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(54) **BONDCASTING PROCESS USING INVESTMENT AND SAND CASTING**

(57) A method of forming a component having a plurality of parts constructed from at least two different materials includes forming a first part made from a first material, placing a sandcasting pattern in a sand molding box, filling the sand molding box with sand, removing the sandcasting pattern from the sand molding box, placing

the first part in a first portion of a void in the sand with the void formed by the removal of the sandcasting pattern, filling a remaining area of the void with a second material, and allowing the second material to solidify to form a second part.

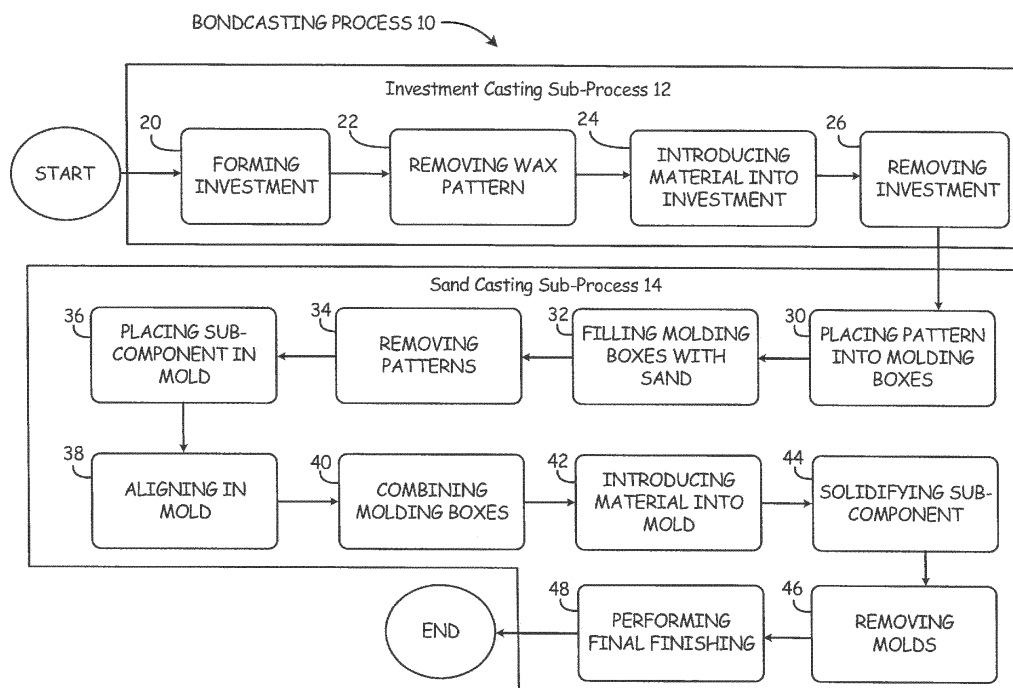


Fig. 1



EUROPEAN SEARCH REPORT

Application Number
EP 16 15 3301

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2011/297344 A1 (CAMPBELL CHRISTIAN X [US] ET AL) 8 December 2011 (2011-12-08) * paragraphs [0019] - [0024]; figures 1-4 *	1,4-10	INV. B22D19/02
X	GB 2 010 170 A (TRW INC) 27 June 1979 (1979-06-27) * the whole document *	1,4-10	
X	US 2 894 318 A (BLOOMBERG DAVID J) 14 July 1959 (1959-07-14) * the whole document *	1,4-10	
X	US 1 621 002 A (DIMBERG PAUL C) 15 March 1927 (1927-03-15) * the whole document *	1,4-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			B22D
<p>The present search report has been drawn up for all claims</p>			
Place of search		Date of completion of the search	Examiner
Munich		27 June 2016	Scheid, Michael
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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 & : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03.02 (P04C01)



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements 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.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ 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 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 invention first mentioned in the claims, namely claims:

1, 4-10

☐ The present supplementary 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 (Rule 164 (1) EPC).



LACK OF UNITY OF INVENTION
SHEET B

Application Number

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

1. claims: 1, 4-10

A method of manufacturing an apparatus by inserting a first sub-component having an locking feature in a sand mold and to cast a second sub-component adjacent to this first sub-component

2. claims: 2, 3, 11, 12

A method of making an apparatus by investment casting a first sub-component having a locking feature, making a sand mold using a pattern, placing this first sub-component in the sand mold and casting a second sub-component adjacent to this first sub-component

3. claims: 13-15

A method of forming a component having a plurality of parts, wherein a first part is made, a sand mold in made using a pattern, the first part is placed in a void of the mold, a remaining area of the mold is filled with a second material.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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