



(51) International Patent Classification:

D06F 39/02 (2006.01) A47L 15/44 (2006.01)

(21) International Application Number:

PCT/EP2020/058326

(22) International Filing Date:

25 March 2020 (25.03.2020)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2019/07739 22 May 2019 (22.05.2019) TR

(71) Applicant: **ARCELIK ANONIM SIRKETI** [TR/TR];
Sutluce Karaagac Caddesi No: 2/6 Beyoglu, 34445 ISTAN-
BUL (TR).

(72) Inventors: **CAO, Jack**; Sutluce Karaagac Caddesi No: 2/6
Beyoglu, 34445 ISTANBUL (TR). **ZHANG, Quin**; Sut-
luce Karaagac Caddesi No: 2/6 Beyoglu, 34445 ISTAN-
BUL (TR). **LIU, Hongming**; Sutluce Karaagac Caddesi
No: 2/6 Beyoglu, 34445 ISTANBUL (TR). **YU, Sam**; Sut-
luce Karaagac Caddesi No: 2/6 Beyoglu, 34445 ISTAN-
BUL (TR). **REN, Jing**; Sutluce Karaagac Caddesi No: 2/6
Beyoglu, 34445 ISTANBUL (TR).

(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, ST, SV, SY, TH, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

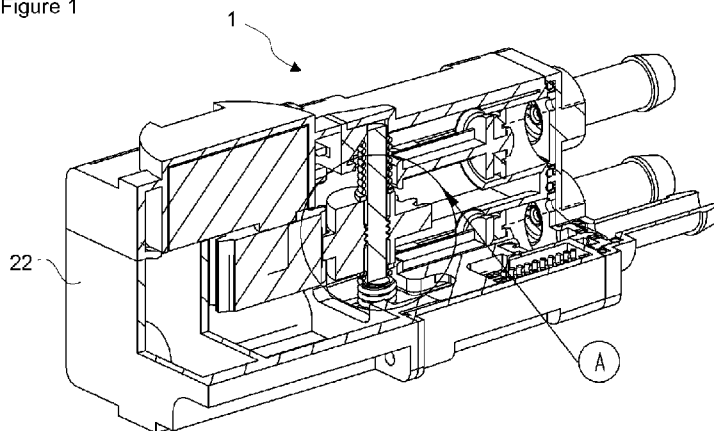
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU,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

(54) Title: AN AUTOMATIC DOSING UNIT WHICH DOSES THE CLEANING AGENT IN HOUSEHOLD APPLIANCES

Figure 1



(57) Abstract: The present invention relates to an automatic dosing unit (1) which is suitable for use in dishwashers or washing machines, comprising a casing (22); a motor (2) which is arranged in the casing (22); a piston (3) which is moved by the motor (2); a dosing receptacle (4) having an inlet (3) and an outlet (6); and a control unit (7) which drives the motor (2) so as to enable the cleaning agents in the dosing receptacle (4) to be dosed by means of the movement of the piston (3).



Description**AN AUTOMATIC DOSING UNIT WHICH DOSES THE CLEANING AGENT IN
HOUSEHOLD APPLIANCES**

- [0001] The present invention relates to a dosing unit which enables liquid cleaning agents to be dosed.
- [0002] Automatic dosing units wherein liquid cleaning agents are stored in a large receptacle and delivered into the washing volume in doses required for each washing cycle are known in the art. Some of the problems encountered in such units are that the cleaning agents which dry up in the unit prevent the operation of the unit afterwards and costs are increased due to the need for using separate pumping assemblies for different cleaning agents. Furthermore, the dosing units are prone to failures as a result of their complex structures and thus, their lifetimes are short.
- [0003] In the state of the art European Patent Application No. EP2829649, an automatic dosing unit is disclosed, comprising a piston and a dosing receptacle.
- [0004] In the state of the art Korean Patent Application No. KR20120004208, an automatic dosing unit is disclosed, wherein the head and the connecting rod of the piston are enabled to move independently.
- [0005] In the state of the art Korean Patent Application No. KR20100081256, an automatic dosing unit is disclosed, comprising a piston and a dosing receptacle.
- [0006] The aim of the present invention is the realization of an automatic dosing unit which is low-cost and which operates more efficiently.
- [0007] The dosing unit realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises a cam arranged on a gear which is rotated by a motor and which enables a piston changing the volume of the dosing receptacle wherein the cleaning agents are dosed to be pushed, and a prestress means which enables the piston to be moved back to its original position. Due to the fact the parts constituting the unit are not connected to each other, the motor can perform its initial movement freely and thus, the problems of malfunctioning/locking in case of the presence of dried cleaning agents are

eliminated.

