



(51) International Patent Classification:
E03C 1/04 (2006.01)

(21) International Application Number:

PCT/US2018/026094

(22) International Filing Date:

04 April 2018 (04.04.2018)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/483,591

10 April 2017 (10.04.2017)

US

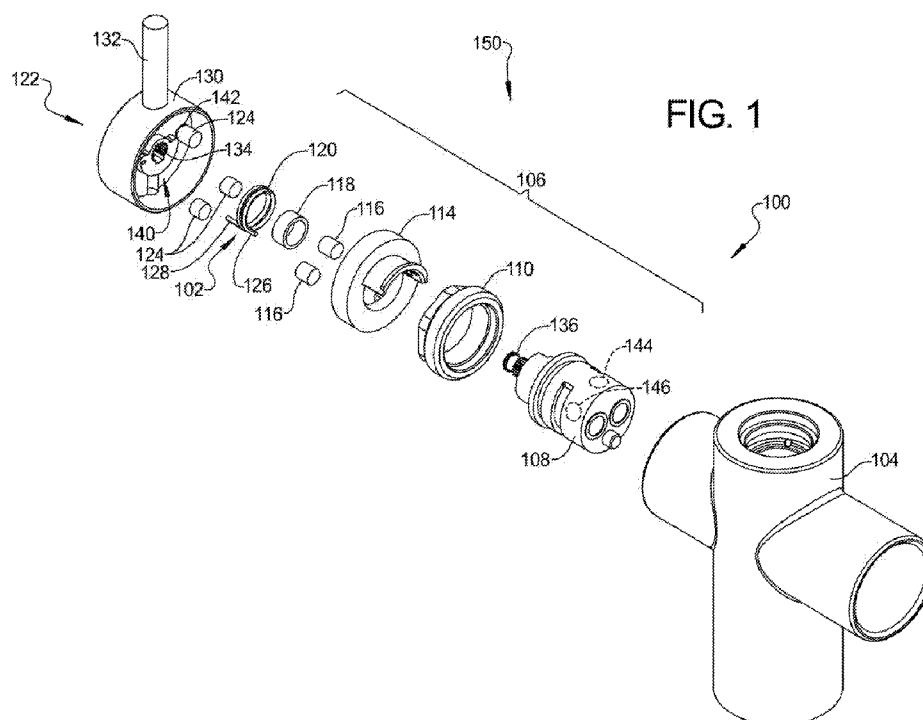
(71) Applicant: EMERSON ELECTRIC CO. [US/US]; 8000
West Florissant Ave., St. Louis, Missouri 63136 (US).

(72) Inventors: LEFEBER, Tom; 3605 Wood Road, Racine,
Wisconsin 53406 (US). ROSANDICH, Joe; 3412 S 44th
St., Greenfield, Wisconsin 53219 (US).

(74) Agent: FULLER, III, Roland A., et al.; Harness, Dickey
& Pierce, P.L.C., P.O. Box 828, Bloomfield Hills, Michigan
48303 (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, 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,

(54) Title: FAUCET WITH MAGNETIC HANDLE STOP



(57) Abstract: In accordance with an aspect of the present disclosure, a faucet has a single handle conditioned water dispensing valve and handle assembly having a single handle movable among a hot side position where it opens a hot water valve of the single handle conditioned water valve and handle assembly leaving a cold water valve of the single handle conditioned water valve and handle assembly, a cold side position where it opens the cold water valve leaving the hot water valve closed and a neutral off position between the hot side position and the cold side position where both the hot and cold water valves are closed. The single handle conditioned water dispensing valve and handle assembly has a spring that forces the handle from the hot side position to the neutral off position and a magnetic handle stop that stops and holds the handle when it is returned by the spring from the hot side position to the neutral off position.

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.

- (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, ST, SZ, TZ, 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, KM, ML, MR, NE, SN, TD, TG).

Published:

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

FAUCET WITH MAGNETIC HANDLE STOP

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 62/483,591, filed on April 10, 2017. The entire disclosure of the above
5 application is incorporated herein by reference.

FIELD

[0002] The present disclosure relates to a faucet with a magnetic handle stop, and more particularly, to a faucet having a single handle conditioned water dispensing valve and handle assembly with the magnetic handle stop.

