

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 February 2002 (07.02.2002)

PCT

(10) International Publication Number
WO 02/009919 A3

- (51) International Patent Classification⁷: **B29B 7/20**, B01F 7/08, 7/10 (81) Designated States (*national*): AT, DE, DK, ES, GB, JP, SG, US.
- (21) International Application Number: PCT/IN00/00071 (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- (22) International Filing Date: 31 July 2000 (31.07.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (71) Applicant and
(72) Inventor: **PADMANABHAN, Babu** [IN/IN]; #290, 4th Main, Peenya Industrial Area, Peenya, Bengalor 560 058, Karnataka (IN).
- Published:**
— with international search report
— with amended claims and statement
- (88) Date of publication of the international search report:
29 August 2002

(74) Agent: **MANDAL, Partha**; Fox Mandal Associates, FM House, 6/12, Primrose Road, Bangalore 560 025, Karnataka (IN).

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.



WO 02/009919 A3

(54) Title: FRACTIONAL AND HIGHER LOBED CO-ROTATING TWIN-SCREW ELEMENTS

(57) Abstract: A twin-screw extruder having a novel fractional element has been invented that can provide different tip angles. The twin-screw extruder is suitable for processing thermo plastic, thermo set and other material. It has a barrel with two parallel intersecting bores, two sets of co-rotating fully intermeshed extruder elements that are linked to each other in non rotary manner forming continuous chain, each element operating in one of the bores and each screw being provided with multi lobbed elements that has special gemetry.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN00/00071

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(7) :B29B7/20; B01F 7/08, 7/10
 U'S CL :366/82, 85
 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)
 U.S. : 366/82, 85, 301; 425/204

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 practicable, 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	US 3,254,367 A (ERDMENGER) 07 June 1966, entire document, especially Fig. 1.	1,2
X	US 3,900,187 A (LOOMANS) 19 August 1975, entire reference, especially Fig. 2.	1,2
X	US 4,300,839 A (SAKAGAMI) 17 November 1981, entire reference, especially Fig. 5b.	1,2
X	US 5,048,971 A (WALL et al.) 17 September 1991, Fig. 8.	1,2,5
X	US 6,048,088 A (HARING et al.) 11 April 2000, Fig. 9.	1,2
X,E	US 6,170,975 B (ANDERSEN) 09 January 2001, entire document.	1,2

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 document 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)	"G"	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		

Date of the actual completion of the international search: 07 FEBRUARY 2002
 Date of mailing of the international search report: 05 MAR 2002

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks, Box PCT, Washington, D.C. 20231, Facsimile No. (703) 305-3230
 Authorized officer: DAVID L. SORKIN (with signature), Telephone No. (703) 308-0661

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IN00/00071

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international 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.: 6
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:

Fails to comply with PCT rule 6.2a, i.e. omnibus claim.

3. Claims Nos.: 3,4,6
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

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 an additional fee, this Authority did not invite payment of any additional fee.
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.
 No protest accompanied the payment of additional search fees.