

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
3 January 2002 (03.01.2002)

PCT

(10) International Publication Number
WO 02/00560 A1

(51) International Patent Classification⁷: **C03B 9/34**,
9/347, 9/335

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(21) International Application Number: PCT/PL00/00091

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(22) International Filing Date:

28 November 2000 (28.11.2000)

(81) Designated States (*national*): CZ, SK, US.

(25) Filing Language:

English

(84) Designated States (*regional*): European patent (AT, BE,
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,
NL, PT, SE, TR).

(26) Publication Language:

English

(30) Priority Data:

P-341086

27 June 2000 (27.06.2000) PL

Published:

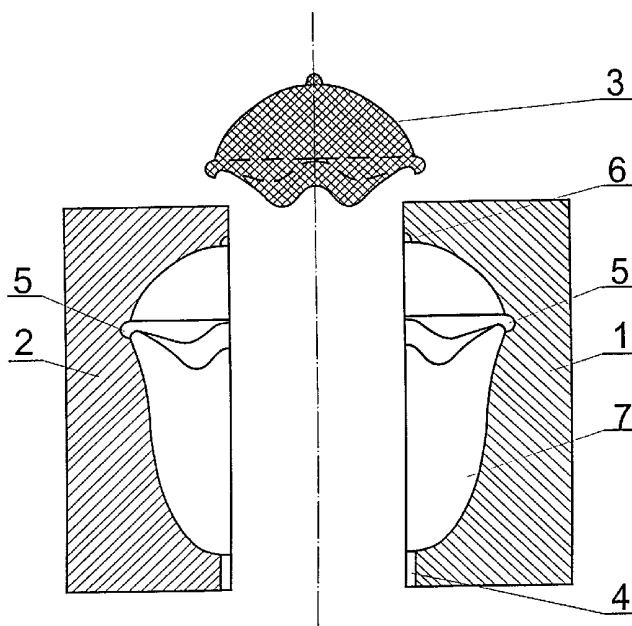
- with international search report
- with amended claims and statement

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

(54) Title: A MOULD WITH AN INTERNAL SHAPING CORE FOR MANUFACTURING THIN-WALLED BLOWN GLASS OBJECTS



(57) Abstract: The mould with an internal shaping core for manufacturing thin-walled blown glass objects, for example Christmas tree decorations, consists of at least two semi-moulds with a free mould division axes, matched and connected disjointly with an opening for inserting the stay for blowing the air inside the mould. The shaping core fastened inside the mould is stabilised in at least one seat or lock through full closure of both semi-moulds. In the thus shaped spatial cavity a heated glass bulb is blown up which is given a final, monolithic complex shape.



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A mould with an internal shaping core for manufacturing thin-walled blown glass objects

The subject of the invention is a mould with an internal shaping core for manufacturing thin-walled blown glass objects.

There are known methods of manufacturing thin-walled blown glass products and products thus manufactured by blowing which use split metal moulds where a heated and shapeable raw glass bulb is introduced and given a desired shape by further blowing while being locked in such a mould, a shape of the internal, previously prepared surfaces of the mould. The manufacturing methods of thin-walled blown glass elements using split, simple moulds, used for the manufacture of thin-walled blown glass objects and especially Christmas tree decorations or other decorations manufactured using such a technology have a limited range of application, which is shown in obtaining products which are limited in shape and spatial configuration. This limitation originates from the impossibility to remove the moulds of the finished products which are developed in three axes of the Cartesian coordinate system from without damaging them, especially when the surfaces of the products or figures are curved, corrugated or turned down. The safe and non-damaging obtainment of blown figures and other complex sets of elements made of thin-walled blown glass, executed as a one-part blown element not requiring further connection of two or more elements in order to obtain a complete figural composition in one full blowing operation requires the usage of a split mould with an internal and at least one shaping core with an appropriately shaped seat for fastening the shaping core.

It is the aim of the invention to construct a mould which will permit the construction of thin-walled blown glass products in more complicated shapes and varied surface.

This aim was achieved by using a mould with an internal shaping core which additionally allows to give desired shapes to the plastified raw glass bulb through its blowing in such a mould. This is of special importance in the case of manufacturing a thin-walled blown glass product with an elongated shape or a complex, many-shaped figure which may be obtained in one complete operation, without the necessity to connect two or more

elements obtained separately in the manufacturing process and later connected in one figure.