- [0008] In an embodiment of the present invention, a cam is provided on both surfaces of the gear, and two pistons triggered by the cams and two dosing receptacles are used. The cams move the pistons with each rotation of the gear and the cleaning agents in the two dosing receptacles are enabled to be dosed. By means of this embodiment, two different cleaning agents can be dosed by means of a single mechanism.
- [0009] In another embodiment of the present invention, the dosing is performed by rotating the motor in opposite directions for each dosing receptacle. Thus, different cleaning agents can be dosed at different times during the washing process.
- [0010] In another embodiment of the present invention, the gear moves around the rotation axis by being rotated by the motor and thus, the cams contact and push the pistons. In different versions of this embodiment, the cams are circular or elliptical, and the movable structure of the gear provides flexibility in determining the position of the cam. The gear pushes the pistons by moving around the rotation axis and thus, the cam which is not intended to push is prevented from contacting the piston.
- [0011] In another embodiment of the present invention, the cams are arranged on the gear symmetrically and each piston is pushed separately. By positioning the cams symmetrically so as to look like as halves, the need for moving the gear around the rotation axis is eliminated and when the gear rotates in one direction one of the cams pushes the corresponding piston and with the rotation in the opposite direction, the other cam pushes the other piston. Thus, different cleaning agents can be dosed at different times during the washing process. In another version of this embodiment, the cam has a parabolic form and the piston which is pushed as the gear rotates is moved at a constant speed.
- [0012] In another embodiment of the present invention, the longer part of the cam extends up to the periphery of the gear. Thus, the distance to which the pistons are pushed is increased. Depending on the shapes of the dosing receptacle and the cam, the cleaning agent to be dosed and the dosing rate can be controlled as needed.

- [0013] In another embodiment of the present invention, the automatic dosing unit comprises a side arm which is connected to the piston and which has a part extending parallel to the piston, and the prestress means is connected to the side arm at one end. The prestress means is compressed or stretched when the piston is pushed into the dosing receptacle and as the gear rotates and interrupts the contact between the piston and the cam, the prestress means pushes or pulls the piston back to its original position.
- [0014] In another embodiment of the present invention, one-way valves are used at the inlet and outlet of the dosing receptacle. Thus, the cleaning agents are enabled to flow only in one direction.
- [0015] By means of the automatic dosing unit of the present invention, the detergent and the softener can be dosed effectively by a simple mechanism.
- [0016] The automatic dosing unit realized in order to attain the aim of the present invention is illustrated in the attached figures, where:
- [0017] Figure 1 - is the perspective view of the cross-section of an automatic dosing unit.
- [0018] Figure 2 – is the enlarged view of the detail A in Fig. 1.
- [0019] Figure 3 – is the exploded view of the automatic dosing unit in an embodiment of the present invention.
- [0020] Figure 4 – is the top view of the automatic dosing unit in an embodiment of the present invention.
- [0021] Figure 5 – is the side view of the automatic dosing unit in an embodiment of the present invention.
- [0022] Figure 6 – is the top view of the automatic dosing unit in another embodiment of the present invention.
- [0023] Figure 7 – is the enlarged view of the detail B of Fig. 6;
- [0024] The elements illustrated in the figures are numbered as follows:
- [0025] 1. Automatic dosing unit
- [0026] 2. Motor
- [0027] 3. Piston
- [0028] 4. Dosing receptacle
- [0029] 5. Inlet

[0030] 6. Outlet

[0031] 7. Control unit

[0032] 8. Gear

[0033] 9. Cam

[0034] 10. Prestress means

[0035] 11. Pin

[0036] 12. Spring

[0037] 13. Side arm

[0038] 14. Valve

[0039] 15. Lower body

[0040] 16. Upper body

[0041] 17. Lid

[0042] 18. Middle body

[0043] 19. Piston head

[0044] 20. Gaskets

[0045] 21. Front body

[0046] 22. Casing

[0047] The automatic dosing unit (1) is suitable for use in dishwashers or washing machines and comprises a casing (22); a motor (2) which is arranged in the casing (22); a piston (3) which is moved by the motor (2); a dosing receptacle (4) having an inlet (3) and an outlet (6); and a control unit (7) which drives the motor (2) so as to enable the cleaning agents in the dosing receptacle (4) to be dosed by means of the movement of the piston (3). The automatic dosing unit (1) can be used in dishwashers or washing machines and enables the liquid cleaning agents to be dosed in desired amounts. By changing the volume of the dosing receptacle (4) which is connected to the reservoir wherein the cleaning agents are stored by means of the piston (3), in other words, by moving the piston (3) in the dosing receptacle (4) back and forth, the cleaning agent flows from the reservoir into the dosing receptacle (4), and thus, the cleaning agents which fill the dosing receptacle (4) are dosed to be used in the washing process. The pressure in the dosing receptacle (4) decreases as the piston (3) is driven by the motor (2) so as to increase the volume of the