10

BACKGROUND

[0003] This section provides background information related to the present disclosure which is not necessarily prior art.

[0004] Faucets used with hot water dispensers, such as under-sink hot water dispensers, are often single handle faucets. That is, there is only one
15 handle on a dual hot and cold faucet. When the handle is rotated one direction to a hot side position, it opens a hot water valve (with a cold water valve remaining closed) and dispenses near boiling water and when rotated the other direction to a cold side position, it opens a cold water valve (with the hot water valve remaining closed) and dispenses filtered cold water. The hot and cold
20 water valves are typically disposed in a valve assembly, such as in a valve cartridge of the valve assembly. When the handle is in a neutral off position between the hot and cold side positions, both the hot and cold water valves are closed. Such faucets have an automatic return mechanism that returns the handle from the hot side position to the neutral off position. Typically, the
25 automatic return mechanism has a spring that is biased when the handle is moved to the hot side position and the spring force of the biased spring returns the handle back to the neutral off position when the handle is released. When returning from the hot side, the handle must stop completely vertical without

activating the cold side – opening the cold water valve. The spring must be strong enough to properly return the handle to the neutral off position. The spring also must be in an engaged position when the handle is in the neutral off position. Typically, a mechanical stop mechanism is employed to stop and then
5 hold the handle in the neutral off position and to operate the handle. Typically, the handle must then be pushed in toward the faucet body to disengage the mechanical stop mechanism and then rotated to initiate the flow of water.

[0005] A disadvantage of the above type of faucet is that a user who is not familiar with the faucet may try to rotate the handle without first pushing the
10 handle toward the faucet body to disengage the mechanism stop mechanism. This may cause damage to the faucet.

[0006] Another disadvantage is that the mechanical stop mechanism includes components that add cost and complexity to the faucet.

[0007] Another disadvantage is that the mechanical stop mechanism is
15 subject to metal on metal wear that can result in a rougher feel of handle actuation over time. This may cause user concern with the quality of the faucet.

[0008] A design constraint for the mechanical stop design is the amount of space inside the handle needed to employ to the mechanical stop mechanism. The mechanical stop mechanism must be strong enough to stop the handle from
20 traveling past the neutral off position and small enough to fit inside the faucet handle. The push down mechanism can limit the range of the industrial design of the faucet.

SUMMARY

[0009] This section provides a general summary of the disclosure, and is
25 not a comprehensive disclosure of its full scope or all of its features.

[0010] In accordance with an aspect of the present disclosure, a faucet has a faucet body and a single handle conditioned water dispensing valve and handle assembly that includes a single handle movable among a hot side position where it opens a hot water valve of a valve cartridge received in the
30 faucet body leaving a cold water valve of the valve cartridge closed, a cold side position where it opens the cold water valve leaving the hot water valve closed

and a neutral off position between the hot side position and the cold side position where both the hot and cold water valves are closed. The single handle conditioned water dispensing valve and handle assembly has a spring that forces the handle from the hot side position to the neutral off position. The single
5 handle conditioned water dispensing valve and handle assembly also has at least one magnet disposed in the handle and a corresponding magnet disposed in a valve assembly. When the handle is at the neutral off position, the magnets in the handle and valve assembly align and attract toward each other providing a stop for the handle when it returns to the neutral off position from the hot side
10 position.

[0011] In accordance with an aspect of the present disclosure, a plurality of magnets are disposed in the handle and a plurality of corresponding magnets are disposed in the valve assembly.

[0012] In accordance with an aspect of the present disclosure, the faucet
15 includes a hot and cold tap water dispensing and valve assembly as well as the single handle conditioned water dispensing valve and handle assembly.

[0013] Further areas of applicability will become apparent from the description provided herein. The description and specific examples in this summary are intended for purposes of illustration only and are not intended to
20 limit the scope of the present disclosure.

DRAWINGS

[0014] The drawings described herein are for illustrative purposes only of selected embodiments and not all possible implementations, and are not intended to limit the scope of the present disclosure.