The essence of the inventive solution is a split metal multiple use mould with a free division axis having a monolithic model in a diversified shape represented inside, which is additionally ensured by a shaping core introduced inside the mould, which is fastened and stabilized in the desired spatial position in the seat or in the mould lock. Thus, a cavity is created in the mould which is to be filled with the plastified glass bulb introduced into the mould which, after being fully blown, shall take the shape of the inside of the mould together with the core fastened in the cavity.

In accordance with the invention, the solution has numerous advantages, among which are: elimination of complicated and time-consuming operations both in the manufacturing process itself, as well as during the additional operations of assembling and connecting two or more elements produced separately in order to obtain a final complex figure made of thin-walled blown glass. The multiple use metal mould with a free division axis with a monolithic model in a diversified shape represented inside together with a shaping core fastened and spatially stabilized in it permits to significantly broaden the assortment of products made of thin-walled blown glass and especially such products as Christmas tree decorations or other decorations manufactured using this technology in one technological operation of full blowing of figures complicated as far as their surface and spatial construction are concerned.

The metal mould with a free division axis and an internal shaping core for manufacturing of thin-walled blown glass products consists of at least two parts in the form of a closed bowl or a box where at least one shaping core spatially stabilised through being fixed in the seat or in the lock inside the mould is placed. The mould has an opening where the stay of the raw, plastified glass bulb is inserted through which the air required to blow and to shape the hot glass bulb inside the mould is transported. The shaping core in the mould with a defined and required shape shapes the blown up glass bulb heated up to a temperature in which it is possible to form the required shapes, gives the final shape to the bulb introduced into the mould. The shaping core is placed in one or in more seats

inside the mould in such a way as to facilitate the opening of the particular parts of the mould and the removal of the shaping core or cores without destroying the surface of the product thus formed, its removal from the mould in a permanent shape blown according to the mould and the shaping core.

The subject of the invention has been shown in a drawing where fig. 1 presents the cross-section through the assembled mould with a shaping core inside, fig. 2 presents the cross-section through an open mould without the shaping core and fig. 3 presents a finished product obtained after the opening of the mould and the removal of the shaping core.

The metal mould with a free division axis consists of two semi-moulds: semi-mould 1 and semi-mould 2 which, after being assembled, consist a whole and which have a circumferential seat 5 for the installation of the shaping core 3 and stabilising it in a desired spatial position which is to be additionally ensured by the central seat 6. The mould has an opening where a stay 4 is to be placed which is used for blowing in the air that forms the hot glass bulb to the shape 8 it will eventually take from the inside of the metal mould and the shaping core installed in it.

The final product produced in a mould with the shaping core is obtained in such a way that the shaping core is inserted in one semi-mould and placed in a desired position, it is stabilised in the seat or the lock, then the glass bulb, heated up to the temperature that enables its shaping, is introduced into thus prepared assembly. Then the stay is placed in the stay opening, the mould is closed with the other semi-mould and then the bulb is blown until the mould cavity is completely filled and the desired figure is obtained. Following the blowing the above actions are performed in a reverse order, i.e. the closing part of the mould is opened, the core and the blown product, shaped according to the cavity where the hot glass bulb was blown are removed, the bulb is annealed and after cooling its handed over for further processing, such as silvering, painting, glittering and other decorative activities.

Claims

1. The mould with an internal shaping core for the manufacture of thin-walled blown glass products, consisting of at least two semi-moulds with a free division axis, matched and connected disjointly with an opening for inserting the stay for blowing the air into the formed glass bulb characterized in that the shaping core /3/ is fixed in a desired spatial position and stabilized in at least one seat /5/ or a lock through full locking of both semi-moulds /1/ and /2/.
2. The mould with an internal shaping core according to claim 1, characterized in that the inside of the mould has a shaped surface and together with the shaping core /3/ creates a spatial cavity /7/ to be filled by the plastified glass bulb blown up in the cavity of the spatial mould.
3. The mould with an internal shaping core according to claims 1 and 2, characterised in that the plastified glass bulb is placed in the mould with a mounted shaping core /3/ before it is fully closed, the stay is placed in the stay opening /4/ and then the mould is closed and the glass bulb is blown up to be given the shape defined by the spatial cavity /7/ and the shaping core /3/.