dosing receptacle (4), and the cleaning agent is sucked from the reservoir into the dosing receptacle (4) as a result of the vacuum created. As the volume of the dosing receptacle (4) decreases, the cleaning agent in the dosing receptacle (4) is transferred to the washing cycle through the outlet (6).

[0048] The automatic dosing unit (1) of the present invention comprises a gear (8) which is arranged in the casing (22) and which is driven by the motor (2); a cam (9) which is arranged on the gear (8) and which enables the piston (3) to be pushed into the dosing receptacle (4); and a prestress means (10) which pulls the piston (3) back. The motor (2) enables the gear (8) to be rotated by engaging with the gear (8). When the cam (9) on the gear (8) is in its original position, the piston (3) is in the rear position, in other words, the volume of the dosing receptacle (4) is at maximum. With the rotation of the gear (8), the cam (9) also rotates and pushes the piston (3), thus decreasing the volume of the dosing receptacle (4), and with the rotation of the motor (2) in the opposite direction, the contact between the piston (3) and the cam (9) is interrupted and the prestress means (10) pulls the piston (3) back so as to create vacuum. Thus, the piston (3) is allowed to move only linearly and the need for moving parts is eliminated and the lifetime of the automatic dosing unit (1) is increased.

[0049] In an embodiment of the present invention, the automatic dosing unit (1) comprises a cam (9) arranged on each of the two surfaces of the gear (8); two dosing receptacles (4) for two different cleaning agents; and two pistons (3) which are pushed by the cams (9). By means of the cams (9) arranged on both surfaces of the gear (8), the two dosing receptacles (4) filled with two different cleaning agents can be used by means of a single motor (2) and a single gear (8). The dosing receptacles (4) are arranged preferably one above the other, and the pistons (3) are positioned such that the free ends thereof align with the cams (9). With the rotation of the gear (8), the cams (9) push the pistons (3) simultaneously and for example, two different detergents which are used for different types of dirt can be dosed simultaneously or as will be explained hereinafter, the cleaning agents are enabled to be dosed by creating vacuum in the dosing

receptacles (4) at different times.

- [0050] In another embodiment of the present invention, the control unit (7) drives the motor (2) in different directions for different dosing receptacles (4). When the motor (2) rotates in a direction, the piston (3) corresponding to a dosing receptacle (4) is pushed and with the rotation in the opposite direction, the other piston (3) is pushed. Thus, the dosing receptacles (4) containing different cleaning agents can be dosed at different times during the washing process.
- [0051] In another embodiment of the present invention, the gear (8) moves around its own axis during the rotation of the motor (2). The gear (8) is positioned on a pin (11) and moves on the pin (11) as the motor (2) rotates. By means of the gear (8) moving on the pin (11), the gear (8) can be rotated the desired number of times. Springs (12) which are positioned on the pin (11) can be used in order to guide the movement of the gear (8) on the pin (11). In a version of this embodiment, the cam (9) is circular or elliptical. By means of movable structure of the gear (8), since the gear (8) moves away from a piston (8) upon moving towards the other piston (8), the cams (9) on each surface of the gear (8) can be formed so as to be circular or elliptical, and when a piston (3) is pushed, the cam (9) which is not being used is prevented from contacting the other piston (3).
- [0052] In another embodiment of the present invention, the cams (9) are in the form of a parabolic half egg and are positioned symmetrically around a line which overlaps with the diameter line which crosses through the center of the gear (8). By positioning the cams (9) on the gear (8) symmetrically, the two dosing receptacles (4) can be dosed at different times without the need for moving the gear (8). When the gear (8) rotates in a direction only one cam (9) contacts and pushes the piston (3) and the other piston (3) is kept at its initial position. When the gear (8) rotates in the opposite direction the other cam (9) contacts and pushes the other piston (3) and provides dosing. Thus, the detergent and the softener can be dosed in the dosing receptacles (4) successively and moreover, by positioning the pistons (3) closer to each other, a smaller dosing unit (1) can be produced. The cams (9) are in the form of a parabolic half egg and positioned on

each surface of the gear (8) as mirror images of each other.

