of the respective terms for which said patents or any of them
have been or may be granted, as fully and entirely as the same would have been
held and enjoyed by me had no sale and assignment of said interest been made;

AND I hereby covenant and agree for myself, my heirs, and my legal rep-
resentatives, to assist my said assignee in the prosecution of said application
and in any interference which may arise involving said invention, and, upon
request, to execute without further consideration all necessary and desirable
divisional, continuing, renewal, reissue, or other applications for patents in
any country, that might be deemed necessary by said assignee fully to secure to
said assignee its interest as aforesaid in and to said invention or any part
thereof, and in and to said several patents or any of them. Further, I hereby
authorize the above-mentioned assignee to insert in this instrument the identi-
fying serial number and filing date of my said application when received.

AND I do hereby authorize and request the Commissioner of Patents of the
United States of America to issue any and all United States patents which may
be granted upon said United States applications or any of them, or upon said
invention or any part thereof, to said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal this

7th day of June, 2001.

David L. Lewis
David L. Lewis
, COUNTY WOOD ss:

STATE OF OHIO

On this 7 day of JUNE, 2001, before me, a Notary
Public, personally appeared the above named David L. Lewis,
personally known to me and known by me to be the one who executed the foregoing
instrument and subscribed the same in my presence, and acknowledged the same to
be his free act and deed.

Joyce M. Murphy
Notary Public

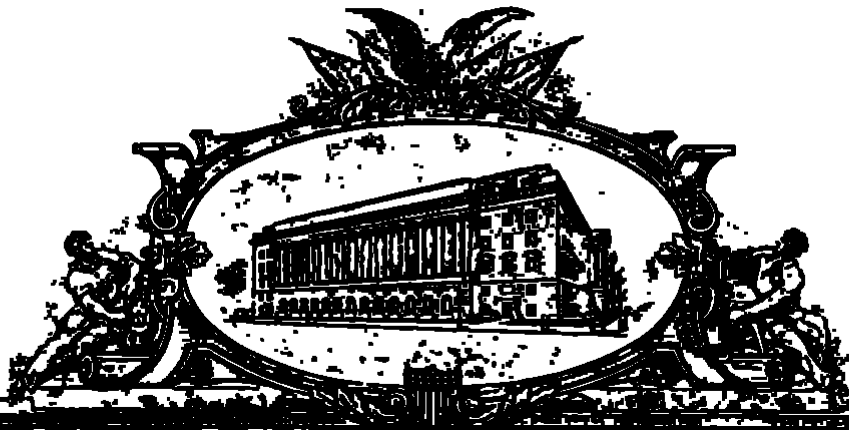
My Commission Expires:

November 29, 2004

JOYCE M. MURPHY
Notary Public, State of Ohio
Commission Expires 11-29-04

U. S. Serial No. _____ Filing Date _____

28
88303 25



VA 804778

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

April 24, 2002

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

APPLICATION NUMBER: 09/879,495

FILING DATE: June 12, 2001



By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

H. Phillips
H. PHILLIPS
Certifying Officer

06-13-01

A 26

06/12/01

09879495-061201

Please type a post sign (*) inside this box ☒

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PTO/BB/05 (11-00)
Approved for use through 10/31/2002 OMB 0551-0032
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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. 17489 USA
First Inventor David L. Lewis
Title Glassware Forming Mold and ...
Express Mail Label No. EL 507167882 US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ Fee Transmittal Form (e.g., PTO/BB/17)
(Submit fee original and a duplicate for fee payment)
2. ☐ Applicant claims small entity status
See 37 CFR 1.27
3. ☒ Specification (Total Pages 7)
(preferred arrangement and form below)
 - Descriptive title of the invention
 - Cross Reference to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to sequence listing, a table, or a computer program listing appendix
 - Background of the invention
 - Brief Summary of the invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
4. ☐ Drawing(s) (35 U.S.C. 113) [Total Sheets]
5. Oath or Declaration [Total Pages 2]
 - a. ☒ Newly executed (original or copy)
Copy from a prior application (37 CFR 1.63 (d))
(for continuation/divisional with Box 18 completed)
 - b. ☐ **DELETION OF INVENTOR(S)**
Signatures attached deleting inventor(s)
named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b)
6. ☐ Application Data Sheet. See 37 CFR 1.78

ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix)
8. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
 - a. ☐ Computer Readable Form (CRF)
 - b. Specification Sequence Listing on:
 - i. ☐ CD-ROM or CD-R (2 copies); or
 - ii. ☐ paper
 - c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. ☒ Assignment Papers (cover sheet & document(s))
10. ☐ 37 CFR 3.73(b) Statement of Power of Attorney
(when there is an assignee)
11. ☐ English Translation Document *(if applicable)*
12. ☒ Information Disclosure Statement (IDS)/PTO-1449 ☒ Copies of IDS
Claims
13. ☐ Preliminary Amendment
14. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
16. ☒ Request and Certification under 35 U.S.C. 122
*(b)(2)(B)(i) Applicant must attach form PTO/BB/35
or its equivalent.*
17. ☒ Other Power of Atty PTO/BB/81

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.78:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP)

Prior application information

Serial No.

of prior application No. _____

Group Art Unit _____

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

19. CORRESPONDENCE ADDRESS

☐ Customer Number or Bar Code Label						or ☒ Correspondence address below
Name	H. G. Bruss 25 LDP					
Address	Owens-Illinois, Inc.					
Address	One SeaGate					
City	Toledo	State	OH	Zip Code	43666	
Country	USA	Telephone	419-247-8547	Fax	247-8555	

Name (Print/Type)	H. G. Bruss	Registration No. (Attorney/Agent)	24,389
Signature	<i>H. G. Bruss</i>	Date	6/12/01

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual user. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FREE OR COMPLETED FORMS TO THIS ADDRESS. SEND TO Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

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FEE TRANSMITTAL for FY 2001

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT (\$)
710

Complete if Known

Application Number
Filing Date
First Named Inventor David L. Lewis
Examiner Name
Group Art Unit
Attorney Docket No. 17489 USA

METHOD OF PAYMENT

1. ☒ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:

Deposit Account Number 15-0875
Deposit Account Name Owens-Illinois, Inc.

