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Aktenzeichen / Case Number / N^o du recours : T 255/89 - 3.2.2

Anmeldenummer / Filing No / N^o de la demande : 85 850 093.7

Veröffentlichungs-Nr. / Publication No / N^o de la publication : 0 163 618

Bezeichnung der Erfindung: Method and apparatus for forming glass articles

Title of invention:

Titre de l'invention :

Klassifikation / Classification / Classement : C03B 9/38
C03B 9/36, C03B 9/193

ENTSCHEIDUNG / DECISION

vom / of / du 21 August 1990

Anmelder / Applicant / Demandeur : AGA AKTIEBOLAG

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Article 56

Schlagwort / Keyword / Mot clé : "Inventive step (yes)"

Leitsatz / Headnote / Sommaire

Europäisches
Patentamt

Beschwerdekammern

European Patent
Office

Boards of Appeal

Office européen
des brevets

Chambres de recours



Case Number : T 255/89 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 21 August 1990

Appellant : AGA Aktiebolag
S-18181 Lidingö (SE)

Representative : Karlzén, Bengt Erik
AGA AB
Patent Department
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Decision under appeal : Decision of Examining Division
of the European Patent Office
dated 12 October 1988 refusing
European patent application
No. 85 850 093.7 pursuant to
Article 97(1) EPC

Composition of the Board :

Chairman : G. Szabo

Members : K. Stamm

J.-C. Saisset

Summary of Facts and Submissions

- I. European patent application No. 85 850 093.7, filed on 14 March 1985 and published on 4 December 1985 under publication number 163 618, was refused by the decision of the Examining Division dated 12 October 1988. The decision was based on Claims 1 to 13 filed on 9 June 1988.
- II. The independent Claims 1, 8 and 12 read as follows:

"1. A method of making a hollow glass article (54), including the steps of introducing a quantity of molten glass (50) into a mold cavity (60), conforming the quantity of molten glass (50) to a shape defined by the mold cavity (60) to form a hollow glass article (54), and providing a flow of pressurized cooling gas (80) and injecting the pressurized flow of cooling gas (80) into the mold cavity (60) interiorly with respect to the hollow glass article (54) being formed in the cavity (60), characterized in that the step of providing a flow of cooling gas includes the steps of providing a source (270) of pressurized cold cryogen vapor which has a temperature substantially below that of ambient air, providing supply means for ducting a controlled flow of cold cryogen vapor from the source (270) into a mold cavity (60), and operating the supply means to duct a controlled flow of cold cryogen vapor from the source (270) into the mold cavity (60) to cool molten glass therein and to hasten its solidification."

"8. A method of finish-molding a hollow glass article (100) including the steps of introducing a blank (54) into a mold cavity (92), effecting expansion of the blank (54) to conform its shape to that (of!) the cavity (92) by ducting blow-molding gas into the blank (54), whereby the glass

article (100) is formed, and providing a flow of cooling gas (98) through the interior of glass article (100), characterized in that the step of introducing a flow of blowing gas into the mold cavity includes the step of providing a controlled flow of pressurized cold cryogen vapor to form said flow of pressurized gas."

"12. In a hollow glass article manufacturing machine including a mold (62) having a cavity (60) into which a quantity of molten glass (50) is introduced to be conformed to a desired shape as defined by the mold cavity (60), and having gas inlet means for admitting a flow of blowing gas to the mold cavity (60) interiorly with respect to the hollow glass article being formed in the cavity (60) to directly cool interior surface portions of the molten glass therein for at least assisting in conforming a quantity of molten glass to a desired configuration defined by the mold cavity (60), characterized by means (270, 272, 302, 262) for providing a flow of pressurized cold cryogen vapor to form at least a portion of a flow of pressurized blowing gas that has a temperature substantially below that of ambient air, and means for supplying the flow of pressurized blowing gas to the gas inlet means."

III. In its decision the Examining Division held that the subject-matter of independent Claims 1, 8 and 12 did not involve an inventive step having regard to document B, mentioned in the European Search Report citing the following documents:

- A US-A-3 235 353
- B US-A-3 236 620
- C US-A-3 171 731
- D FR-A-2 041 504.

The Examining Division mentioned (under point 2.3 of the decision) the fact, that the time necessary to cool a blank sufficiently restricts the speed of operation, was known in the art and that also it was known that heat exchange increases with increasing temperature difference. It was, therefore, obvious to lower the temperature when the production speed was to be increased - as defined in Claim 1.

- IV. A Notice of Appeal was filed on 2 December 1988, and the appeal fees were duly paid. A Statement of Grounds was filed on 8 February 1989 by telecopy and confirmed by letter received on 13 February 1989.

