

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 459 353 A3

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **91108586.8**(51) Int. Cl.⁵: **B22F 3/12, B22F 3/04**(22) Date of filing: **27.05.91**

(30) Priority: **29.05.90 JP 137107/90**
29.10.90 JP 288385/90

(43) Date of publication of application:
04.12.91 Bulletin 91/49

(84) Designated Contracting States:
DE FR GB SE

(86) Date of deferred publication of the search report:
27.10.93 Bulletin 93/43

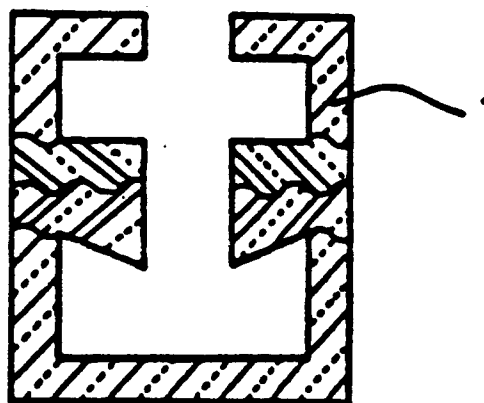
(71) Applicant: **NKK CORPORATION**
1-2 Marunouchi 1-chome,
Chiyoda-ku
Tokyo(JP)

(72) Inventor: **Nishio, Hiroaki**
c/o NKK CORPORATION,
1-2, Marunouchi 1-chome
Chiyoda-ku, Tokyo(JP)
Inventor: **Sato, Michitaka**
c/o NKK CORPORATION,
1-2, Marunouchi 1-chome
Chiyoda-ku, Tokyo(JP)
Inventor: **Takase, Akira**
c/o NKK CORPORATION,
1-2, Marunouchi 1-chome
Chiyoda-ku, Tokyo(JP)

(74) Representative: **Patentanwälte Grünecker,**
Kinkeldey, Stockmair & Partner
Maximilianstrasse 58
D-80538 München (DE)

(54) **Molding method for powder of metal, ceramic, etc.**

(57) A method of molding the powder of a metal, ceramic or the like which comprises preparing a plastic mold having at least one opening on the surface of a pattern having a desired form to be molded, removing the pattern to form a cavity on the plastic mold, filling a molding material of metal powder, ceramic powder or the like into the cavity through the opening, sealing the cavity, and treating the mold with cold isostatic pressing. In the method of the invention, by using a plastic material for the mold, the external liquid pressure is transmitted to the molded body therein, and an isotropic pressure is added to the molded body during the cold isostatic pressing. According to the method of the invention, the time for preparing a mold can be shortened to about 1 hour from 5 to 20 hours which is taken in the previous method.

FIG. 4**EP 0 459 353 A3**



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 10 8586

Page 1

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-3 741 755 (ALLEN) 26 June 1973 * column 1, line 54 - line 61 * * column 3, line 58 - line 68 * * claim 1 * ---	1	B22F3/12 B22F3/04
X	DE-C-3 726 259 (MTU MOTOREN- UND TURBINEN-UNION MÜNCHEN GMBH) 8 December 1988 * column 3, line 60 - column 4, line 13 * * figure * ---	1-3	
X	GB-A-893 377 (THE GENERAL ELECTRIC COMPANY LIMITED) 11 April 1962 * page 2, column 10 - column 24 * * claims * ---	1-3	
X	GB-A-989 255 (ENGELHARD INDUSTRIES, INC.) 14 April 1965 * claims * ---	1,2	
A	DATABASE WPI Section Ch, Week 7627, Derwent Publications Ltd., London, GB; Class A12, AN 76-50481X [27] & JP-A-5 007 722 (HITACHI KK) 27 January 1975 * abstract * ---	4,5	TECHNICAL FIELDS SEARCHED (Int. Cl.5) B22F
X	EP-A-0 115 104 (SUMITOMO CHEMICAL COMPANY, LIMITED) 8 August 1984 * claims * * example 1 * --- -/-	6,7	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 AUGUST 1993	Examiner RIBA VILANOVA M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons --- A : member of the same patent family, corresponding document			



European Patent
Office

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid,
namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions.

namely:

See sheet -B-

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid,
namely claims:
- ☐ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims.
namely claims:



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 10 8586
Page 2

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	GB-A-2 081 733 (SUMITOMO CHEMICAL COMPANY, LIMITED) 24 February 1982 * claims * * example 1 *	6,7	
X	FR-A-2 380 999 (MONTEDISON S.P.A.) 15 September 1978 * example 1 * * claims *	8	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 AUGUST 1993	Examiner RIBA VILANOVA M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : member of the same patent family, corresponding document			



LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-5 Method of moulding metal powder and plastic mould material
2. Claims: 6,7 Moulding material comprising an organic binder
3. Claim : 8 Moulding material comprising porous metal powder