- ☒ Charge Any Additional Fee Requested Under 37 CFR 1.16 and 1.17
☐ Applicant claims small entity status See 37 CFR 1.17

2. ☐ Payment Enclosed:

☐ Check ☐ Credit card ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code (S)	Small Entity Fee Code (S)	Fee Description	Fee Paid
101 710	201 355	Utility filing fee	710
106 320	206 160	Design filing fee	
107 490	207 245	Plant filing fee	
108 710	208 355	Resubmitting filing fee	
114 190	214 75	Provisional filing fee	

SUBTOTAL (1) (\$)
710

2. EXTRA CLAIM FEES

Total Claims 4
Independent Claims 3
Multiple Dependent 1
Extra Claims Fee from Initial Fee Paid
-30** = 0
-3** = 0
0

Large Entity Fee Code (S)	Small Entity Fee Code (S)	Fee Description
103 15	203 5	Claims in excess of 20
102 80	202 40	Independent claims in excess of 3
104 270	204 135	Multiple dependent claim, if not paid
105 80	205 40	** Resubmit independent claims over original patent
118 15	218 5	** Resubmit claims in excess of 30 and over original patent

SUBTOTAL (2) (\$)
0

**or number previously paid, if greater. For Resubmits, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code (S)	Small Entity Fee Code (S)	Fee Description	Fee Paid
105 130	205 65	Surcharge - late filing fee or cash	
127 60	227 25	Surcharge - late provisional filing fee or cover sheet	
130 130	130 130	Non-English specification	
147 2,520	147 2,520	For filing a request for ex parte reexamination	
112 520*	112 520*	Requesting publication of SIF prior to Examiner action	
113 1,840*	113 1,840*	Requesting publication of SIF after Examiner action	
115 110	215 55	Extension for reply within first month	
116 380	216 190	Extension for reply within second month	
117 880	217 440	Extension for reply within third month	
118 1,320	218 660	Extension for reply within fourth month	
125 1,680	225 840	Extension for reply within fifth month	
119 310	219 155	Notice of Appeal	
120 310	220 155	Filing a brief in support of an appeal	
121 270	221 135	Request for oral hearing	
138 1,510	138 1,510	Petition to establish a public use proceeding	
140 110	240 55	Petition to revive - unwithdrawn	
141 1,240	241 620	Petition to revive - withdrawn	
142 1,240	242 620	Utility issue fee (or resubmit)	
143 440	243 220	Design issue fee	
144 820	244 410	Plant issue fee	
122 130	122 130	Petitions to the Commissioner	
123 80	123 80	Processing fee under 37 CFR 1.17(a)	
128 180	128 180	Submission of Information Disclosure Sheet	
581 40	581 40	Recording each patent assignment per property (unless number of properties)	
146 710	246 355	Filing a submission after final rejection (37 CFR § 1.120(a))	
148 710	248 355	For each additional invention to be examined (37 CFR § 1.120(b))	
179 710	279 355	Request for Continued Examination (RCE)	
189 900	189 900	Request for expedited examination of a design application	

Other fee (specify)

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$)
0

SUBMITTED BY

Name (Print/Type) H. G. BRUCE Registration No. 24,389 Telephone 419-247-8547
Signature [Signature] Date 6/12/01

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

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PTO 5878 (11-02)

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REQUEST AND CERTIFICATION UNDER 35 U.S.C. 122(b)(2)(B)(i)	First Named Inventor	David L. Lewis
	Title	Glassware Forming Mold and Method of...
	Atty Docket Number	17489 USA

I hereby certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral agreement, that requires publication at eighteen months after filing. I hereby request that the attached application not be published under 35 U.S.C. 122(b).

4/17/01
Date


Signature

H. G. Bruce
Typed or printed name

This request must be signed in compliance with 37 CFR 1.33(b) and submitted with the application upon filing.

Applicant may rescind this nonpublication request at any time. If applicant rescinds a request that an application not be published under 35 U.S.C. 122(b), the application will be scheduled for publication at eighteen months from the earliest claimed filing date for which a benefit is claimed.

If applicant subsequently files an application directed to the invention disclosed in the attached application in another country, or under a multilateral international agreement, that requires publication of applications eighteen months after filing, the applicant must notify the United States Patent and Trademark Office of such filing within forty-five (45) days after the date of the filing of such foreign or international application. Failure to do so will result in abandonment of this application (35 U.S.C. 122(b)(2)(B)(ii)).

Burden Hour Statement: This collection of information is required by 37 CFR 1.213(d). The information is used by the public to request that an application not be published under 35 U.S.C. 122(b) and the PTO to process that request. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This form is estimated to take 5 minutes to complete. This time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

09879495-061201

GLASSWARE FORMING MOLD AND METHOD OF MANUFACTURE

The present invention is directed to glassware forming machines, and more particularly to a glassware forming mold and method of manufacture in which the microstructure of the mold material is tailored to obtain desired heat transfer characteristics.