The Appellant (Proprietor of the patent) expresses the following arguments: In spite of the fact that for many years there has been a need of increasing the output of glass forming machines and that it has been well known to every technician that heat exchange between two media increases with increasing temperature difference, the method of using cryogen gas has not been proposed before the priority date of the application. Although it should lead to an expected increase in the production speed when the temperature of the compressed cooling gas is lowered - this would have been considered as to be avoided since a high temperature gradient in the cooled container might involve the risk of higher stress and thus of the formation of cracks. In addition to a surprisingly high production increase of about 35%, the invention has also provided an unexpected indirect effect of a considerably improved quality of the final containers i.e. a more stable "skin" (surface layer) - resulting in a much shorter time for cooling a parison before it can be transferred to the finishing mold.

- V. The Appellant requests remittal to the first instance for further prosecution of the examination on the basis of Claims 1, 8 and 12.

Reasons for the Decision

1. The Appeal is admissible.

2. **Amendments**

Claim 1 is based on Claims 2 and 9, Claim 8 on page 6, lines 4 ff and Claim 12 on Claim 15 of the application as filed. Claims 1 and 12 comprise also a restriction ("interiorly with respect to the hollow glass article") based on the embodiment according to Figures 5 and 6.

The amendments comply, therefore, with Article 123(2) EPC.

3. **Novelty**

None of the cited documents mentions the use of cryogen gas or means attached to the machine to provide such gas. The subject-matter of the independent Claims 1, 8 and 12 is, therefore, new and meets the requirements of Article 54 EPC.

4. **Closest state of the art; problem and solution**

Among the cited documents, B appears closest to the invention. It relates to a method of making a hollow glass article according to the preamble of Claim 1. In order to speed the operation determined by the cooling time a particular cooling tube is suggested. This cooling air supply tube is located within a blowhead. Immediately after the finished article is blown to final form and while the blowhead is lifted, the cooling air supply tube is projected into the finished article. The two coaxial devices (blowhead and cooling tube) are controlled in their respective vertical movements by means of pistons and valves.

The problem to be solved - without hints to the invention - is to further improve the speed of production in relation of the cooling system.

The solution of this problem is evidently achieved by providing cryogene compressed vapor having a temperature substantially below the temperature of ambient air - as required by Claim 1.

5. Inventive step

- 5.1 As mentioned above, document B suggests to use a particular cooling air supply tube which is coaxially located within the blowhead. Documents A, C and D also refer to cooling devices in apparatuses for blowing glassware.

Document A suggests the use of water vapor in a predetermined quantity, location and time for achieving optimal conditions, in particular to avoid any detrimental chill of the parison before it is completely expanded.

Document C concentrates in particular on the contact between glass and the metal plunger and suggests a special hollow plunger filled with a mass of discrete particles which is shape retaining and infusible. The interstices between the particles allow flow of the coolant medium and good temperature-distribution along the different parts of the parison.

Document D describes, similarly to document B, to use a coaxial blowing and cooling device.

Each of these documents might, therefore, have invited the skilled man to further improve the mechanical means for distribution of the cooling medium and possibly to optimize the balance between the various technical factors involved.

These documents do not contain, however, any definite information concerning the meaning of the temperature-value as such, in particular in the direction of any low temperature value - as defined in Claim 1. All of the cited documents relate to the cooling-problem without in fact mentioning a definite value for an advantageous temperature of the cooling medium. However, without any reference to low temperatures which require additional and very specific means for providing, the assumption must then be that air for cooling has a normal temperature in the circumstances. It appears that acting against this established technical condition in the art is itself unexpected. This is in spite of the fact that it was well known that lowering the temperature of the coolant faster heat transfer could be achieved. There must have been an expectation of some disadvantage, i.e. cracking or tensions in the solidified mass in consequence of too rapid cooling. It is, therefore, surprising that the technique works without such problems.

- 5.2 From the above it follows that the subject matter of Claim 1 is not obvious to the man skilled in the art.
- 5.3 Independent Claim 8 contains the feature "providing a controlled flow of pressurized cold cryogen vapor" and Claim 12 "means (270 including a source) for providing such a flow of pressurized cold cryogen vapor" which, following the above observations, are not to be regarded as obvious to the man skilled in the art having regard to the cited documents.

6. The subject-matter of independent Claims 1, 8 and 12 complies, therefore, with the requirements of Article 56 EPC and is patentable with regard to Article 52(1) EPC.

The dependent claims remain valid together with the independent ones.

Order

For these reasons, it is decided that

1. The decision of the Examining Division is set aside.
2. The case is remitted to the Examining Division with the order to continue prosecution of the application on the basis of Claims 1, 8 and 12 mentioned under II. above.

The Registrar:

The Chairman:



S. Fabiani



G. Szabo

29.8.90 Sm

17.9.90