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(71) Applicant and

(72) Inventor: RIVLIN, Eitan [IL/IL]; 21 Beerot St., 90917 Givat Zeev (IL).

Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i))
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

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[Continued on next page]

(54) Title: LOW POWER ELECTRIC OPERATED THERMOSTATIC MIXING VALVE

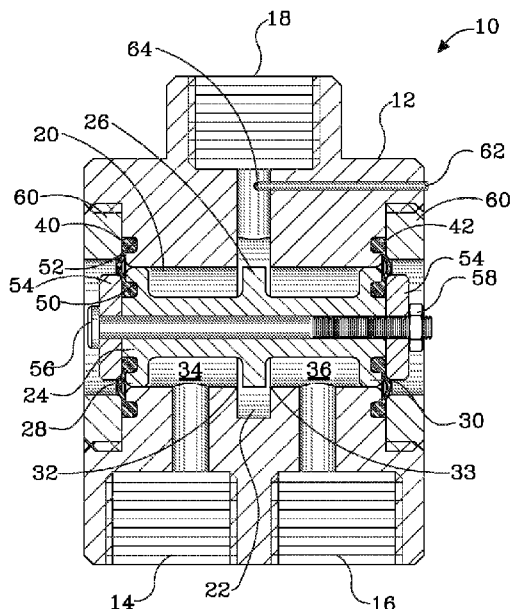


Fig. 1

(57) Abstract: A frictionless, pressure balanced proportioning valve assembly, for low power electric operated thermostatic cartridge, composed of a housing with spaced apart hot and cold water inlets and intermediate mixed water outlet, flow communicated to a spool bore with a central widened portion; a spool, guided in the spool bore, by widened end portions, is carrying a central widened disk portion, separating the spool bore into two tubular inlet chambers; two diaphragm seals disposed at both ends of the spool and housing, pressure balancing the inlet chambers; a temperature sensor, exposed to the mixed water outlet pathway, generates a signal, readable by a control circuit; a drive unit energized by a low power electric motor, driving past gear train and eccentric shaft, a bendable connecting rod, axially displacing the spool. Axial displacement of the balanced friction-free spool, proportions flow from the hot and cold water inlets to the mixed water outlet.

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INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - G05D 23/13 (2009.01) USPC - 236/12.1 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) G05D 23/13 (2009.01) USPC 236/12.1 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC 236/12.1, 12.16, 12.2; Backward/forward citation searches; Text search Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WEST (PGPB, USPT, USOCR, EPAB, JPAB); Terms: (proportion\$3 or mix\$3) near2 valve and pressure adj balanc\$3; Google Scholar: (("thermostatic mixing valve") and motor)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 1,819,045 A (Snediker) 18 Aug 1931 (18.08.1931) fig. 1 and pg. 1 ln 45-90	1-3, 5-7, 12-14, 16-24, 26, 27
Y	US 5,400,961 A (Tsutsui et al.) 28 Mar 1995 (28.03.1995) figs. 1-8 and col 6, ln 55 - col 7, ln 40	1-3, 5-7, 12-14, 16-24, 26, 27
Y	US 3,036,777 A (Budde) 29 May 1962 (29.05.1962) fig. 1 and col 5, ln 20-35	5, 6
Y	US 4,711,392 A (Kidouchi et al.) 08 Dec 1987 (08.12.1987) figs. 1-3	17-21
Y	US 6,444,127 B1 (Vaughan et al.) 03 Sep 2002 (03.09.2002) col 15, ln 25-40	23
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>		
* 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 28 May 2009 (28.05.2009)		Date of mailing of the international search report 08 JUN 2009
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/IB 08/55019

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.: 4, 8-11, 15, 25
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.