AMENDED CLAIMS

[received by the International Bureau on 08 May 2001 (08.05.01);
original claims 1 and 3 amended; remaining claims unchanged (1 page)]

1. The mould with an internal shaping core for the manufacture of blown thin-walled glass products, consisting of at least two bearing sides with a free mould division axis, matched and connected disjointly having an opening for inserting a hood in order to blow the air into the formed hot glass bulb characterized in that at least one of the shaping cores /3/ is fixed in desired position and stabilized in a seat /5/ or a fastener through complete locking of both mould bearing sides /1/ and /2/.
2. Said mould with an internal forming core according to the claim 1, characterized in that the internal surface of the mould together with the shaping core /3/ creates a forming spatial chamber /7/ to be filled by the hot glass bulb blown up in the cavity of the mould forming chamber.
3. The mould with an internal shaping core according to the claims 1 and 2, characterized in that the plastic body of hot glass bulb is placed in the mould forming chamber with the shaping core /3/ mounted inside the mould prior to the complete closing, putting the hood in the proper suction hole /4/, then the mould is closed and the hot glass bulb is blown up in order to the external surface be shaped by the mould spatial cavity /7/ and the shaping core. After blowing up the mould bearing sides are opened, a formed glass figure together with the shaping core /3/ is released and then the shaping core is separated from the formed glass figure giving finally the formed glass figure on which two or more mould splitting lines are visible.

STATEMENT UNDER ARTICLE 19 (1)

Documents considered to be relevant:

- DE 1 943 857 A
- US 1559 394 A

To above mentioned documents find herebelow our remarks:

DE 1 943 857 (Rosenthal AG) – concerns manufacturing of thick-walled, smooth shaped glass by using rotating mould walls over the rigid or exchangeable base plate with the stamp forming signs, inscriptions where the mould turning wall forms a smooth surface as the result of turn.

US 1 559 394 (Williams, Josiah H) – concerns only and exclusively the blowing up of thick-walled glass bottles, where the mould is adopted to form angularly related bottle side walls of a predetermined width, where each of halves forming the bottle side wall is provided with a character molding die surface and flat die surface extending beyond said character molding die surface to and intersecting adjacent corner angle forming walls. Each mould bearing side forming the bottle side walls is provided with a recess and dies fitted in said recess, each die being provided with superposed character delineating surfaces and having a break-joint producing surface between the character delineating surfaces thereof.

In case of international patent declaration PCT/PL00/00091 there is a mould to form the irregular, multisurface bodies made of blown-up thin-walled glass in form of diversified surface where the internal core forms other varied, irregular and complex shapes impossible to obtain from two- or multi-bearing sides mould used to forming for example Christmas tree ornaments and other occasional trinkets produced in that manner.

The core is put in before every blowing up and every time removed together with the blown-up trinket. The core is stabilized during the forming in the seats or fasteners of the forming mould consisting of two or more bearing sides. Thanks to such the mould – core configurations there is a possibility to form unlimited different and diversified spatial irregular shapes blown up in the mould interior additionally equipped with the shaping core from the row, hot glass bulb, whereas is not possible to use above patents DE and US for the products made of thin-walled blown up glass due to lack of ability to take off the products from the moulds used in above patents without product damaging.

Detailed remarks

1. In case of patents DE-1943857 and US-1559394 – glass for production is taken from the glass-furnace. Thick glass in its interior keeps the heat and due to this the period where the glass has plastic properties needed to form it and can be formed several times after heating and can be reheated again unfear of damaging the product made of thick glass. In case of PCT/PL00/00091 the glass used for manufacturing the products is flame heated to the plastic state thin walled glass pipe, what after removal of heat source cools down and there is no other possibility to reheat again without damaging the detail being blown up.
2. Patent DE-1943857 concerns the rotating mould, where required characters are formed only in the bottom of the product, but not on the smooth side walls.
3. In case of patents DE and US mentioned above the forming elements serves only for the product marking (labeling) of low complexity shapes, in the patent declaration

PCT/PL00/00091 there is a big amount, practically infinite, of spatial elements and the possibility of manufacturing multi-axes shaped surfaces

4. In the patents DE-1943857 and US-1559394 the forming core is not permanently fitted and during the product is taken off remains in the same position, in the patent declaration PCT/PL00/00091 the forming core – one or more- is not permanently fitted and is taken off together with the product and after the associative removal of the detail blown up from the thin walled glass together with the internal core is separated from the glass detail in order to not damage the detail shape formed of thin walled glass.