Background and Objects of the Invention

5 The science of glass container manufacture is currently served by the so-called individual section machine. Such machines include a plurality of separate or individual manufacturing sections, each of which has a multiplicity of operating mechanisms for converting one or more charges or gobs of molten glass into hollow glass containers and transferring the containers through successive stations of the machine section. Each machine section typically
10 includes one or more blank molds in which a glass gob is initially formed in a blowing or pressing operation, one or more invert arms for transferring the blanks to blow molds in which the containers are blown to final form, tongs for removing the formed containers onto a deadplate, and a sweepout mechanism for transferring molded containers from the deadplate onto a machine conveyor. U.S. Patent 4,362,544 includes a background discussion of both blow-and-
15 blow and press-and-blow glassware forming processes, and discloses an electropneumatic individual section machine adapted for use in either process. In the past, the blank and blow molds of a glassware forming machine have generally been cooled by directing air onto or through the mold parts. It has been proposed in U.S. Patents 3,887,350 and 4,142,884, for example, to direct a liquid, such as water, through passages in the mold parts to improve heat
20 extraction.

Mold material for manufacture of quality glassware must have the following characteristics: good wear properties, good thermal cycle resistance to cracking, good mechanical properties, good glass release properties, ease of machinability, ease of repair, and economic feasibility. Ductile iron, which is defined as an iron in which free microstructural graphite is in
25 the form of spheres, has been proposed for use as a mold material to manufacture glassware in which reduced thermal conductivity (as compared with gray iron for example) is desired.

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Specific examples of glassware, for which ductile iron is typically employed as the mold material, are containers that require only a small amount of heat removal in the mold equipment, such as cosmetic and pharmaceutical bottles. However, ductile iron has not been employed in manufacture of molds for larger containers, such as beer bottles, because of its reduced heat transfer and thermal cycle resistance properties. Ni-Resist ductile iron has been proposed for glassware manufacture. The increased nickel content of Ni-Resist ductile iron contributes to improved glass release properties. However, standard austenitic Ni-Resist ductile iron does not exhibit desired thermal conductivity and resistance to thermal cyclic cracking.

Copending application Serial No. 09/400,123, filed September 2, 1999 and assigned to the assignee hereof, discloses that the mold body or bodies (either blank mold or blow mold) for an individual section glassware forming machine may be constructed of austenitic Ni-Resist ductile iron. Such ductile iron is preferably a Type D Ni-Resist ductile iron in accordance with ASTM-A439-84, but modified to possess increased silicon and molybdenum contents. Type D2-C iron is a disclosed example. Silicon content is preferably in excess of 3.0 wt %, and most preferably is 4.20 ± 0.20 wt %. Molybdenum content is preferably in excess of 0.5 wt %, and most preferably 0.70 ± 0.10 wt %. The increased silicon content decreases the thermal conductivity of the mold material. The increased molybdenum content improves thermal cyclic resistance to cracking. The increased nickel content characteristic to Ni-Resist materials improves glass release properties. The austenitic Ni-Resist ductile iron composition of that application also yields desirable wear and other mechanical properties, ease of machineability and repair, and desirable economic feasibility. Austenitic Ni-Resist material also provides a more stable microstructure than gray iron, for example, up to a temperature of 1400 F.

According to current technology, the blank molds and the blow molds of an individual section glassware forming machine are designed entirely separately from each other to obtain the most desirable thermal and other properties under the differing conditions in which the molds operate. A general object of the present invention is to provide a general material that can be used for both the blank molds and the blow molds of an individual section glassware

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forming machine, with the heat transfer properties of the molds being tailored at the time of manufacture by selectively tailoring the metal composition prior to casting the mold bodies.

Summary of the Invention

Thermal conductivity of glassware forming blank and blow molds of Ni-Resist iron is selectively controlled by formation of compacted graphite in the mold microstructure during preparation of the melt and casting of the mold bodies. Specifically, with a Type D5 Ni-Resist iron according to ASTM-A439-84, compacted graphite is selectively formed in the cast microstructure of the mold body by controlling the magnesium and sulphur concentrations in the iron composition to the range of 0.01 to 0.04 wt % magnesium and 0.00 to 0.01 wt % sulphur, and adding titanium to the iron composition in the range of 0.10 to 0.25 wt % titanium. Whereas formation of compacted graphite in a cast ductile microstructure is normally considered to be undesirable for glass container forming molds, it has been found that formation of a small but appreciable amount of graphite provides the opportunity selectively to tailor the thermal conductivity characteristics of the mold body.

A mold for a glassware forming machine in accordance with one presently preferred embodiment of the invention comprises an austenitic Ni-Resist compacted graphite ductile iron having a magnesium content in the range of 0.01 to 0.04 wt %, a sulphur content in the amount of 0.00 to 0.01 wt %, and a titanium content in the range of 0.01 to 0.25 wt %. In the preferred embodiment of the invention, the austenitic (Type D5) Ni-Resist compacted graphite iron has an appreciable or measurable amount of compacted graphite of 40 wt% or more, which is to say that at least 40% of the graphite is in compacted rather than nodular form. The preferred embodiment of the invention consists essentially of carbon in the amount of 1.50 to 2.40 wt %, silicon in the amount of 1.00 to 2.80 wt %, manganese in the amount of 0.50 to 1.00 wt %, phosphorus in the amount of 0.00 to 0.80 wt %, nickel in the amount of 34.0 to 36.0 wt %, chromium in the amount of 0.00 to 0.10 wt %, molybdenum in the amount of 0.00 to 0.80 wt %, magnesium in the amount of 0.01 to 0.04 wt %, sulphur in the amount of 0.00 to 0.01 wt %, titanium in the amount of 0.01 to 0.25 wt %, and balance iron.

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5 A method of making a mold for a glassware forming machine in accordance with
a presently preferred embodiment of the invention comprises the steps of casting the mold of an
austenitic Type D5 Ni-Resist ductile iron according to ASTM-A439-84, while selectively
controlling thermal conductivity of the mold by selectively controlling magnesium content of the
mold in the range of 0.01 to 0.04 wt %, sulphur content in the range 0.00 to 0.01 wt % and
titanium content in the range of 0.01 to 0.25 wt %. Selective tailoring of the heat transfer
characteristics of the mold material during the mold forming process allows implementation of
the same basic material for both blank molds and blow molds, while providing opportunity for
selectively tailoring the heat transfer characteristics of each mold type according to the specific
requirements during use.

