



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
01.05.2013 Bulletin 2013/18

(51) Int Cl.:
B22D 1/00 (2006.01) B22D 17/00 (2006.01)
C22C 1/00 (2006.01)

(43) Date of publication A2:
03.04.2013 Bulletin 2013/14

(21) Application number: **12186494.6**

(22) Date of filing: **28.09.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(72) Inventor: **Zanoletti, Marco**
21042 Caronno Pertusella (IT)

(74) Representative: **Coloberti, Luigi et al**
Coloberti & Luppi S.r.l.
Patent department
Via E. De Amicis, 25
20123 Milano (IT)

(30) Priority: **30.09.2011 IT MI20111767**

(71) Applicant: **T.C.S. MOLDING SYSTEMS S.P.A.**
21042 Caronno Pertusella (IT)

(54) **Rheocasting method and apparatus**

(57) A rheocasting method and apparatus are disclosed for die-casting metal alloy pieces. A metal alloy in semi-solid state is injected into a mould (3) by a vertical die-casting system comprising a mixing device (10) and a rotating table (4) provided with injection units (5), each provided with a container (8) for preparing the metal alloy in semi-solid state and injecting the metal alloy in semi-solid state into the mould (3); the injection units (5) are transferred in sequence, with step forward movement, between a loading station (6), where each injection container (8) is filled with a liquid metal alloy which is then stirred mechanically and simultaneously cooled to a semi-solid state by the mixing device (10), an injection station (7) where the semi-solid alloy is injected into the cavity of a mould (3), and a station (6') for removing cast pieces.

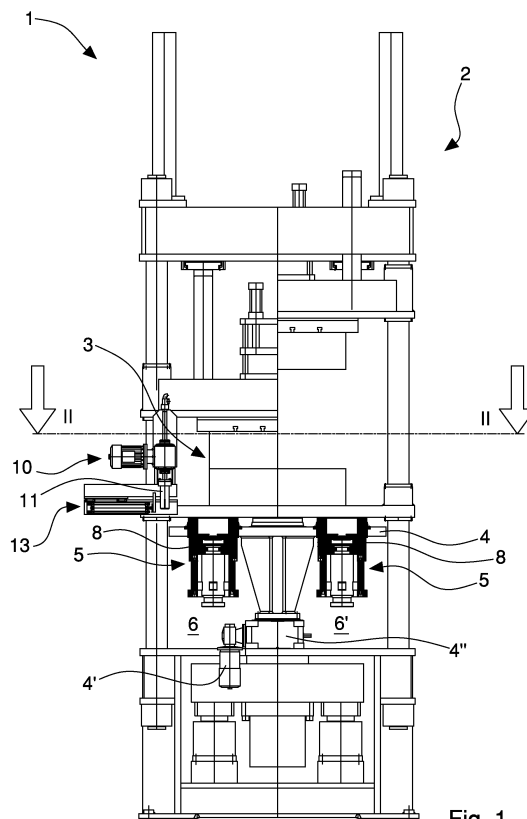


Fig. 1



EUROPEAN SEARCH REPORT

Application Number
EP 12 18 6494

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 6 470 955 B1 (RICHARD KEVIN L [US] ET AL) 29 October 2002 (2002-10-29) * the whole document *	1-3,6-9, 11,12	INV. B22D1/00 B22D17/00 C22C1/00
Y	EP 1 649 951 A1 (HONDA MOTOR CO LTD [JP]) 26 April 2006 (2006-04-26) * the whole document *	1-3,6-9, 11,12	
			TECHNICAL FIELDS SEARCHED (IPC)
			B22D C22C
<div style="text-align: center;"> The present search report has been drawn up for all claims </div>			
Place of search Munich		Date of completion of the search 26 November 2012	Examiner Scheid, Michael
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 & : member of the same patent family, corresponding document			

 1
EPO FORM 1503 03/82 (P04C01)



Application Number

EP 12 18 6494

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:

see annex

☐ 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
EP 12 18 6494

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: 1-3, 6-8, 11, 12

Rheocasting method and apparatus with a cooled impeller

2. claims: 4, 5, 9

Heating of injection container

3. claim: 10

Cooling or heating of injectiong piston

4. claim: 13

Vertical press for die-casting with a plurality of inection
units

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

EP 12 18 6494

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.

26-11-2012

Patent document cited in search report		Publication date	Patent family member(s)			Publication date
US 6470955	B1	29-10-2002	AU	5121999	A	14-02-2000
			BR	9912315	A	16-10-2001
			CA	2338004	A1	03-02-2000
			CN	1311722	A	05-09-2001
			EP	1121214	A1	08-08-2001
			HU	0102977	A2	28-12-2001
			JP	3544943	B2	21-07-2004
			JP	2002521202	A	16-07-2002
			MX	PA01000508	A	29-11-2002
			US	6470955	B1	29-10-2002
			US	2003006020	A1	09-01-2003
			WO	0005015	A1	03-02-2000

EP 1649951	A1	26-04-2006	CA	2530871	A1	13-01-2005
			EP	1649951	A1	26-04-2006
			EP	2289650	A1	02-03-2011
			EP	2292353	A1	09-03-2011
			US	2006151137	A1	13-07-2006
			WO	2005002760	A1	13-01-2005