25 **[0015]** Fig. 1 is an exploded view of a faucet having a single handle conditioned water dispensing valve and handle assembly having a magnetic handle stop in accordance with an aspect of the present disclosure;

[0016] Fig. 2 is an exploded view of the faucet of Fig. 1 from a different perspective;

[0017] Fig. 3 is a simplified perspective view of the faucet of Figs. 1 and 2 showing a handle in dashed lines in a hot side and a cold side position and in solid lines in a neutral off position; and

[0018] Fig. 4 is a perspective view of a faucet having the single handle conditioned water dispensing valve and handle assembly of Figs. 1 and 2 and also a hot and cold tap water dispensing and handle assembly.

[0019] Corresponding reference numerals indicate corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION

[0020] Example embodiments will now be described more fully with reference to the accompanying drawings.

[0021] With reference to Figs. 1 and 2, exploded views of a faucet 150 having a single handle conditioned water dispensing valve and handle assembly 100 that has a magnetic handle stop 102 in accordance with an aspect of the present disclosure is shown. The faucet includes a faucet body 104. The single handle conditioned water dispensing valve and handle assembly 100 includes a valve assembly 106 having, a valve cartridge 108 for dispensing of hot and cold conditioned water, a threaded retaining ring 110, a magnet holding ring 114, valve assembly magnets 116, a wear ring 118 and a torsion spring 120. Single handle conditioned water dispensing valve and handle assembly 100 also includes a handle 122 and handle magnets 124. Valve cartridge 108 is received in faucet body 104 and secured therein by threaded retaining ring 110. Threaded retaining ring 110 also fits around magnet holding ring 114 to hold them in place in faucet body 104. Torsion spring 120 has opposed ends 126, 128 with opposed end 126 attached to valve cartridge 108 and the other opposed end 128 attached to handle 122. Handle 122 is rotatable in one direction from a neutral off position 300 (Fig. 3) to a hot side position 302 in which it opens a hot water valve 144 (Fig. 1) of valve cartridge 108 with a cold water valve 146 (Fig. 1) of valve cartridge 108 remaining closed and in an opposed direction from the neutral off position 300 to a cold side position 304 in which it opens the cold water valve 146 with the hot water valve 144 remaining

closed. When the handle is in neutral off position 300 between the hot and cold side positions, both the hot and cold water valves 144, 146 are closed.

[0022] Handle 122 has an annular body 130 with a lever 132 extending outwardly therefrom. Annular body 130 has a splined annular bore 134 (Fig. 1) therein. Valve cartridge 108 has a splined valve stem 136. Handle 122 is placed on valve cartridge 108 with splined valve stem 136 of valve cartridge 108 received in splined annular bore 134 of handle 122 which aligns handle 122 with valve cartridge 108. Torsion spring 120 is disposed around a portion of splined valve stem 136 with wear ring 118 therebetween. A set screw (not shown) is used to secure handle 122 to valve cartridge 108. It should be understood that valve cartridge 108 is a conventional hot and cold water valve cartridge having a hot water valve (not shown) and a cold water valve (not shown).

[0023] Valve assembly magnets 116 are affixed to magnet holding ring 114, such as in recesses 138 (Fig. 2) in magnet holding ring 114, and handle magnets 124 are affixed in an interior 140 (Fig. 1) of annular body 130 of handle 122, such as in recesses 142 (Fig. 1) in annular body 130. It should be understood that valve assembly magnets 116 and handle magnets 124 can all be the same or can be different. In this regard, the terms valve assembly magnets and handle magnets refer to where the magnets are located – the valve assembly or the handle. It should be understood that valve assembly magnets 116 remain stationary with respect to handle magnets 124 when handle 122 moves among its various positions. The valve assembly magnets 116 and handle magnets 124 are located so that the valve assembly magnets 116 align with corresponding handle magnets 124 when the handle 122 is in the neutral off position. The valve assembly magnets 116 and handle magnets 124 are also oriented so that the poles of the valve assembly magnets and the poles of handle magnets that are adjacent to and face each other when handle 122 is at the neutral off position are opposite poles. That is, north poles of valve assembly magnets 116 are adjacent south poles of handle magnets 124 when handle 122 is at the neutral off position, or south poles of valve assembly magnets 116 are adjacent north poles of handle magnets 124 when handle 122 is at the neutral off position. It should be understood that there can be one or

more than one valve assembly magnet 116 and one or more than one handle magnet 124. In an aspect, there is a corresponding handle magnet 124 for each valve assembly magnet 116.