Detailed Description of Preferred Embodiments

The disclosure of above-noted U.S. application Serial No. 09/400,123, filed
September 2, 1999 and assigned to the assignee hereof, is incorporated herein by reference.

15 Mold bodies for a glassware forming machine (either blank mold or blow mold
bodies) are constructed of austenitic Ni-Resist ductile iron in accordance with the presently
preferred embodiments of the invention. Ni-Resist ductile iron is a ductile iron that has a high
nickel content. Type D5 Ni-Resist cast ductile iron according to ASTM-A439-84 has the
following composition: 1.50 to 2.40 wt % carbon, 1.00 to 2.80 wt % silicon, 0.05 to 1.00 wt %
manganese, 0.00 to 0.80 wt % phosphorus, 34.0 to 36.0 wt % nickel, 0.00 to 0.10 wt %
20 chromium, 0.00 to 0.80 wt % molybdenum, about 0.03 to 0.06 wt % manganese, about 0.01 wt
% sulphur, and balance iron. In accordance with the present invention, the magnesium and
sulphur concentrations in the melt or "heat" prior to casting are reduced to the range of 0.01 to
0.04 wt % magnesium and 0.00 to 0.01 wt % sulphur, and titanium is added to the melt or "heat"
in an amount to yield a titanium concentration in the range of 0.10 to 0.25 wt % titanium.
25 Reduction in the magnesium concentration increases the tendency of the graphite structure to be
compacted rather than nodular. Likewise, reduction in sulfur enhances the formation of
compacted graphite. Addition of titanium increases the tendency of the graphite to assume

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compacted rather than nodular form and aids in the formation of compacted graphite. All three elements must be controlled to ensure repeatability of the microstructure.

Thus, the composition of the mold bodies in accordance with the present invention is: 1.50 to 2.40 wt % carbon, 1.00 to 2.80 wt % silicon, 0.05 to 1.00 wt % manganese, 0.00 to 0.08 wt % phosphorus, 34.0 to 36.0 wt % nickel, 0.00 to 0.10 wt % chromium, 0.00 to 0.80 wt % molybdenum, 0.01 to 0.04 wt % magnesium, 0.00 to 0.01 wt % sulphur, 0.01 to 0.25 wt % titanium, and balance iron. Reduction of the concentrations of magnesium and sulphur, and addition of titanium, produce compacted graphite in the microstructure of the mold bodies. The concentration of compacted graphite in the mold microstructure is selectively controllable by controlling the magnesium, sulphur and titanium concentrations in the melt or "heat" prior to casting. Thus, the same basic melt can be used for producing either blank or blow molds, with the heat transfer characteristics being tailored for either blank or blow mold implementation by selectively controlling the concentrations of magnesium, sulphur and titanium.

There have thus been disclosed a mold and method of mold manufacture that fully satisfy all of the objects and aims previously set forth. In particular, simultaneous selective reduction of magnesium and sulphur concentrations, and addition of titanium, in an austenitic Ni-Resist ductile iron provides for selective control of heat transfer characteristics of the mold body by selective formation of compacted graphite in the cast microstructure of the mold. Thus, the same basic Ni-Resist cast ductile iron composition can be used for either blank or blow molds, with the heat transfer characteristics being tailored by selective control of these minor constituents. Modifications and variations to the mold and method of manufacture will readily suggest themselves to persons of ordinary skill in the art. The invention is intended to embrace all such modifications and variations as fall within the spirit and broad scope of the appended claims.

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CLAIMS

1.

1 A mold for a glassware forming machine that comprises austenitic (type D5) Ni-
2 Resist ductile iron having a magnesium content in the range of 0.01 to 0.04 wt %, a sulphur
3 content in the amount of 0.00 to 0.01 wt %, and a titanium content in the amount of 0.01 to 0.25
4 wt %.

2.

1 A mold for a glassware forming machine that is of austenitic Ni-Resist ductile
2 iron with a microstructure having an appreciable amount of compacted graphite and consists
3 essentially of carbon in the amount of 1.50 to 2.40 wt %, silicon in the amount of 1.00 to 2.80
4 wt %, manganese in the amount of 0.05 to 1.00 wt %, phosphorus in the amount of 0.00 to 0.08
5 wt %, nickel in the amount of 34.0 to 36.0 wt %, chromium in the amount of 0.00 to 0.10 wt %,
6 molybdenum in the amount of 0.00 to 0.80 wt %, manganese in the amount of 0.01 to 0.06 wt
7 %, sulphur in the amount of 0.00 to 0.01 wt %, titanium in the amount of 0.01 to 0.25 wt %, and
8 balance iron.

3.

1 The mold set forth in claim 2 wherein at least 40% of the graphite in said
2 microstructure is compacted graphite.

4.

1 A method of making a mold for a glassware forming machine that comprises the
2 steps of:

3 (a) casting the mold of an austenitic Type D5 Ni-Resist ductile iron according
4 to ASTM-A439-84, and

5 (b) selectively controlling thermal conductivity of the mold during said step

6 (a) by selectively controlling magnesium content of the mold in the range of 0.01 to 0.04 wt %,
7 sulphur content in the range of 0.00 to 0.01 wt %, and titanium content in the range of 0.01 to
8 0.25 wt %.