- [0053] In another embodiment of the present invention, the control unit (7) drives the motor (2) such that the gear (8) makes approximately a half turn. The gear (8) moves one of the pistons (3) by making a half turn in one direction and moves the other piston (3) by making a half turn in the opposite direction. The cam (9) has a parabolic shape, enabling the piston (3) to be moved with linear speed during the half turn of the gear (8) and the dosing to be carried in a controlled manner.
- [0054] In another embodiment of the present invention, the cam (9) extends up to the periphery of the gear (8). Thus, the range of motion of the piston (3) is maximized and all of the cleaning agents in the dosing receptacle (4) are enabled to be dosed and the formation of residues in the dosing receptacle (4) is prevented. In other versions of the present invention, after the cleaning agent is dosed, flushing may be performed by delivering water into the dosing receptacle (4) after the cleaning agent is dosed.
- [0055] In another embodiment of the present invention, the piston (3) has a side arm (13) with a part parallel to the piston (3), to which the prestress means (10) is connected. Since a part of the side arm (13) is parallel to the piston (3) and the prestress means (10) is connected to the part of the side arm (13) parallel to the piston (3), the force applied by the prestress means (10) to the piston (3) is in the same direction as the movement of the piston (3). Thus, the piston (3) is enabled to move smoothly independent of the lateral stress.
- [0056] In another embodiment of the present invention, the automatic dosing unit (1) comprises one-way valves (14) arranged at the inlet (5) and outlet (6) of the dosing receptacle (4). By using one-way valves (14) at the inlet (5) and outlet (6) of the dosing receptacle (4), the cleaning agents are prevented from being transferred back into the reservoir wherein the cleaning agents are stored and the cleaning agents or water is not sucked from the washing volume when the vacuum is in effect.
- [0057] In other embodiments of the present invention, the automatic dosing unit (1) is used in a dishwasher or a washing machine. The automatic dosing unit (1) comprises a lower and an upper body (15, 16) which are the lower

parts of the casing (22) and wherein the motor (2) is disposed, and a cover (17) which is provided on the motor (2) for protection. The dosing receptacles (4) are formed in a middle body (18) and the inlet (5) and the outlet (6) are arranged on a front body (21). A piston head (19) is provided at the end portion of each piston (3) so as to surround the side walls of the dosing receptacle (4). Gaskets (20) are used in order to prevent the detergent from leaking into other parts of the unit (1).

[0058] The automatic dosing unit (1) of the present invention provides a controlled dosing, and by means of the cam (9) and the gear (8), the piston (3) is enabled to move only linearly and thus, its lifetime is prolonged. Moreover, by performing the pushing and pulling functions by means of separate parts, the dosing unit (1) is prevented from getting stuck due to dried detergents in case of infrequent use.

Claims

1. An automatic dosing unit (1) that is suitable for use in dishwashers or washing machines, **comprising** a casing (22); a motor (2) which is arranged in the casing (22); a piston (3) which is moved by the motor (2); a dosing receptacle (4) having an inlet (3) and an outlet (6); and a control unit (7) which drives the motor (2) so as to enable the cleaning agents in the dosing receptacle (4) to be dosed by means of the movement of the piston (3), **characterized by** a gear (8) which is arranged in the casing (22) and which is driven by the motor (2); a cam (9) which is arranged on the gear (8) and which enables the piston (3) to be pushed into the dosing receptacle (4); and a prestress means (10) which pulls the piston (3) back.
2. An automatic dosing unit (1) as in Claim 1, **characterized by** a cam (9) arranged on each of the two surfaces of the gear (8); two dosing receptacles (4) for two different cleaning agents; and two pistons (3) which are pushed by the cams (9).
3. An automatic dosing unit (1) as in Claim 2, **characterized by** the control unit (7) which drives the motor (2) in different directions in order to perform dosing in different dosing receptacles (4).
4. An automatic dosing unit (1) as in Claim 3, **characterized by** the gear (8) moving around its own axis during the rotation of the motor (2).
5. An automatic dosing unit (1) as in Claim 4, **characterized by** the cam (9) which is circular.
6. An automatic dosing unit (1) as in Claim 4, **characterized by** the cam (9) which is elliptical.
7. An automatic dosing unit (1) as in Claim 3, **characterized by** the cams (9) which are in the form of a parabolic ovoid and which are positioned symmetrically around a line which overlaps with the diameter line which crosses through the center of the gear (8).
8. An automatic dosing unit (1) as in Claim 7, **characterized by** the control unit (7) which drives the motor (2) such that the gear (8) makes approximately a half turn.
9. An automatic dosing unit (1) as in any one of the above claims, **characterized by** the cam (9) which extends up to the periphery of the gear (8).