[0024] Torsion spring 120 returns handle 122 from a hot side position 302 (Fig. 3) to a neutral off position 300 when handle 122 is released by a user. That is, when handle 122 is moved by a user to the hot side position 302, torsion spring 120 is biased in torsion. When the user releases handle 122, the spring torsion force of torsion spring 120 moves handle 122 back to the neutral off position 300.

[0025] Valve assembly magnets 116 and handle magnets 124 coact to prevent handle 122 from returning past the neutral off position when handle 122 is returned from the hot side position. As discussed above, when handle 122 is in the neutral off position, valve assembly magnets 116 and handle magnets 124 are aligned with each other. When handle 122 is being returned to the neutral off position and gets close to where the handle magnets 124 align with the valve assembly magnets 116, the valve assembly magnets 116 and the handle magnets 124 will magnetically attract toward each other. When this magnetic attraction occurs, this will hold handle 122 in the neutral off position when handle 122 reaches the neutral off position and prevent handle 122 from moving past the neutral off position toward the cold side position. Faucet 150 having single handle conditioned water dispensing valve and handle assembly 100 having magnetic handle stop 102 addresses the disadvantages of the prior art described in the Background of the present application.

[0026] In a variation with reference to Fig. 4, a faucet 400 for dispensing hot and cold tap water as well as hot and cold conditioned water is shown. Faucet 400 includes a faucet body 402 and a hot and cold tap water dispensing valve and handle assembly 404 for the dispensing of hot and cold tap water having a second valve cartridge 406 disposed in faucet body 402. A handle 408 is affixed to valve cartridge 406 in conventional fashion. Faucet 400 also includes single handle conditioned water dispensing valve and handle assembly 100 with valve cartridge 108 received in faucet body 402.

[0027] When an element or layer is referred to as being "on," "engaged to," "connected to," or "coupled to" another element or layer, it may be directly on, engaged, connected or coupled to the other element or layer, or intervening elements or layers may be present. In contrast, when an element is referred to as being "directly on," "directly engaged to," "directly connected to," or "directly coupled to" another element or layer, there may be no intervening elements or layers present. Other words used to describe the relationship between elements should be interpreted in a like fashion (e.g., "between" versus "directly between," "adjacent" versus "directly adjacent," etc.). As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items.

[0028] Although the terms first, second, third, etc. may be used herein to describe various elements, components, regions, layers and/or sections, these elements, components, regions, layers and/or sections should not be limited by these terms. These terms may be only used to distinguish one element, component, region, layer or section from another region, layer or section. Terms such as "first," "second," and other numerical terms when used herein do not imply a sequence or order unless clearly indicated by the context. Thus, a first element, component, region, layer or section discussed below could be termed a second element, component, region, layer or section without departing from the teachings of the example embodiments.

[0029] Spatially relative terms, such as "inner," "outer," "beneath," "below," "lower," "above," "upper," and the like, may be used herein for ease of description to describe one element or feature's relationship to another element(s) or feature(s) as illustrated in the figures. Spatially relative terms may be intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. For example, if the device in the figures is turned over, elements described as "below" or "beneath" other elements or features would then be oriented "above" the other elements or features. Thus, the example term "below" can encompass both an orientation of above and below. The device may be otherwise oriented (rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein interpreted accordingly.

[0030] The foregoing description of the embodiments has been provided for purposes of illustration and description. It is not intended to be exhaustive or to limit the disclosure. Individual elements or features of a particular embodiment are generally not limited to that particular embodiment, but, where applicable, are interchangeable and can be used in a selected embodiment, even if not specifically shown or described. The same may also be varied in many ways. Such variations are not to be regarded as a departure from the disclosure, and all such modifications are intended to be included within the scope of the disclosure.