Abstract of the Disclosure

Thermal conductivity of glassware forming blank molds and blow molds of Ni-Resist ductile iron is selectively controlled by formation of compacted graphite in the mold microstructure during preparation of the melt and casting of the mold bodies. Specifically, with a Type D5 Ni-Resist ductile iron according to ASTM-A439-84, compacted graphite is selectively
5 formed in the cast microstructure of the mold body by reducing the magnesium and sulphur concentrations in the iron composition to the range of 0.01 to 0.04 wt % magnesium and 0.00 to 0.01 wt % sulphur, and adding titanium to the iron composition in the range of 0.10 to 0.25 wt % titanium. Whereas formation of compacted graphite in the cast microstructure is normally considered to be undesirable for glassware forming molds, it has been found that formation of
10 a small but appreciable amount of graphite provides the opportunity selectively to tailor the thermal conductivity characteristics of the mold body.

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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63) ☒ Declaration Submitted with Initial Filing or ☐ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)	Attorney Docket Number	17489 USA
	First Named Inventor	David L. Lewis
	COMPLETE IF KNOWN	
	Application Number	/
	Filing Date	
	Group Art Unit	
	Examiner Name	

As a below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

GLASSWARE FORMING MOLD AND METHOD OF MANUFACTURE

(Title of the Invention)

the specification of which

☒ is attached hereto or as United States Application Number or PCT International Application Number

☐ was filed on (MM/DD/YYYY) and was amended on (MM/DD/YYYY) (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/025 attached hereto.

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)

☐ Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/025 attached hereto.

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Under the Patent Act of 1952, no person is required to execute this form if the inventor is a U.S. citizen or resident.

DECLARATION — Utility or Design Patent Application

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Name **H. G. Bruss 25-LCP**

Address **Owens-Illinois, Inc.**

Address **One SeaGate**

City **Toledo**

State **OH**

ZIP **43666**

Country **USA**

Telephone **419-247-8547**

Fax **419-247-8555**

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR:

☐ A petition has been filed for this unsigned inventor

Given Name **David L.**
(first and middle (if any))

Family Name **Lewis**
or Surname

Inventor's Signature **David L Lewis**

Date **06/07/01**

Residence: City **Sylvania**

State **OH**

Country **USA**

Citizenship **USA**

Mailing Address **3731 Wild Phasant Lane**

Mailing Address

City **Sylvania**

State **OH**

ZIP **43560-3580**

Country **USA**

NAME OF SECOND INVENTOR:

☐ A petition has been filed for this unsigned inventor

Given Name
(first and middle (if any))

Family Name
or Surname

Inventor's
Signature

Date

Residence: City

State

Country

Citizenship

Mailing Address

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City

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ZIP

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☐ Additional inventors are being named on the _____ supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto

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POWER OF ATTORNEY OR AUTHORIZATION OF AGENT	Application Number	
	Filing Date	
	First Named Inventor	David L. Lewis
	Group Art Unit	
	Examiner Name	
	Attorney Docket Number	17489 USA

I hereby appoint:

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☒ Practitioner(s) named below:

Name	Registration Number
Principal Attorney: H. G. Bruce	24,389
Associate Attorney: R. C. Collins	27,430

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☐ Assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/68).

SIGNATURE of Applicant or Assignee of Record

Name	David L. Lewis
Signature	<i>David L. Lewis</i>
Date	06/07/01

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

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**TRADUCCIÓN DEL INGLÉS AL CASTELLANO de la Solicitud de
Patente de los Estados Unidos No.09/879,495 relacionada con:**

**MOLDE DE FORMACIÓN DE ARTÍCULOS DE VIDRIO Y
MÉTODO DE FABRICACIÓN**

**ANEXOS. La Solicitud de Patente de los Estados Unidos Serie No.09/
879,495 arriba mencionada, Declaración y Poder, Solicitud de Patente,
Certificación del Comisionado de Patentes y Marcas de los Estados
Unidos de América.**

LOS ESTADOS UNIDOS DE AMÉRICA

**DEPARTAMENTO DE COMERCIO DE LOS ESTADOS UNIDOS DE
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Abril 24, 2002

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REQUISITOS PARA CONCEDERLE UNA FECHA DE
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**NUMERO DE SOLICITUD: 09/879,495
FECHA DE PRESENTACIÓN: Junio 12, 2001**

**Por autorización del
COMISIONADO DE PATENTES Y MARCAS
H. Phillips (Firmado)
H. PHILLIPS
Funcionario de Certificaciones**

SELLO ADHERIDO

RCC/gu

17489

**MOLDE DE FORMACIÓN DE ARTÍCULOS DE VIDRIO Y
MÉTODO DE FABRICACIÓN**

La presente invención se dirige a máquinas de formación de

artículos de vidrio, y más particularmente a un molde de formación y un método de fabricación donde la micro estructura del material del molde está constituida para obtener deseadas características de transferencia de calor.

Antecedentes y Objetivos de la Invención

La ciencia de la fabricación de recipientes de vidrio se sirve corrientemente de la denominada máquina de secciones individuales. Dichas máquinas incluyen una pluralidad de secciones de fabricación separadas o individuales, cada una de las cuales tiene una multiplicidad de mecanismos de operación para convertir una o más cargas o pequeñas masas de vidrio fundido en recipientes huecos de vidrio y transferir los recipientes a través de estaciones sucesivas de la sección de la máquina, cada sección de la máquina incluye típicamente uno o más moldes de preforma donde una pequeña masa de vidrio se forma inicialmente en una operación de soplado o prensado, uno o más brazos de inversión para transferir las preformas a los moldes de soplado donde los recipientes son soplados a la forma final, lengüetas para retirar los recipientes formados en una placa muerta, y un mecanismo de balanceo para transferir los recipientes moldeados desde la placa muerta hacia un transportador de máquina. La Patente US 4,362,544 incluye una discusión antecedente de ambos procesos de formación de artículos de vidrio tanto de soplado y soplado como de prensado y soplado, y divulga una máquina de secciones individuales electro neumática adaptada para uso en cualquier proceso. En el pasado, los moldes de preforma y soplado de una máquina de formación de artículos de vidrio se han enfriado generalmente dirigiendo aire dentro o a través de las partes del molde. Se ha propuesto en las Patentes US 3,887,350 y 4,141,884, por ejemplo, dirigir un líquido, tal como agua, a través de pasajes en las partes del molde para mejorar la extracción de calor.

