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(71) Applicant: **Honeywell International Inc.**
Morris Plains, NJ New Jersey 07950 (US)

(72) Inventors:
• **PAL, Ramkrishna U.**
Morris Plains, NJ New Jersey 07950 (US)
• **RAVILLA, Sridhar**
Morris Plains, NJ New Jersey 07950 (US)
• **SINGH, Dilip**
Morris Plains, NJ New Jersey 07950 (US)
• **DASH, Debasis**
Morris Plains, NJ New Jersey 07950 (US)
• **KULKARNI, Unmesh**
Morris Plains, NJ New Jersey 07950 (US)

(74) Representative: **Houghton, Mark Phillip**
Patent Outsourcing Limited
1 King Street
Bakewell, Derbyshire DE45 1DZ (GB)

(54) **SYSTEMS AND METHODS FOR LEAK DETECTION AND REMOTE, NON-INTRUSIVE, AUTOMATIC SHUTOFF IN RESIDENTIAL REGULATORS**

(57) Systems and methods for leak detection and remote, non-intrusive, automatic shutoff in residential regulators are provided. Such systems and methods can include a shutoff device that includes a mounting bracket for mounting on a supply container, a linking device for coupling to a knob of a valve of a regulator of the supply container, and an actuator for, responsive to a control signal, automatically rotating the linking device, which rotates the knob, which rotates the valve from an on position to an off position. In some embodiments, a leak sensor can detect a presence of a fuel leak and, responsive thereto, transmit the control signal to the actuator, and in some embodiments, a position sensor can determine that a current position of the valve is indicative of the on position and, responsive thereto, transmit the control signal to the actuator.

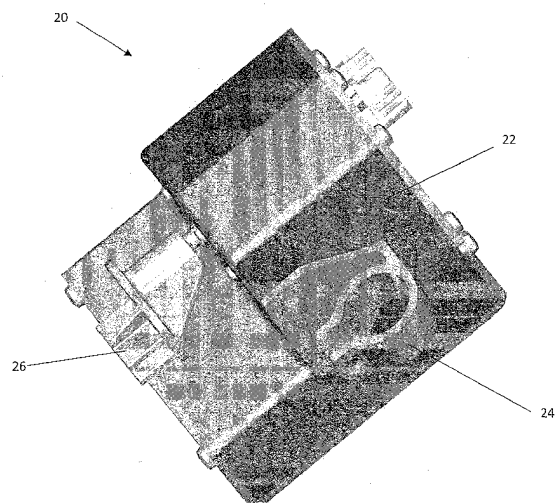


FIG. 1



EUROPEAN SEARCH REPORT

Application Number
EP 18 19 4570

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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 4 629 157 A (TSUCHIYA YUJI [JP] ET AL) 16 December 1986 (1986-12-16) * abstract; claims 1, 2; figures 1-5 * * column 1, lines 7-10 * * column 3, line 48 - column 4, line 30 * * column 5, lines 9-14 * * column 5, line 40 - column 6, line 3 * * column 6, lines 4-8 * -----	1-15	INV. F16K1/30 F17C13/12 F16K31/60 F16K31/10
A	US 2012/132838 A1 (STAFFIERE DONALD [US] ET AL) 31 May 2012 (2012-05-31) * abstract; claims 1-20; figures 1-16 * * paragraphs [0009], [0088] - [0090] * -----	1-15	
A	US 2014/264111 A1 (PORTER DOUGLAS ROY [US] ET AL) 18 September 2014 (2014-09-18) * abstract * * paragraph [0049] * -----	2,12	
			TECHNICAL FIELDS SEARCHED (IPC)
			F16K F17C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 25 June 2019	Examiner Moscelli, Nicola
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	

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Application Number

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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:

☐ 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, 3-11, 13-15

Shutoff device for gas cylinders configured to actuate the gas cylinder valve in case of a gas leak

1.1. claims: 3-8, 13-15

Wireless remote control of the actuator

1.2. claim: 9

Time-controlled actuation

1.3. claim: 10

Status report transmission

2. claims: 2, 12

Valve knob position detection

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

**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
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25-06-2019

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US 2012132838 A1	31-05-2012	NONE	
US 2014264111 A1	18-09-2014	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82