10. An automatic dosing unit (1) as in any of the above claims, **characterized by** the piston (3) which has a side arm (13) parallel to the piston (3), to which one end of the prestress means (10) is connected.
11. An automatic dosing unit (1) as in any one of the above claims, **characterized by** one-way valves (14) arranged at the inlet (5) and outlet (6) of the dosing receptacle (4).
12. A dishwasher (1) comprising an automatic dosing unit (1) as in any one of the above claims.
13. A washing machine comprising an automatic dosing unit (1) as in any one of the Claims 1 to 11.

Figure 1

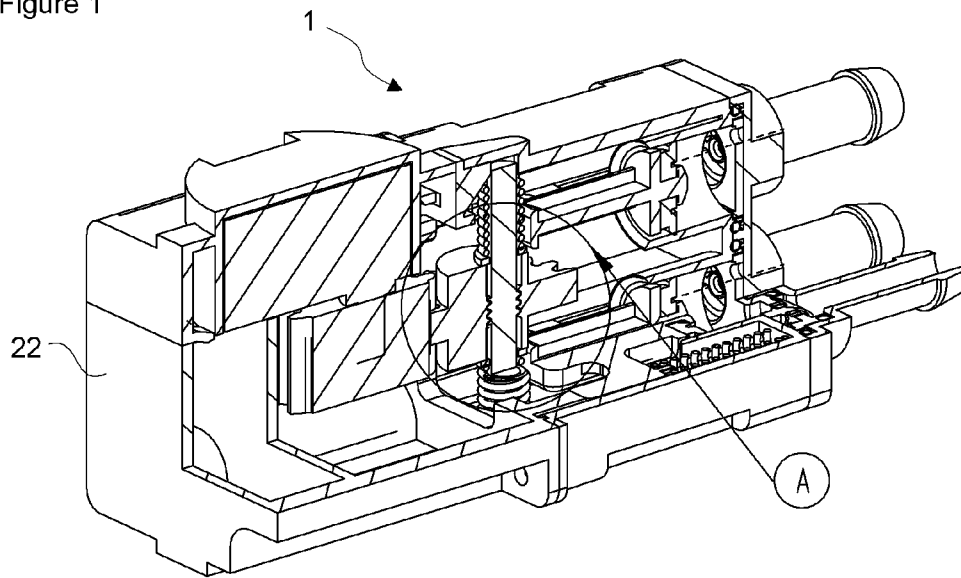


Figure 2