El material del molde para fabricar artículos de vidrio de calidad debe tener las siguientes características: buenas propiedades de desgaste, buena resistencia del ciclo térmico a la fractura, buenas propiedades mecánicas, buenas propiedades de liberación del vidrio, facilidad de maquinación, facilidad de reparación, y facilidad económica. El hierro dúctil, el cual se define como un hierro donde el grafito micro estructural libre está en forma de esferas, se ha propuesto para uso como un material de molde para fabricar artículos de vidrio donde se desea reducida conductividad térmica (en comparación con el hierro gris por ejemplo). Ejemplos específicos de artículos de vidrio, para los cuales se emplea típicamente hierro dúctil como material de molde, son los recipientes que requieren únicamente una pequeña cantidad de retiro de calor en el equipo del molde, tal como botellas cosméticas y farmacéuticas. Sin

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embargo, el hierro dúctil no se ha empleado en la fabricación de moldes para grandes recipientes, tales como botellas de cerveza, debido a sus reducidas propiedades de transferencia de calor y resistencia del ciclo térmico. El hierro dúctil Ni-Resist se ha propuesto para la fabricación de artículos de vidrio. El incrementado contenido de níquel del hierro dúctil Ni-Resist contribuye a mejorar las propiedades de liberación del vidrio. Sin embargo, el hierro dúctil Ni-Resist austenítico estándar no exhibe la deseada conductividad térmica y resistencia a la fractura cíclica térmica.

La solicitud copendiente Serie No. 09/400,123, presentada en Noviembre 2, 1999 y cedida al presente cesionario, divulga que el o los cuerpos del molde (ya sea molde de preforma o molde de soplado) para una máquina de formación de artículos de vidrio de secciones individuales puede construirse de hierro dúctil Ni-Resist austenítico. Dicho hierro dúctil es preferiblemente un hierro dúctil Tipo D Ni-Resist de acuerdo con ASTM-A439-84, pero modificado para poseer incrementados contenidos de silicio y molibdeno. El hierro del Tipo D2-C es un ejemplo divulgado. El contenido de silicio es preferiblemente en exceso de 3,0% en peso y más preferiblemente es $4,20 \pm 0,80\%$ en peso. El contenido de molibdeno es preferiblemente en exceso de 0,5% en peso, y más preferiblemente $0,70 \pm 0,10\%$ en peso. El incrementado contenido de silicio decrece la conductividad térmica del material de molde. El incrementado contenido de molibdeno mejora la resistencia térmica cíclica a la fractura. El incrementado contenido de níquel que caracteriza a los materiales Ni-Resist mejoran las propiedades de liberación de vidrio. La composición de hierro dúctil Ni-Resist austenítico de esa solicitud también logra deseable propiedad al desgaste y otras propiedades mecánicas, facilidad de maquinación, y reparación, y deseable facilidad económica. El material Ni-Resist austenítico también proporciona una micro estructura más estable que el hierro gris, por ejemplo, hasta una temperatura de 760°C .

De acuerdo con la tecnología corriente, los moldes de preforma, y los moldes de soplado de una máquina de formación de artículos de vidrio de secciones individuales se diseñan enteramente en forma separada uno del otro para obtener las más deseables propiedades térmicas y otras propiedades bajo diferentes condiciones en las cuales operan los moldes. Un objetivo general de la presente invención es proporcionar un material general que pueda usarse tanto para moldes de preforma como para moldes de soplado de una máquina de formación de artículos de vidrio de secciones individuales, con las propiedades de transferencia de calor de los moldes ajustadas en el momento de fabricación ajustando selectivamente la composición del metal antes de fundir los cuerpos de los moldes.

Resumen de la Invención

La conductividad térmica de los moldes de preforma y los moldes de soplado de formación de artículos de vidrio de hierro Ni-Resist se controla selectivamente mediante la formación de grafito compactado en la micro estructura del molde durante la preparación de la fusión y fundición de los cuerpos del molde. Específicamente, con un hierro Tipo D5 Ni-Resist de acuerdo con ASTM-A439-84, el grafito compactado se forma selectivamente en la micro estructura de fundición del cuerpo del molde controlando las concentraciones de magnesio y azufre en la composición del hierro al rango de 0,01 a 0,04% en peso de magnesio y 0,00 a 0,01% en peso de azufre y agregando titanio a la composición de hierro en el rango de 0,10 a 0,25% en peso de titanio. Aunque la formación del grafito compactado en la micro estructura dúctil de fundición se considera normalmente como indeseable para los moldes de formación de recipientes de vidrio, se ha encontrado que la formación de una pequeña pero apreciable cantidad de grafito proporciona la oportunidad de ajustar selectivamente las características de conductividad térmica del cuerpo del molde.

Un molde para una máquina de formación de artículos de vidrio de acuerdo con una modalidad actualmente preferida de la invención comprende un hierro dúctil de grafito compactado Ni-Resist austenítico que tiene un contenido de magnesio en el rango de 0,01 a 0,04% en peso, un contenido de azufre en la cantidad de 0,00 a 0,01% en peso, y un contenido de titanio en el rango de 0,01 a 0,25% en peso. En la modalidad preferida de la invención el hierro de grafito compactado Ni-Resist austenítico (Tipo D5) tiene una cantidad apreciable o medible de grafito compactado de 40% en peso o más, lo cual es decir que por lo menos el 40% del grafito está en forma compactada más que modular. La modalidad preferida de la invención consiste esencialmente de carbono en la cantidad de 1,50 a 2,40% en peso, silicio en la cantidad de 1,00 a 2,80% en peso, manganeso en la cantidad de 0,50 a 1,00% en peso, fósforo en la cantidad de 0,00 a 0,80% en peso, níquel en la cantidad de 34,0 a 36,0% en peso, cromo en la cantidad de 0,00 a 0,10% en peso, molibdeno en la cantidad de 0,00 a 0,80% en peso, magnesio en la cantidad de 0,01 a 0,04% en peso, azufre en la cantidad de 0,00 a 0,01% en peso, titanio en la cantidad de 0,01 a 0,25% en peso, y el balance es hierro.

