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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

(54) Title: INJECTION MOLDING APPARATUS AND METHOD OF USE

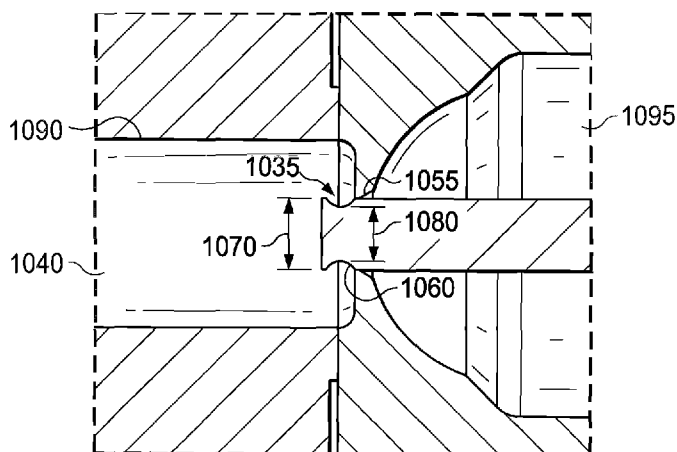


FIG. 1B

(57) Abstract: The present invention surrounds an apparatus and method for the use in injection molding of articles of manufacture using an injection molding apparatus having a valve-gate pin or a plurality of valve-gate pins for actuation to extend and retract from a cavity within an injection mold. The valve-gate pin may have a retention feature or retention features configured for the retention of molded parts such that the retraction or extension of the valve-gate pin provides part removal from an associated injection mold. Further, the valve-gate pin may have a feature or features to facilitate the injection of fluids, gases or particles during or after the primary injection process. Additionally, a plurality of such valve-gate pins may be employed within each mold cavity, or within each valve-gate actuation system.



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- *with international search report (Art. 21(3))*
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 17/29174

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(8) - B29C 45/23 (2017.01)
 CPC - B29C 45/23

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)

See Search History Document

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

See Search History Document

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

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,530,654 A (ROSE) 23 July 1985 (23.07.1985) Figs. 1-2; col 2 ln 16-20, 25-29, col 3 ln 29-32.	1-2, 7
Y		5-6, 8-9
A		3-4
Y	US 5,820,803 A (HASHIMOTO) 13 October 1998 (13.10.1998) Fig. 6; col 5 ln 9-14, 62-67, col 6 ln 54-64.	5-6
Y	US 2012/0248644 A1 (DE OLIVIERA ANTUNES et al.) 04 October 2012 (04.10.2012) Fig. 1; paras [0103-4], [0114].	8-9
A	US 4,274,823 A (STANCIU et al.) 23 June 1981 (23.06.1981) Fig. 1; col 3 ln 30-35, col 6 ln 20-24.	10-15
A	US 2007/0036878 A1 (GOODENOUGH et al.) 15 February 2007 (15.02.2007) Fig. 6; paras [0100], [0119], [0121], [0126].	10-15
A	US 7,306,455 B2 (DEWAR et al.) 11 December 2007 (11.12.2007) Figs. 6-7; col 5 ln 6-27.	1-15
A	US 2007/0222111 A1 (HUSSAIN et al.) 27 September 2007 (27.09.2007) Figs. 4C-D; paras [0014-5].	1-15

Further documents are listed in the continuation of Box C.

See patent family annex.

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

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 17/29174

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
 -*- See Extra Sheet -*-

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

- Remark on Protest**
- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
 - The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
 - No protest accompanied the payment of additional search fees.

-*- Continuation of Box III - Observations where unity of invention is lacking -*-

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I Claims 1-9, directed to an injection molding apparatus including an actuating mechanism,

Group II Claims 10-15, directed to a method for the injection molding of a part including clamping an injection mold.

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical feature(s) for the following reasons:

Group I requires the special technical features of a retention feature, an actuating mechanism, a material delivery chamber having an aperture with a valve-gate pin therein, not required by Group II.

Group II requires the special technical features of an injection mold with clamped sides, an injected material, and the step of holding injected material under pressure for a finite period of time, wherein the injected material is separable from a surface, not required by Group I.

The only shared technical feature(s) that would otherwise unify Groups I-II are an injection molding apparatus or method including:
an injection mold having a cavity between a first side and a second side; and
a valve-gate pin.

However, these technical features do not represent a contribution to the prior art, because they are anticipated by US 4,433,969 A (GELLERT) (hereinafter "Gellert").

Gellert teaches an injection molding apparatus or method (apparatus: unnumbered; the apparatus illustrated in Fig. 1; "injection molding system" col 3 ln 13-15) including:

an injection mold (which includes cavity plate 14 and the unnumbered body below cavity 32 in Fig. 1; col 3 ln 21-23) having a cavity (cavity 32, Fig. 1; col 3 ln 21-23) between a first side (cavity plate 14, Fig. 1; col 3 ln 16-18) and a second side (the unnumbered body below cavity 32 in Fig. 1; col 3 ln 21-23)

As the common technical feature(s) of Groups I-II were known in the art at the time of the invention, they cannot be considered to be common technical feature(s) that would otherwise unify Groups I-II.

Therefore, Groups I-II lack unity under PCT Rule 13.

Note(s)

1. Claim 7 presently depends from no claim but has been interpreted both to depend and to derive antecedent basis of "said valve-gate pin" from claim 1.