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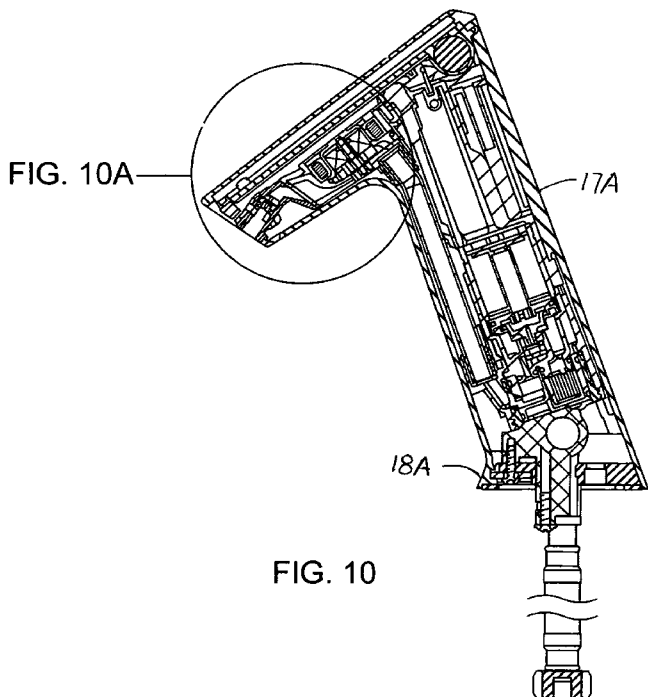
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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, 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.

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[Continued on next page]

(54) Title: AUTOMATIC FAUCETS



(57) Abstract: An automatic faucet includes a housing forming partially an internal barrel and a faucet head and being constructed to include at least one water inlet conduit extending into said barrel and a water outlet for delivering water from a spout. The automatic faucet also includes a faucet head having a removable faucet crown and the spout, wherein the faucet crown is removably mounted to the faucet head. The automatic faucet also includes a valve module, a sensor module, a battery module, a turbine module, and a control module.





UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, 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).

— 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/US 12/00337

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - E03C 1/05 (2012.01)

USPC - 4/623

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)
USPC: 4/623

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
IPC(8): E03C 1/05 (2012.01)
USPC: 4/623; 251/129.01; 137/551, 560

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase and Google: faucet, housing, head, spout, cover, remove, sense, sensor, IR, infrared, PIR, maintenance, replace, passive, valve, turbine, generator, power, electricity, modular, control, controller, circuit, circuit board, CPU, processor, microprocessor, actuate, actuator, electromagnetic, solenoid, quick connect, LED, diode, power, algori

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 7,690,623 B2 (Parsons et al) 06 April 2010 (06.04.2010), entire document, especially Fig. 1-6 and 6; col 1, ln 13-14; col 4, ln 7-19; col 5, ln 32 to col 9, ln 21; col 21, ln 64 to col 22, ln 45	1-3, 22/1, 23/1, 24/1, 25/1 and 32/1 ----- 4/(1, 2, 3), 5/4/(1, 2, 3), 6, 11/(1, 2, 3), 7/(1, 2, 3), 8/7/(1, 2, 3), 9/7/(1, 2, 3), 10/4/(1, 2, 3), 12/10/(1, 2, 3), 13/10/(1, 2, 3), 15, 22/16, 23/16, 24/15 40, 26/24/1, 26/24/15, 42, 43/7/(1, 2, 3), 44/43/7/(1, 2, 3), 45/43/7/(1, 2, 3), 47/43/7/(1, 2, 3), and 46/43/7/(1, 2, 3)
X --- Y	US 7,871,057 B2 (Shimizu et al) 18 January 2011 (18.01.2011), entire document, especially Fig. 1; col 2, ln 59 to col 5, ln 50	15, 16, 25/15, 27, 32/15, 33-36, and 38 ----- 4/(1, 2, 3), 5/4/(1, 2, 3), 6, 11/(1, 2, 3), 10/(1, 2, 3), 12/4/(1, 2, 3), 13/10/4/(1, 2, 3), 15, 17-18, 19-21, 22/

Further documents are listed in the continuation of Box C.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search 26 October 2012 (26.10.2012)	Date of mailing of the international search report 22 MAR 2013
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

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 12/00337

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2010/0275359 A1 (Guler et al) 04 November 2010 (04.11.2010), entire document, especially para [0054] and [0122]	7/(1, 2, 3), 8/7/(1, 2, 3), 9/7/(1, 2, 3), 10/4/(1, 2, 3), 12/10/4/(1, 2, 3), 13/10/4/(1, 2, 3), 30-31, 43/7/(1, 2, 3), 44/43/7/(1, 2, 3), 45/43/7/(1, 2, 3), 47/43/7/(1, 2, 3) and 46/43/7/(1, 2, 3)
Y	US 7,921,480 B2 (Parsons et al) 12 April 2011 (12.04.2011), entire document, especially col 5, ln 62 to col 6, ln 19; col 13, ln 24 to col 14, ln 15	17-18, 26/1, 42, and 26/24/15
Y	US 2010/0044604 A1 (Burke et al) 25 February 2010 (25.02.2010), entire document, especially para [0009], [0018]-[0021] and [0026]	19-21 and 39
Y	US 5,199,639 A (Kobayashi et al) 06 April 1993 (06.04.1993), entire document, especially col 6, ln 30-69; col 16, ln 5-63	12/10/4/(1, 2, 3), 28-29 and 37
Y	US 7,608,936 B2 (Shimizu et al) 27 October 2009 (27.10.2009), entire document, especially col 3, ln 36-47; col 4, ln 4-47; col 5, ln 61 to col 6, ln 4	33
Y	US 2010/0327197 A1 (Parsons et al) 30 December 2010 (30.12.2010), entire document, especially para [0043] and para [0048]-[0049]	38 and 41
A	US 5,823,229 A (Bertrand et al) 20 October 1998 (20.10.1998), entire document, especially col 5, ln 9-20; Fig. 6	1-13, 15-47
A	US 2010/0269923 A1 (Parsons et al) 28 October 2010 (28.10.2010), entire document, especially para [0055]-[0083]	1-13, 15-47
A	US 6,082,407 A (Paterson et al) 04 July 2000 (04.07.2000), entire document, especially col 3, ln 20 to col 6, ln 18	1-13, 15-47
A	US 2009/0106891 A1 (Klicpera) 30 April 2009 (30.04.2009), entire document, especially para [0017]-[0040]	1-13, 15-47
A	US 7,650,653 B2 (Johnson et al) 26 January 2010 (26.01.2010), entire document, especially col 9, ln 1, to col 13, ln 12	1-13, 15-47
A	US 2010/0071126 A1 (Rudisser) 25 March 2010 (25.03.2010), entire document, especially para [0022]-[0030]	1-13, 15-47
A	US 4,894,874 A (Wilson) 23 January 1990 (23.01.1990), entire document, especially col 2, ln 6 to col 4, ln 40	1-13, 15-47

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 12/00337

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.: 14
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:

- 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 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.:

- 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.