Un método de elaborar un molde para una máquina de formación de artículos de vidrio de acuerdo con una modalidad actualmente preferida de la invención comprende los pasos de fundir el molde de un hierro dúctil Ni-Resist austenítico del Tipo D5 de acuerdo con ASTM-A439-84, mientras se controla selectivamente la conductividad térmica

del molde controlando selectivamente el contenido de magnesio del molde en el rango de 0,01 a 0,04% en peso, un contenido de azufre en el rango de 0,00 a 0,01% en peso y un contenido de titanio en el rango de 0,01 a 0,25% en peso. El ajuste selectivo de las características de transferencia de calor del material del molde durante el proceso de formación permite la implementación del mismo material básico tanto para los moldes de preforma como para los moldes de soplado, mientras se proporciona la oportunidad de ajustar selectivamente las características de transferencia de calor de cada tipo de molde de acuerdo con los específicos requerimientos durante el uso.

Descripción Detallada de las Modalidades Preferidas

La divulgación de la arriba anotada solicitud US Serie No. 09/400,123, presentada en Noviembre 2, 1999 y cedida al presente cesionario, se incorpora aquí a modo de referencia.

Los cuerpos de los moldes para una máquina de formación de artículos de vidrio (ya sean cuerpos de molde de preforma o de molde de soplado) se construyen de hierro dúctil Ni-Resist austenítico de acuerdo con las modalidades actualmente preferidas de la invención. El hierro dúctil Ni-Resist es un hierro dúctil que tiene un alto contenido de níquel. El hierro dúctil fundido Tipo D5 Ni-Resist de acuerdo con ASTM-A439-84 tiene la siguiente composición: 1,50 a 2,40% en peso de carbono, 1,00 a 2,80% en peso de silicio, 0,05 a 1,00% en peso de manganeso, 0,00 a 0,80% en peso de fósforo, 34,0 a 36,0% en peso de níquel, 0,00 a 0,10% en peso de cromo, 0,00 a 0,80% en peso de molibdeno, alrededor de 0,03 a 0,06% en peso de manganeso, alrededor de 0,01% en peso de azufre, y el balance es hierro. De acuerdo con la presente invención, las concentraciones de magnesio y azufre en la fusión o "calor" antes de la fundición se reducen al rango de 0,01 a 0,04% en peso de magnesio y 0,00 a 0,01% en peso de azufre, y el titanio se agrega a la fusión o "calor" en una cantidad para lograr una concentración de titanio en el rango de 0,10 a 0,25% en peso de titanio. La reducción en la concentración de magnesio incrementa la tendencia de la estructura del grafito a ser compactado más que modular. Similarmente, la reducción en azufre mejora la formación de grafito compactado. La adición de titanio incrementa la tendencia del grafito a asumir una forma compactada más que modular y ayuda en la formación de grafito compactado. Todos los tres elementos deben controlarse para asegurar la capacidad de repetición de la micro estructura,

Consecuentemente, la composición de los cuerpos del molde de acuerdo con la presente invención es: 1,50 a 2,40% en peso de carbono, 1,00 a 2,80% en peso de silici , 0,05 a 1,00% en peso de manganeso,

0,00 a 0,08% en peso de fósforo, 34,0 a 36,0% en peso de níquel, 0,00 a 0,10% en peso de cromo, 0,00 a 0,80% en peso de molibdeno, 0,01 a 0,04% en peso de magnesio, 0,00 a 0,01% en peso de azufre, 0,01 a 0,25% en peso de titanio, y el balance es hierro. La reducción de las concentraciones de magnesio y azufre, y la adición de titanio, produce grafito compactado en la micro estructura de los cuerpos de molde. La concentración de grafito compactado en la micro estructura del molde se controla selectivamente controlando las concentraciones de magnesio, azufre y titanio en la fusión o "calor" antes de la fundición. Consecuentemente, la misma fusión básica se puede usar para producir los moldes ya sea de preforma o de soplado, estando ajustadas las características de transferencia de calor para la implementación del molde ya sea de preforma o de soplado controlando selectivamente las concentraciones de magnesio, azufre y titanio,

Se ha divulgado así un molde y un método de fabricación de moldes que satisface completamente todos los objetivos y demandas previamente establecidas. En particular, la simultánea reducción selectiva de las concentraciones de magnesio y azufre, y adición de titanio, en un hierro dúctil Ni-Resist austenítico para el control selectivo de las características de transferencia de calor del cuerpo del molde, mediante la formación selectiva de grafito compactado en la micro estructura de fundición del molde. Consecuentemente, la misma composición básica de hierro dúctil fundido Ni-Resist puede usarse para moldes de ya sea preforma o de soplado, con las características de transferencia de calor ajustadas mediante el control selectivo de estos constituyentes menores. Modificaciones y variaciones al molde y método de fabricación serán ellas mismas sugeridas fácilmente a personas de experticia ordinaria en el arte. La invención pretende abarcar todas estas modificaciones y variaciones en el sentido en que se encuentran dentro del espíritu y amplio alcance de las reivindicaciones del apéndice.