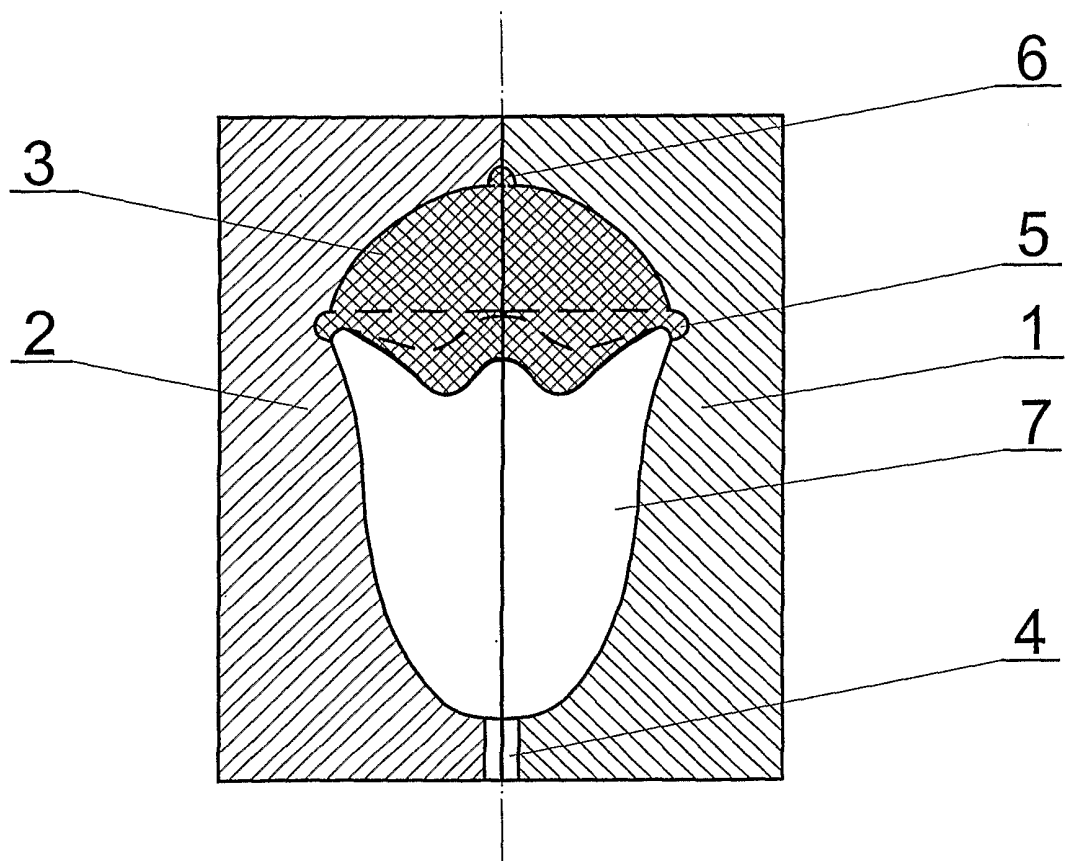


Fig.1

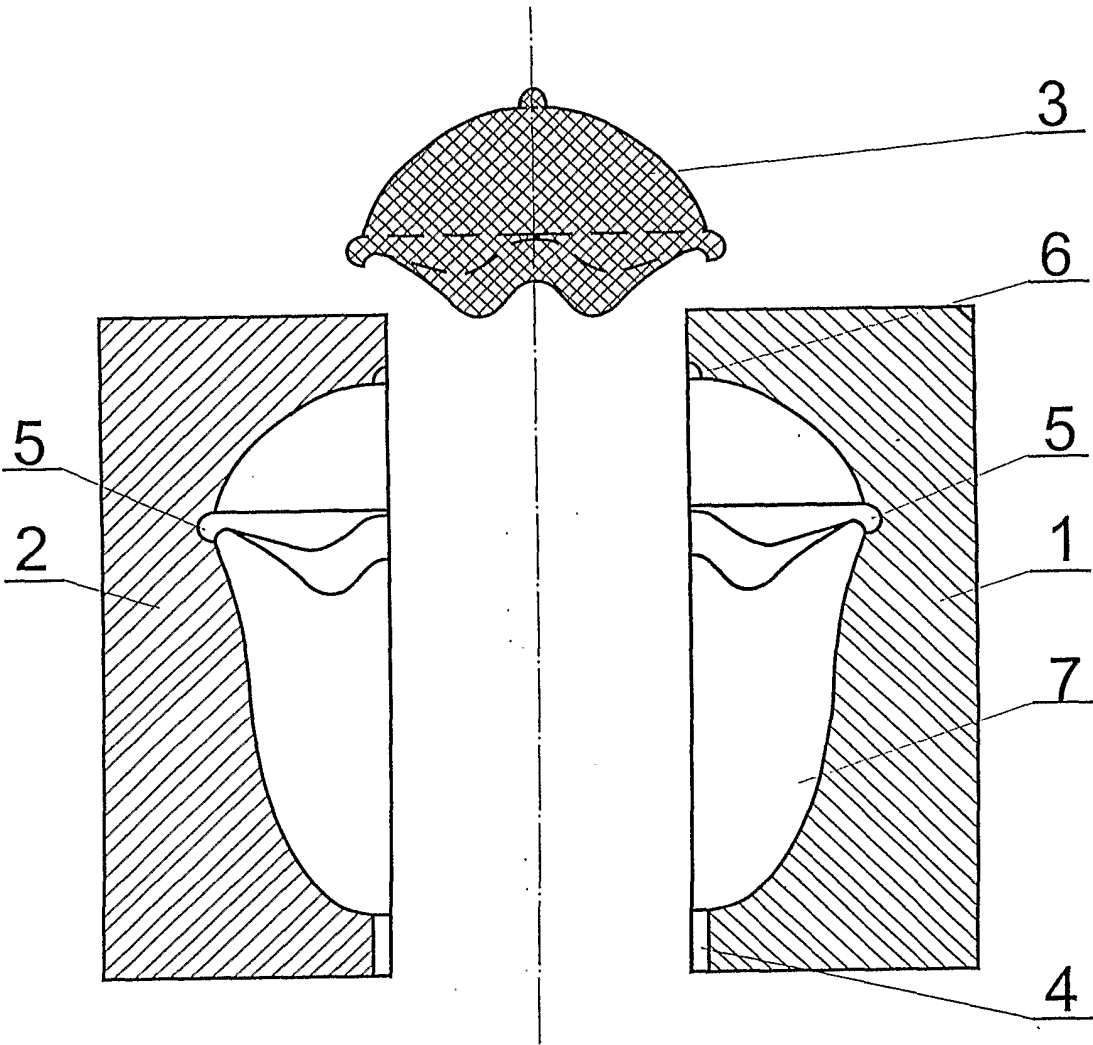


Fig.2

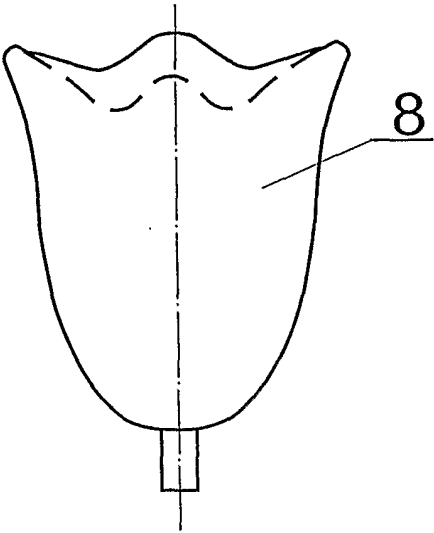


Fig.3

INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/PL 00/00091

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C03B9/34 C03B9/347 C03B9/335

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C03B

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 19 43 857 A (ROSENTHAL AG) 11 March 1971 (1971-03-11) the whole document	1-3
X	US 1 559 394 A (WILLIAMS, JOSIAH H) 27 October 1925 (1925-10-27) the whole document	1-3

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

° Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

23 February 2001

Date of mailing of the international search report

07/03/2001

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INTERNATIONAL SEARCH REPORT

information on patent family members

In International Application No

PCT/PL 00/00091

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 1943857	A	11-03-1971	NONE	
US 1559394	A	27-10-1925	NONE	