10

CLAIMS

What is claimed is:

1. A faucet, comprising:

a faucet body;

5 a single handle conditioned water dispensing valve and handle assembly that includes:

a single handle movable among a hot side position where it opens a hot water valve of a valve cartridge received in the faucet body leaving a cold water valve of the valve cartridge closed, a cold side position where it
10 opens the cold water valve leaving the hot water valve closed and a neutral off position between the hot side position and the cold side position where both the hot and cold water valves are closed;

a spring that forces the handle from the hot side position to the neutral off position; and

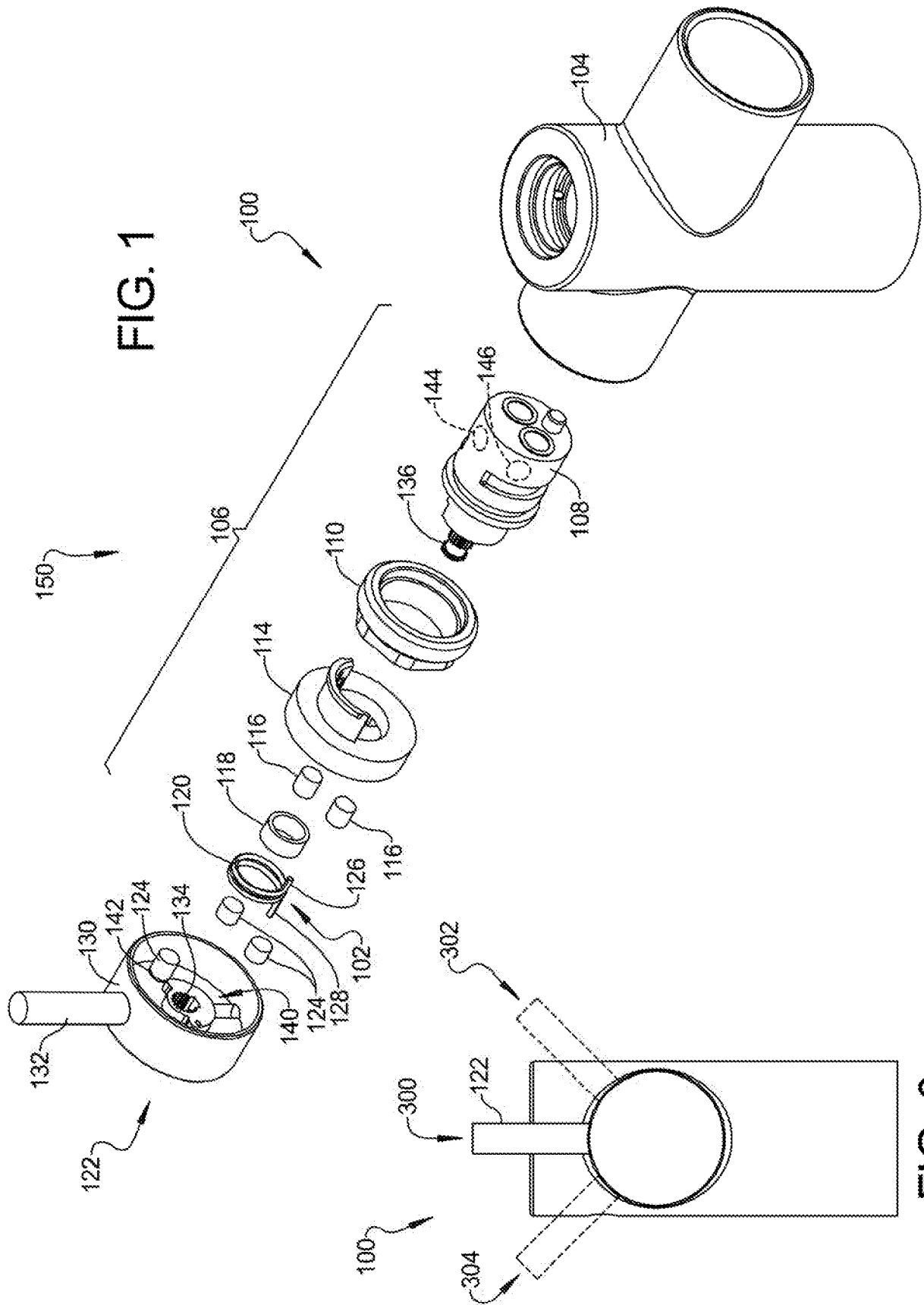
15 at least one magnet disposed in the handle and a corresponding magnet disposed in a valve assembly of the faucet wherein when the handle is at the neutral off position, the magnets in the handle and valve assembly align and attract toward each other providing a stop for the handle when it returns to the neutral off position from the hot side position.