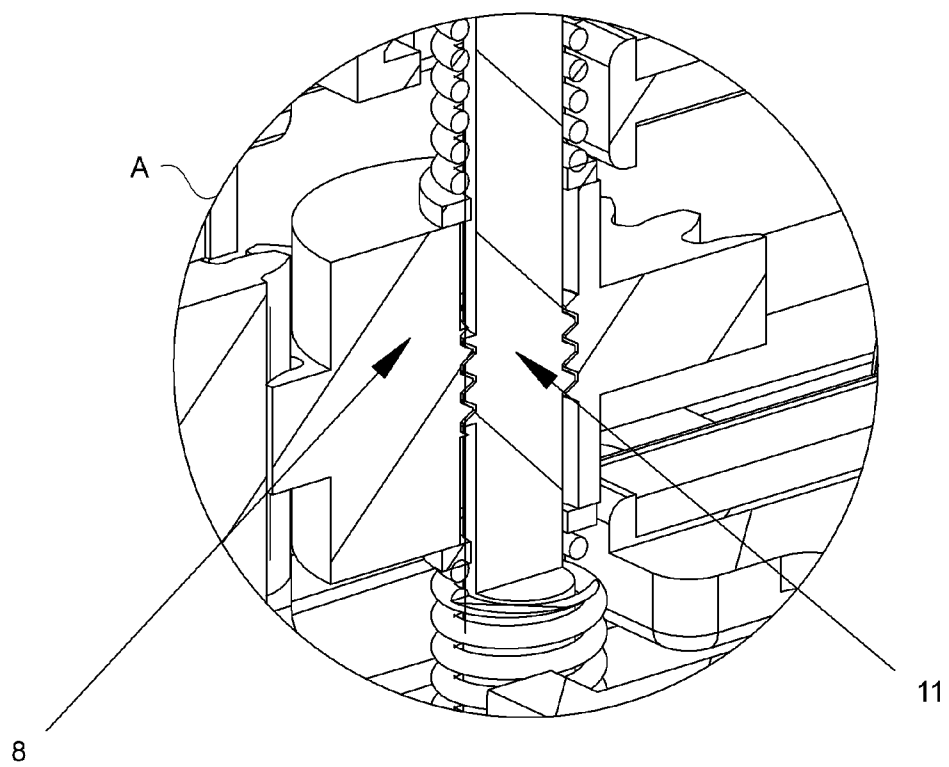


Figure 3

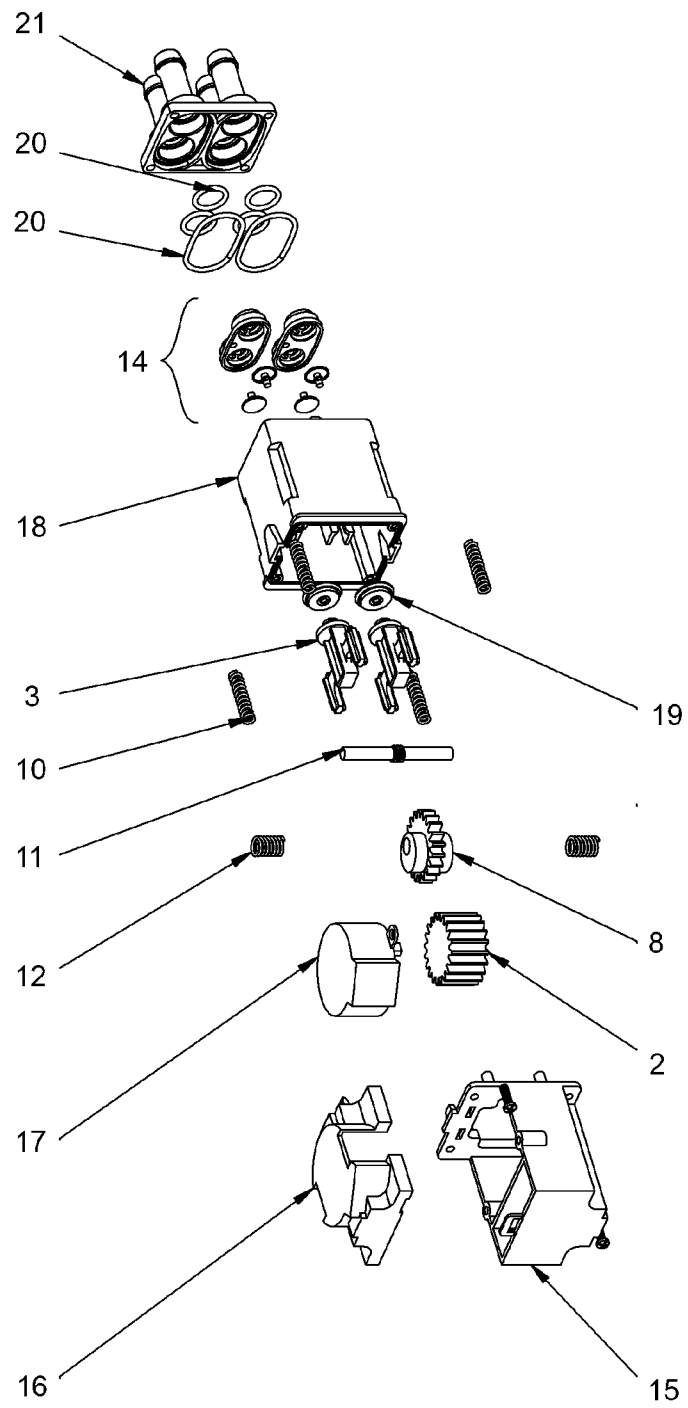


Figure 4

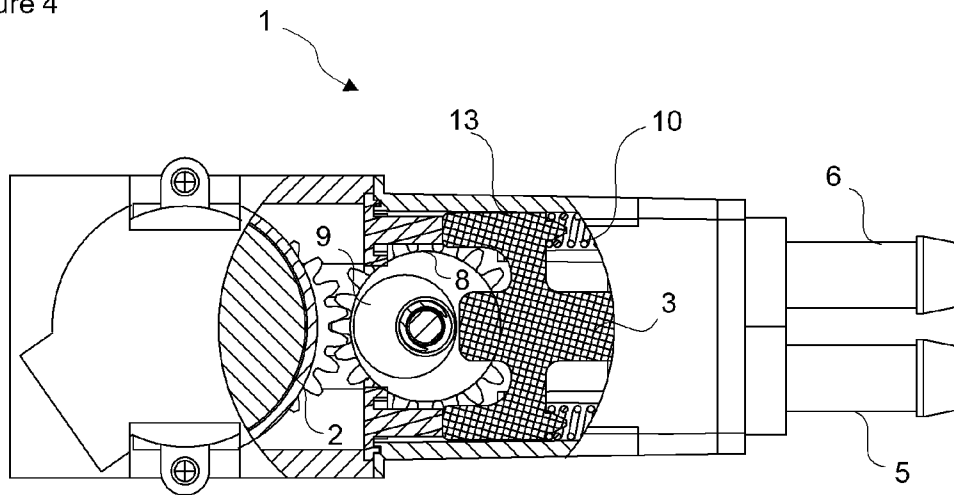


Figure 5

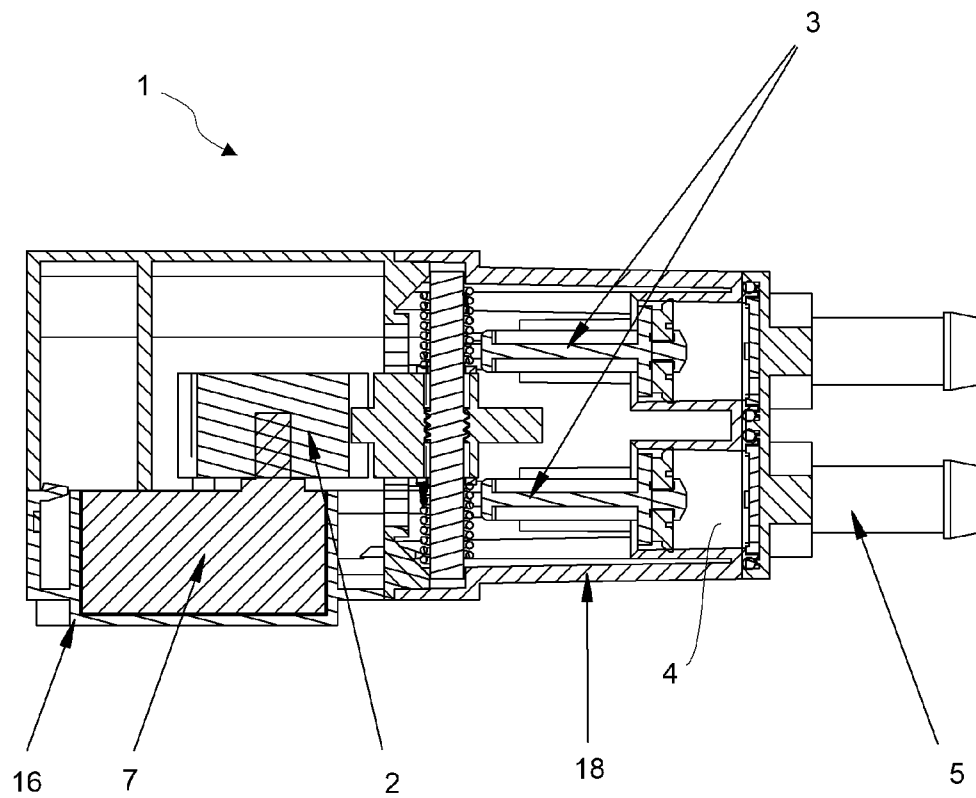


Figure 6

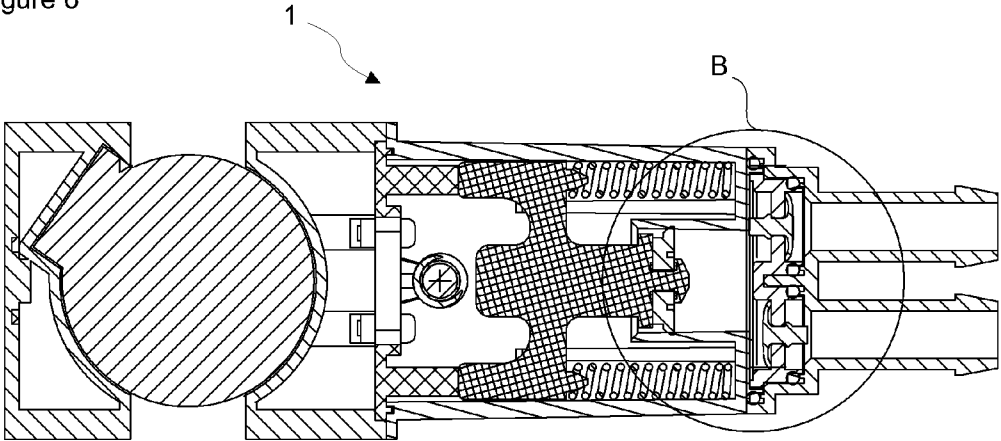
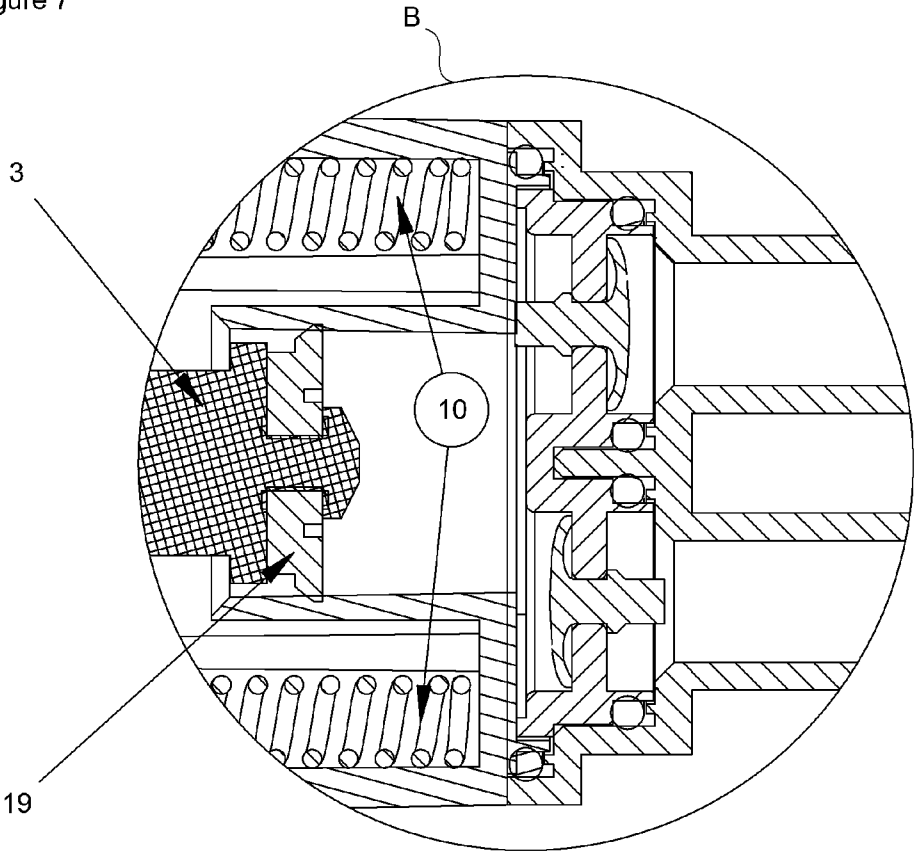


Figure 7



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2020/058326

A. CLASSIFICATION OF SUBJECT MATTER
INV. D06F39/02 A47L15/44
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)
D06F A47L

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.
X	WO 2015/142058 A1 (SAMSUNG ELECTRONICS CO LTD [KR]) 24 September 2015 (2015-09-24)	1,2, 11-13
