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(71) Applicant: **Tetra Laval Holdings & Finance S.A.**
1009 Pully (CH)

(72) Inventor: **Thereström, Magnus**
221 86 Lund (SE)

(74) Representative: **Tetra Pak - Patent Attorneys SE**
AB Tetra Pak
Patent Department
Ruben Rausinga gata
221 86 Lund (SE)

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(54) **A METHOD FOR MONTORING CAP APPLICATION AND A CAP HOLDER**

(57) A method (600) for monitoring cap application in a filling machine (300) is presented. The filling machine (300) comprises a cap holder (100) comprising a peripheral element (102) for encircling a cap (106), gripping elements (104) connected to the peripheral element (102) and arranged for preventing movement of the cap (106) with respect to the peripheral element (102) during rotation of the peripheral element (102) around a center axis (A), a sensor arrangement (110) attached to the peripheral element (102), and a communication module (112) linked to the peripheral element (102), communicatively connected to the sensor arrangement (110) and arranged to transmit sensor data to the data processing apparatus (312), said method comprising receiving (602) the sensor data (314) captured by the sensor arrangement (110), comparing (604) the sensor data (314) with sensor reference data (320) held in a reference database (318) communicatively connected to the data processing apparatus (312), in case of discrepancy (606) between the sensor data (314) and the sensor reference data (320), transmitting (608) a check notification (322) from the data processing apparatus (312) to a control system (324).

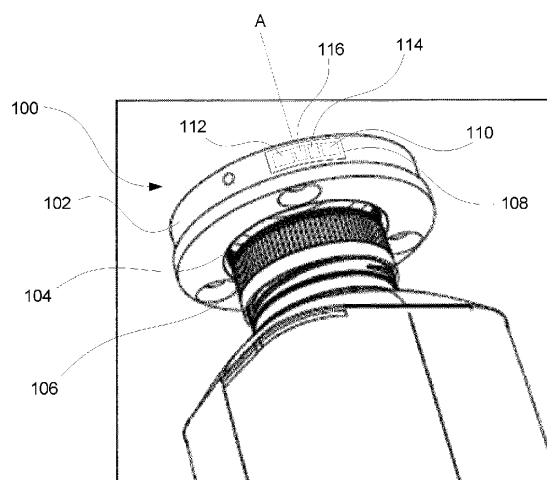


Fig. 1



EUROPEAN SEARCH REPORT

Application Number

EP 22 21 1684

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	JP 2000 159291 A (SHIBUYA KOGYO CO LTD) 13 June 2000 (2000-06-13)	1, 6, 10, 11, 14, 15	INV. B67B3/20
Y	* abstract; figures *	4-6	B67B3/26
A	* Paragraphs [0005]-[0010], [0013]-[0014] of the attached machine translation *	12, 13	
X	CN 209 974 269 U (HUNAN SUNDY SCIENCE & TECH CO LTD) 21 January 2020 (2020-01-21)	1, 2, 10, 11, 14, 15	
Y	* Paragraphs [0031]-[0041] of the attached	4-6	
A	machine translation *	12, 13	
X	EP 1 996 502 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]) 3 December 2008 (2008-12-03)	1, 3, 10, 11, 14, 15	
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	-/--		
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		8 May 2023	Oliveira, Casimiro
CATEGORY OF CITED DOCUMENTS		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	
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			



EUROPEAN SEARCH REPORT

Application Number

EP 22 21 1684

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* page 7, line 27 - page 9, line 27; figures *	12, 13	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 8 May 2023	Examiner Oliveira, Casimiro
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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CLAIMS INCURRING FEES

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

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- ☐ 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):

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- ☐ 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.

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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:

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see sheet B

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- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

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

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- ☐ 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:

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- ☒ 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:

1-6, 10-14 (completely); 8, 15 (partially)

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- ☐ 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 22 21 1684

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: 1-6, 10-14(completely); 8, 15(partially)

A method for monitoring cap application in a filling machine using a data processing apparatus, wherein the filling machine comprises a cap holder comprising

- a peripheral element for encircling a cap,
- gripping elements connected to the peripheral element and arranged for preventing movement of the cap with respect to the peripheral element during rotation of the peripheral element around a center axis (A),
- a sensor arrangement attached to the peripheral element, and
- a communication module linked to the peripheral element, communicatively connected to the sensor arrangement and arranged to transmit sensor data to the data processing apparatus,

said method comprising receiving the sensor data captured by the sensor arrangement, comparing the sensor data with sensor reference data held in a reference database communicatively connected to the data processing apparatus, in case of discrepancy between the sensor data and the sensor reference data, transmitting a check notification from the data processing apparatus to a control system, the method comprising generating energy by means of an energy harvester in the holding unit.

Corresponding cap holder, filling machine and computer program product comprising instructions, which when the program is executed by a data processing apparatus, cause the data processing apparatus to carry out the method.

2. claims: 7, 9(completely); 8, 15(partially)

A method for monitoring cap application in a filling machine using a data processing apparatus, wherein the filling machine comprises a cap holder comprising

- a peripheral element for encircling a cap,
- gripping elements connected to the peripheral element and arranged for preventing movement of the cap with respect to the peripheral element during rotation of the peripheral element around a center axis (A),
- a sensor arrangement attached to the peripheral element, and
- a communication module linked to the peripheral element, communicatively connected to the sensor arrangement and arranged to transmit sensor data to the data processing apparatus,

said method comprising receiving the sensor data captured by the sensor arrangement, comparing the sensor data with sensor reference data held in a reference database communicatively connected to the data processing apparatus,

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 22 21 1684

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:

in case of discrepancy between the sensor data and the sensor reference data, transmitting a check notification from the data processing apparatus to a control system, the method comprising detecting whether the holding unit is of the correct type by reading an holding unit ID from a memory unit in the holding unit.

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

EP 22 21 1684

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