20

2. The faucet of claim 1 wherein a plurality of magnets are disposed in the handle and a plurality of corresponding magnets are disposed in the valve assembly.

25 3. The faucet of claim 2 further including a hot and cold tap water dispensing valve and handle assembly having a second valve cartridge received in the valve body and a second handle affixed to the second valve cartridge.

30 4. The faucet of claim 1 further including a hot and cold tap water dispensing valve and handle assembly having a second valve cartridge received in the valve body and a second handle affixed to the second valve cartridge.



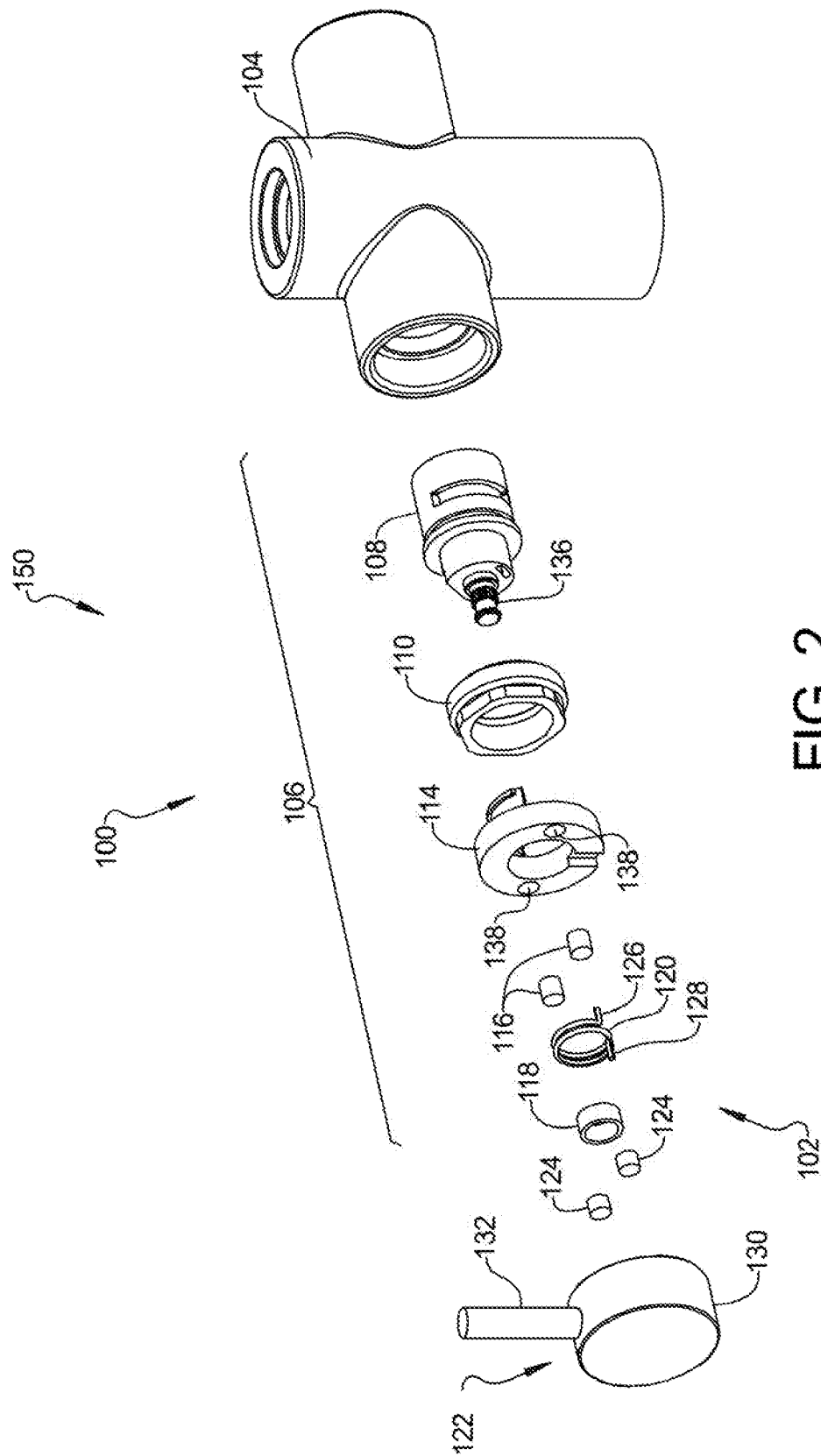


FIG. 2

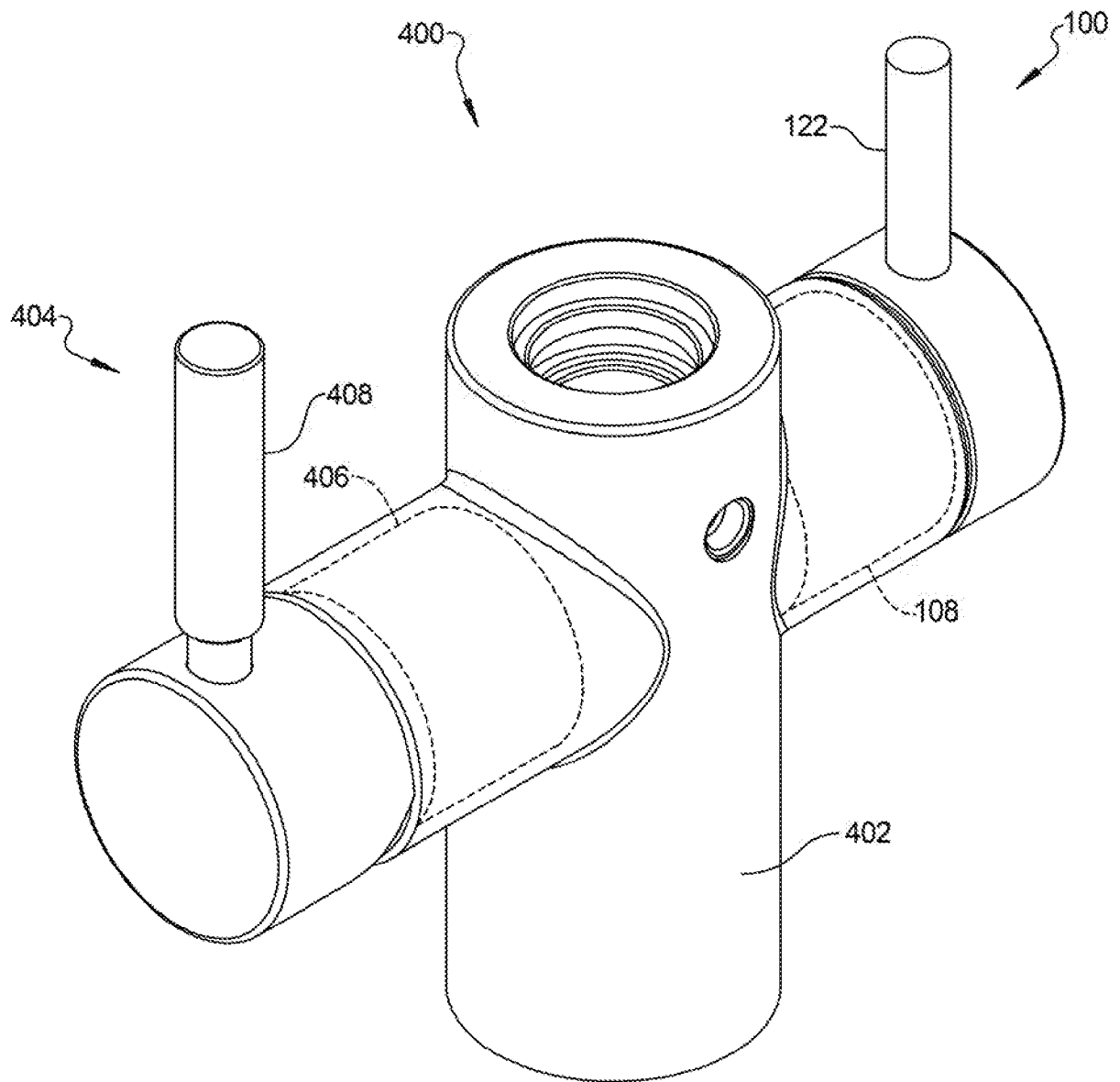


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2018/026094

A. CLASSIFICATION OF SUBJECT MATTER
INV. E03C1/04
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)
E03C F16K

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	EP 2 664 831 A1 (EMERSON ELECTRIC CO [US]) 20 November 2013 (2013-11-20) paragraphs [0002] - [0009], [0054] - [0058], [0066], [0068], [0081], [0082]; figures 1, 2, 10, 15, 28, 29 -----	1-4
Y	WO 2013/093521 A1 (KOHLER MIRA LTD [GB]) 27 June 2013 (2013-06-27) pages 1-7; figures 3, 4 -----	1-4