Y	page 13, line 22 - page 14, line 28; figures 1,17-24	1,9, 11-13
Y	----- US 5 938 416 A (SAITO KATSUHIKO [JP] ET AL) 17 August 1999 (1999-08-17) column 1, line 24 - line 46; figure 5	1,9, 11-13
Y	----- JP 2005 144710 A (RICOH KK) 9 June 2005 (2005-06-09) figure 5	9
A	----- EP 2 772 179 A1 (EMAINOX S P A [IT]) 3 September 2014 (2014-09-03) paragraph [0002]; figures 1,3a,3b	1,4-6, 12,13
	----- -/-	



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

6 May 2020

Date of mailing of the international search report

18/05/2020

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

Kising, Axel

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2020/058326

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 3 135 180 A1 (ARÇELİK ANONİM ŞİRKETİ [TR]) 1 March 2017 (2017-03-01) figures 4,5 -----	1,9,12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2020/058326

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2015142058	A1	24-09-2015	NONE

US 5938416	A	17-08-1999	DE 69823719 T2 07-10-2004
			EP 0863311 A2 09-09-1998
			JP 3180706 B2 25-06-2001
			JP H10252643 A 22-09-1998
			US 5938416 A 17-08-1999

JP 2005144710	A	09-06-2005	JP 4347665 B2 21-10-2009
			JP 2005144710 A 09-06-2005

EP 2772179	A1	03-09-2014	NONE

EP 3135180	A1	01-03-2017	EP 3135180 A1 01-03-2017
			US 2017055803 A1 02-03-2017
