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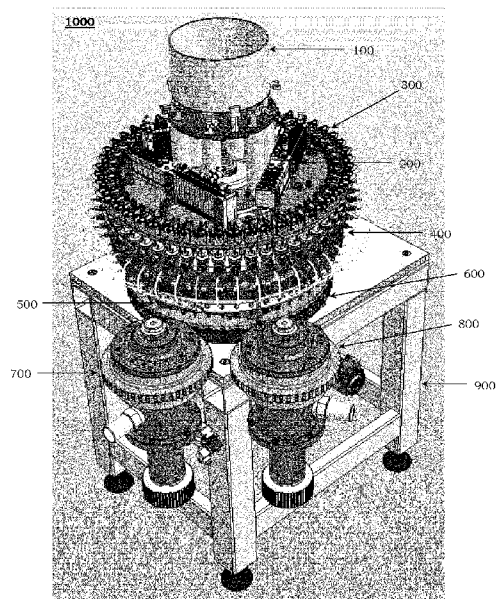
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(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,  
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,  
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,  
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,  
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,  
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,  
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,  
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,  
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KM, ML, MR, NE, SN, TD, TG).

(54) Title: APPARATUS FOR FILLING CARTRIDGES OF E-VAPOR DEVICES

FIG. 1



(57) Abstract: An apparatus (1000) for the automated filling of cartridges (610) of e-vapor devices may include a filling drum (600) configured to receive at least one cartridge (610) of an e-vapor device. The apparatus (1000) may additionally include a needle assembly (500) including at least one hypodermic needle (502). The needle assembly (500) is configured to transition between a lowered state and a raised state. The lowered state is where the hypodermic needle (502) is moved down into the cartridge (610), while the raised state is where the hypodermic needle (502) is lifted up and away from the cartridge (610). The apparatus (1000) may further include a pump assembly (400) configured to pump a pre-vapor formulation into the cartridge (610) when the needle assembly (500) is in the lowered state. The pump assembly (400) may include a variable amplitude cam system configured to adjust an amount of the pre-vapor formulation for pumping to the cartridge (610) without changing start and stop times for the pumping.



**Published:**

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2017/084107

A. CLASSIFICATION OF SUBJECT MATTER  
 INV. B65B37/20 B65B59/00 B65B65/00 B65B1/38 F04B49/12  
 B65B43/50 B65B43/60 B65B3/32  
 ADD.  
 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)  
 B65B F04B B67C

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
 EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|-----------|---|-----------------------|
| Y         | US 3 870 089 A (LAUB III HERMAN)<br>11 March 1975 (1975-03-11)<br>abstract<br>column 6, line 63<br>figures 3-4<br>column 13, line 12 - line 16<br>column 13, line 45 - line 48<br>claim 1 | 1,2,4-7               |
| X         | US 4 108 221 A (FREIMUTH GERHART WILLIAM<br>ET AL) 22 August 1978 (1978-08-22)  | 8-19                  |
| Y         | abstract; claim 1<br>column 7, line 37 - line 68<br>figures 2, 9, 14<br>figures 3, 5B, 8<br>column 5, line 46 - column 6, line 15<br>column 7, line 4 - line 13                           | 1,2,4-7,<br>20        |
|           | -----<br>-/--   |                       |

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

|   |   |
|---|---|
| <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> | <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p> |
|---|---|

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| Date of the actual completion of the international search<br><br>25 July 2018 | Date of mailing of the international search report<br><br>02/08/2018 |
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| Name and mailing address of the ISA/<br>European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016 | Authorized officer<br><br>Damiani, Alberto |
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2017/084107

| C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |  |                       |
|--|--|-----------------------|
| Category*  | Citation of document, with indication, where appropriate, of the relevant passages                                   | Relevant to claim No. |
| Y  | CA 1 101 809 A (NAT INSTR CO)<br>26 May 1981 (1981-05-26)<br>claim 1<br>figures 1-4<br>-----                         | 1,2,4-7               |
| Y  | DE 20 45 837 A1 (POLSKA AKADEMIA NAUK)<br>15 April 1971 (1971-04-15)<br>figure 1<br>-----                            | 1,2,4-7               |
| Y  | WO 2016/105191 A1 (SLUIS CIGAR MACHINERY<br>BV [NL]) 30 June 2016 (2016-06-30)<br>abstract<br>figures 11-14<br>----- | 20<br>1,2,4-19        |
| A  |  |                       |

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP2017/084107

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:  
  
1, 2, 4-20
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

|   |
|---|
| International application No<br>PCT/EP2017/084107 |
|---|

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date            |
|--|------------------|-------------------------|-----------------------------|
| US 3870089                             | A                | 11-03-1975              | NONE                        |
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| US 4108221                             | A                | 22-08-1978              | NONE                        |
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|  |                  |                         | PL 70315 B1 28-02-1974      |
| -----                                  |                  |                         |                             |
| WO 2016105191                          | A1               | 30-06-2016              | EP 3237289 A1 01-11-2017    |
|  |                  |                         | WO 2016105191 A1 30-06-2016 |
| -----                                  |                  |                         |                             |

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 2, 4-7

An apparatus for automated filling of cartridges with a filling drum.

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2. claim: 3

An apparatus with a needle assembly configured to be moved radially.

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3. claims: 8-13

A pump assembly with a pump cam.

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4. claims: 14-20

A variable amplitude cam system and a method with a pivotable track and an adjuster bolt.

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