A	US 2011/000564 A1 (CORBIN JEAN-YVES [FR] ET AL) 6 January 2011 (2011-01-06) paragraphs [0002] - [0018], [0047] - [0050], [0082] - [0087]; figures 1A-1C ----- -/--	1-4



Further documents are listed in the continuation of Box C.



See patent family annex.

* 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

9 July 2018

Date of mailing of the international search report

17/07/2018

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Posavec, Daniel

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2018/026094

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2016/072949 A1 (ECZACIBASI YAPI GEREÇLERİ SANAYİ VE TİCARET ANONİM ŞİRKETİ [TR]) 12 May 2016 (2016-05-12) pages 1-6; figures 6-9 -----	1-4
A	US 9 481 985 B1 (CHEN JUI-CHIEN [TW]; CHEN JUI-CHING [TW]) 1 November 2016 (2016-11-01) columns 1-2; figure 2 -----	1-4
Y	EP 2 990 703 A1 (GREG ROWE LTD [GB]) 2 March 2016 (2016-03-02) paragraphs [0002] - [0017]; figure 1 -----	3,4
A	US 2006/086394 A1 (MOLINA CHARLES [US] ET AL) 27 April 2006 (2006-04-27) paragraphs [0001] - [0008]; figures 1-3 -----	1-4
A	DE 34 44 123 A1 (GROHE ARMATUREN FRIEDRICH [DE]) 5 June 1986 (1986-06-05) pages 3-6; figures 1, 2 -----	1-4

