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(71) **Applicant** *(for all designated States except US)*: **BAKER HUGHES INCORPORATED** [US/US]; P.O. Box 4740, Houston, Texas 77210-4740 (US).

(72) **Inventor; and**

(75) **Inventor/Applicant** *(for US only)*: **O'MALLEY, Edward J.** [US/US]; 720 Rutland Street, Houston, Texas 77007 (US).

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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))*

[Continued on next page]

(54) **Title**: APPARATUS AND METHOD FOR COMPLETING WELLS USING SLURRY CONTAINING A SHAPE-MEMORY MATERIAL PARTICLES

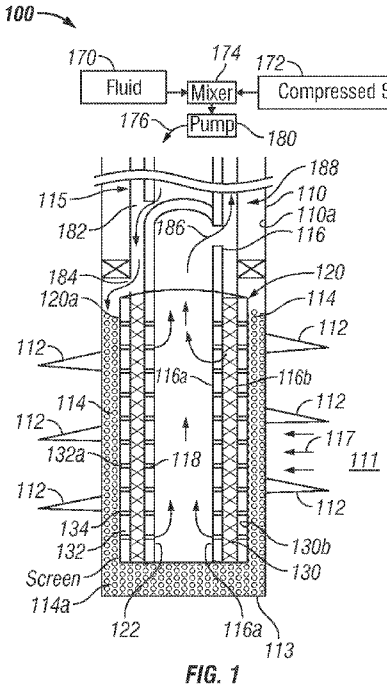

FIG. 1

(57) **Abstract**: In aspects, the present disclosure provides a method of performing a wellbore operation, which in one embodiment includes supplying a mixture containing a fluid and shape memory particles of a first size into a selected region in the wellbore, retaining the shape memory particles of the first size in the selected region while expelling the fluid from the selected region, and activating the shape memory particles retained in the selected region to cause them to expand to attain a second shape to fill the selected region with shape memory particles having the second shape.

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A. CLASSIFICATION OF SUBJECT MATTER

E21B 33/13(2006.01)i, E21B 43/00(2006.01)i

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)

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

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Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: shape-memory particle, wellbore, screen

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	US 2006-0042795 A1 (WILLIAM, RICHARDS) 02 March 2006 See abstract, paragraphs [0008], [0056], [0060], and figure 8.	1,3,5-8,14,15 2,4,9-13,16-20
Y A	US 2011-0036578 A1 (CORONADO, MARTIN P.) 17 February 2011 See abstract, paragraphs [0021], [0031], and figure 2.	1,3,5-8,14,15 2,4,9-13,16-20
A	US 2010-0089565 A1 (DUAN, PING et al.) 15 April 2010 See abstract, paragraphs [0001], [0035], and figures 1, 2.	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea

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Authorized officer

Park Sang Hyun

Telephone No. 82-42-481-5434

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-0042795 A1	02.03.2006	US 7191833 B2	20.03.2007
US 2011-0036578 A1	17.02.2011	WO 2011-019989 A2	17.02.2011
		WO 2011-019989 A3	03.06.2011
		WO 2011-019989 A3	17.02.2011
US 2010-0089565 A1	15.04.2010	AU 2009-303675 A1	22.04.2010
		CN 102224321 A	19.10.2011
		EP 2334899 A2	22.06.2011
		US 2011-0162780 A1	07.07.2011
		US 7926565 B2	19.04.2011
		US 8048348 B2	01.11.2011
		WO 2010-045077 A2	22.04.2010
		WO 2010-045077 A3	08.07.2010
		WO 2010-045077 A3	22.04.2010