



- (51) International Patent Classification: F04B 43/08 (2006.01)
- (21) International Application Number: PCT/US2011/066423
- (22) International Filing Date: 21 December 2011 (21.12.2011)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 61/425,340 21 December 2010 (21.12.2010) US
- (71) Applicant (for all designated States except US): MEAD-WESTVACO CALMAR, INC. [US/US]; 501 South 5th Street, Richmond, Virginia 23219-0501 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): BOES, Erwin [NL/NL]; De Lingert 51-65, NL-6605 DD Wijchen (NL). DE REGT, Jeroen D. [NL/NL]; Schering 22, NL-5348KX Oss (NL).
- (74) Agents: JENSEN, Devin et al.; MeadWestvaco Corporation, 501 South 5th Street, Richmond, Virginia 23219-0501 (US).
- (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, BR, BW, BY, BZ,

[Continued on next page]

(54) Title: PUMP DEVICES AND METHODS FOR USING THE SAME

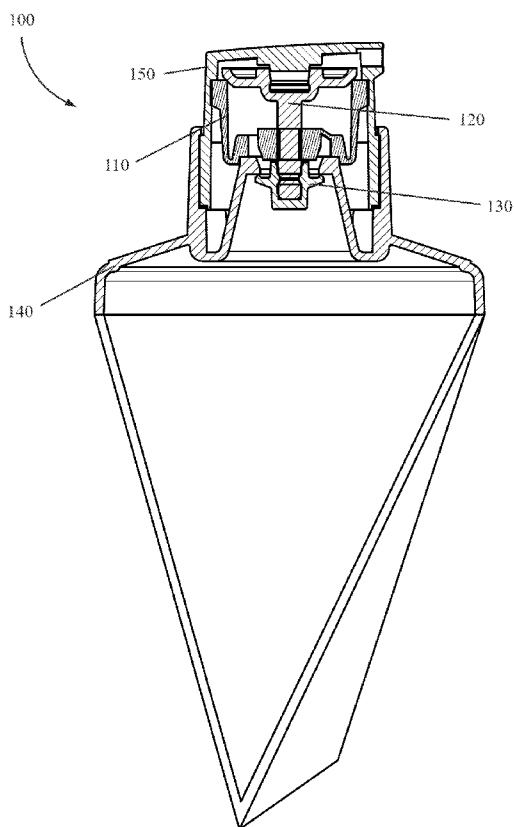


FIG. 12

(57) Abstract: A simplified pump system may include a bellows having a suction valve, a stem, and a fluid lock wherein the product flow into and out of a pump chamber formed by the bellows and stem is controlled by the suction valve and fluid lock.





CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ,

(88) Date of publication of the international search report:

10 April 2014

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 11/66423

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - F04B 43/08 (2012.01)

USPC - 417/472

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)

IPC(8) - F04B 43/08 (2012.01)

USPC - 417/472

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
222/631, 632, 633, 321.6, 321.7, 321.8;
417/437, 472, 474, 480

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

PubWest (PGPB, USPT, EPAB, JPAB); Google

Search Terms: Pump, bellows, stem, rod, piston, plunger, hole, aperture, opening, base, gasket, dispenser, dip tube, elastomer

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/0110576 A1 (BROUWER et al.) 30 April 2009 (30.04.2009) Entire document, especially Abstract, para[0009], para[0023]- para[0024], para[0030] and FIGS. 1A-1D.	1
X	WO 2010/050772 A2 (YOON et al.) 06 May 2010 (06.05.2010) Abstract, FIGS. 1-4.	2-4, 6-7, 9-10 and 12
-		
Y		5, 8 and 11
Y	US 5,544,789 A (GILLINGHAM) 13 August 1996 (13.08.1996) Abstract, col 2,ln 54-61; and FIG. 1.	5, 8 and 11
A	US 5,788,124 A (BOUGAMONT et al.) 04 August 1998 (04.08.1998) Entire document.	1-12

 Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"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

"&" document member of the same patent family

Date of the actual completion of the international search

09 April 2012 (09.04.2012)

Date of mailing of the international search report

01 MAY 2012

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774