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2018/026094

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2664831	A1	20-11-2013	AU 2009322852 A1 30-06-2011
			CN 102272500 A 07-12-2011
			EP 2352940 A1 10-08-2011
			EP 2664831 A1 20-11-2013
			ES 2434740 T3 17-12-2013
			ES 2627884 T3 31-07-2017
			JP 5391399 B2 15-01-2014
			JP 2012511125 A 17-05-2012
			US 2010139793 A1 10-06-2010
			US 2012145264 A1 14-06-2012
			WO 2010065193 A1 10-06-2010
WO 2013093521	A1	27-06-2013	CN 104204638 A 10-12-2014
			EP 2795170 A1 29-10-2014
			GB 2511999 A 17-09-2014
			HK 1204671 A1 27-11-2015
			WO 2013093521 A1 27-06-2013
US 2011000564	A1	06-01-2011	CN 101960189 A 26-01-2011
			EP 2235410 A2 06-10-2010
			ES 2399582 T3 02-04-2013
			FR 2926124 A1 10-07-2009
			US 2011000564 A1 06-01-2011
			WO 2009112661 A2 17-09-2009
WO 2016072949	A1	12-05-2016	EP 3215681 A1 13-09-2017
			WO 2016072949 A1 12-05-2016
US 9481985	B1	01-11-2016	NONE
EP 2990703	A1	02-03-2016	CN 105387243 A 09-03-2016
			EP 2990703 A1 02-03-2016
			GB 2531141 A 13-04-2016
			US 2016061338 A1 03-03-2016
US 2006086394	A1	27-04-2006	NONE
DE 3444123	A1	05-06-1986	NONE