REIVINDICACIONES

1. Un molde para una máquina de formación de artículos de vidrio que comprende hierro dúctil Ni-Resist (tipo D5) austenítico que tiene un contenido de magnesio en el rango de 0,01 a 0,04% en peso, un contenido de azufre en la cantidad de 0,00 a 0,01% en peso, y un contenido de titanio en la cantidad de 0,01 a 0,25% en peso.
2. Un molde para una máquina de formación de artículos de vidrio que es de hierro dúctil Ni-Resist austenítico con una micro estructura que tiene una cantidad apreciable de grafito compactado y consiste esencialmente de carbono en la cantidad de 1,50 a 2,40% en peso, silicio en la cantidad de 1,00 a 2,80% en peso, manganeso en la

cantidad de 0,05 a 1,00% en peso, fósforo en la cantidad de 0,00 a 0,08% en peso, níquel en la cantidad de 34,0 a 36,0% en peso, cromo en la cantidad de 0,00 a 0,10% en peso, molibdeno en la cantidad de 0,00 a 0,80% en peso, magnesio en la cantidad de 0,01 a 0,04% en peso, azufre en la cantidad de 0,00 a 0,01% en peso, titanio en la cantidad de 0,01 a 0,25% en peso, y el balance es hierro.

3. El molde establecido en la reivindicación 2 donde por lo menos 40% del grafito en dicha micro estructura es grafito compactado.

4. Un método de elaborar un molde para una máquina de formación de artículos de vidrio que comprende los pasos de:

(a) fundir el molde de un hierro dúctil Ni-Resist Tipo D5 austenítico de acuerdo con ASTM-A439-84, y

(b) controlar selectivamente la conductividad térmica del molde durante dicho paso (a) controlando selectivamente el contenido de magnesio del molde en el rango de 0,01 a 0,04% en peso, el contenido de azufre en el rango de 0,00 a 0,01% en peso y el contenido de titanio en el rango de 0,01 a 0,25% en peso.

Extracto de la Divulgación

La conductividad térmica de los moldes de preforma y los moldes de soplado de hierro dúctil Ni-Resist se controla selectivamente mediante la formación de grafito compactado en la micro estructura del molde durante la preparación de la fusión y fundición de los cuerpos del molde. Específicamente, con un hierro dúctil Ni-Resist Tipo D5 de acuerdo con ASTM-A439-84, el grafito compactado se forma selectivamente en la micro estructura fundida del cuerpo del molde reduciendo las concentraciones de magnesio y azufre en la composición de hierro en el rango de 0,01 a 0,04% en peso de magnesio, y 0,00 a 0,01% en peso de azufre, y agregando titanio a la composición de hierro en el rango de 0,01 a 0,25% en peso de titanio. Aunque la formación de grafito compactado en la micro estructura se considera normalmente como indeseable para los moldes de formación de artículos de vidrio, se ha encontrado que la formación de una pequeña pero apreciable cantidad de grafito proporciona la oportunidad de ajustar selectivamente las características de conductividad térmica del cuerpo de los moldes.

ES TRADUCCIÓN FIEL Y COMPLETA DEL DOCUMENTO ANEXO
TERMINADA ESTE 3 DE AGOSTO, 2002.

2° EXAMEN DE FORMA, PATENTE DE INVENCION

Folio 51

Radicación N° 02-49640

Concepto Técnico N° 110

Clasificación Internacional de Patentes: B22D 17/22, C03B 9/00

Practicado el examen de acuerdo a lo establecido en el Art. 38 de la Decisión 486, se determinó que esta solicitud de Patente:

- SI ☒ NO ☐ Contiene un resumen de la invención (Art. 26-e)
- SI ☒ NO ☐ Contiene el título o nombre de la invención (Art. 27-d)
- SI ☒ NO ☐ Contiene la descripción de la invención (Art. 26-b)
- SI ☐ NO ☐ NO ES APLICABLE ☒ Contiene los dibujos necesarios para comprender la invención (Art. 26-d)
- SI ☒ NO ☐ Contiene una o más reivindicaciones (Art. 26-c)
- SI ☐ NO ☐ NO ES APLICABLE ☒ Han sido desarrollados los productos a partir de recursos genéticos o de sus productos derivados de los que cualquiera de los Países Miembros es país de origen (Art. 26-h)
- SI ☐ NO ☐ NO ES APLICABLE ☒ Los productos y o procedimientos han sido obtenidos o desarrollados a partir a partir de los conocimientos tradicionales de las comunidades indígenas, afro americanas, o locales de los Países Miembros, de acuerdo a lo establecido en la Decisión 391 y sus modificaciones y reglamentaciones vigentes (Art. 26-i)
- SI ☐ NO ☒ La invención se refiere a un producto relativo a un material biológico (Art. 26-j)
- SI ☒ NO ☐ NO ES APLICABLE ☐ La prioridad coincide con la materia reivindicada.
- SI ☒ NO ☐ **CUMPLE LOS REQUISITOS TÉCNICOS**

OBSERVACIONES Y OTROS: SI ☐ NO ☐ Ver hoja(s) anexa(s)

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EXAMINADOR TÉCNICO: 202051

Bogotá D C, enero 30 de 2004.

2020
Bogotá D C

Doctor(a)
RAMIRO CASTRO DUQUE
Apoderado(a)

REFERENCIA:	Radicación N°	02-49640
	Trámite	002
	Evento	001
	Actuación	416
	Oficio N°	109
	Folios	001

Teniendo en cuenta que la solicitud de privilegio de patente que se tramita bajo el expediente indicado en la referencia, reúne los requisitos de forma establecidos en los artículos 26 y 27 de la Decisión 486, de la Comisión de la Comunidad Andina, y en las demás disposiciones vigentes sobre la materia, se envía el extracto de la solicitud a la oficina de comunicaciones para efecto de su publicación en la Gaceta de Propiedad Industrial, conforme lo establece el artículo 40 de la Decisión 486.

Cúmplase

Dado en Bogotá D C,

30 ENF. 2009


ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe División de Nuevas Creaciones.

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