(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 February 2024 (22.02.2024)

WIPO | PCT

(10) International Publication Number
WO 2024/039341 A1

(51) International Patent Classification:
A47L 15/42 (2006.01)

(21) International Application Number:
PCT/TR2023/050806

(22) International Filing Date:
14 August 2023 (14.08.2023)

(25) Filing Language: Turkish

(26) Publication Language: English

(30) Priority Data:
2022/012857 15 August 2022 (15.08.2022) TR

(71) Applicant: **VESTEL BEYAZ ESYA SANAYI VE TICARET ANONIM SIRKETI** [TR/TR]; Organize Sanayi Bolgesi, 45030 Yunusemre/Manisa (TR).

(72) Inventors: **KALAYCI, Ismail Furkan**; Organize Sanayi Bolgesi, 45030 Yunusemre/Manisa (TR). **ELDEM, Mehmet**; Organize Sanayi Bolgesi, 45030 Yunusemre/Manisa (TR).

(74) Agent: **CAYLI, Hulya**; Paragon Consultancy Incorporated, Koza Sokak 63/2, GOP, 06540 Ankara (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, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, 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, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, 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, ME, 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))*
— *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))*

(54) Title: A WASHING DEVICE

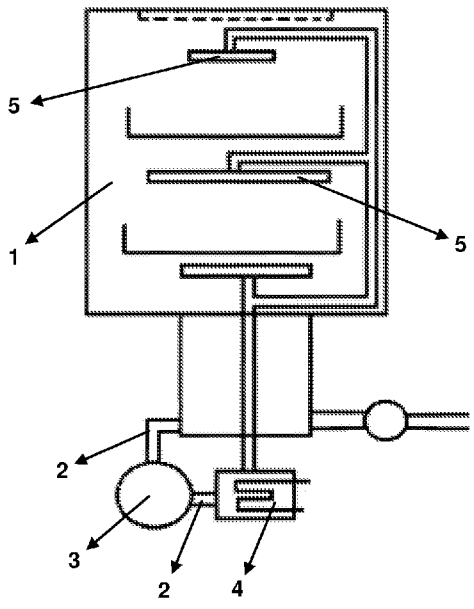

Figure – 1

(57) Abstract: The present invention discloses a washing device comprising at least one body; at least one inner compartment (1) in the body, which is suitable for placing the items to be washed; at least one door for accessing into the inner compartment (1); at least one circulation line (2) connected with the inner compartment (1) for circulating at least one washing liquid in the inner compartment (1); at least one circulation pump (3) provided in the circulation line (2) for moving the washing liquid in the circulation line (2). Here, the circulation line (2) comprises at least one metal pipe (2a), and the circulation pump (3) comprises at least one stator (3a); at least one rotor (3b) rotating with respect to the stator (3a); at least one impeller (3c) on at least one side of the rotor (3b), which is rotated by the rotor (3b) to move the washing liquid in the circulation line (2); at least one magnetic element (3d) located to face the metal pipe (2a) on at least another side of the rotor (3b) and which, when rotated by the rotor (3b), allows the metal pipe (2a) to be heated.

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A WASHING DEVICE

Technical Field

The present invention relates to a washing device for heating a washing liquid circulated therein.

Background of the Invention

A washing device such as a washing machine or a dishwasher generally comprises at least one body; at least one inner compartment in the body suitable for placing the items to be washed; and at least one door for accessing into the inner compartment. Users move the door to an open position to place the items to be washed in the inner compartment. Afterwards, using a washing liquid such as detergent water, the items placed in the inner compartment are washed and cleaned.

Water received from a water main is generally used for a washing process in washing devices. The mains water has a relatively low temperature, causing problems such as insufficient cleaning of the dirt in the washed items if the mains water is used directly in the washing process. For this reason, at least one heating system is used in washing devices to heat the washing liquid.

Heating systems in washing devices use at least one heating element for heating the washing liquid and at least one temperature sensor for sensing a temperature of the heated washing liquid. Here, the temperature sensor detects that the washing liquid has reached a desired temperature, so that operation of the heating element is stopped. Thus, the washing liquid is prevented from overheating and damaging the items being washed. Heating elements used in heating systems are generally resistance type heaters. Thus, the washing liquid is heated quickly, such that the cleaning process is carried out quickly. However, since the resistance type heating devices draw a high amount of electric current, the washing device consumes a high amount of energy for heating the washing liquid.

Brief Description of the Invention

The present invention discloses a washing device comprising at least one body; at least one inner compartment in the body, which is suitable for placing the items to be washed; at least one door for accessing into the inner compartment; at least one circulation line connected with the inner compartment for circulating at least one washing liquid in the inner compartment; at least one circulation pump provided in the circulation line for moving the washing liquid in the circulation line. Here, the circulation line comprises at least one metal pipe, and the circulation pump comprises at least one stator; at least one rotor rotating with respect to the stator; at least one impeller on at least one side of the rotor, which is rotated by the rotor to move the washing liquid in the circulation line; at least one magnetic element located to face the metal pipe on at least another side of the rotor and which, when rotated by the rotor, allows the metal pipe to be heated.

In the washing device according to the present invention, the washing liquid passing through the circulation line is heated by the magnetic element and the metal pipe. The heating process does not require an additional heater while circulating the washing liquid, since the circulation pump, which ensures rotation of the magnetic element, is already running. Thus, the washing device can be efficiently operated.

Object of the Invention

An object of the present invention is to provide a washing device that allows the circulated washing liquid to be heated.

Another object of the present invention is to provide a washing device with high energy efficiency.

A further object of the present invention is to provide a durable and reliable washing device.

Description of the Drawings

Exemplary embodiments of the washing device according to the present invention are illustrated in the attached drawings, in which:

Figure 1 is an exemplary illustration of the washing device according to the invention.

Figure 2 is a side view of a circulation pump used in the washing device according to the invention.

All the parts illustrated in figures are individually assigned a reference numeral and the corresponding terms of these numbers are listed below:

Inner compartment	(1)
Circulation line	(2)
Metal pipe	(2a)
Circulation pump	(3)
Stator	(3a)
Rotor	(3b)
Impeller	(3c)
Magnetic element	(3d)
Heating element	(4)
Spray arm	(5)

Description of the Invention

A washing device such as a washing machine or a dishwasher is used to wash and clean various items, such as textile products and kitchen utensils. Here, in order to carry out the washing process with a desired efficiency, the washing liquid, e.g. a detergent water, must be heated to a desired level in the washing devices. Therefore, the present invention provides a washing device for heating the washing liquid during circulation.

The washing device according to the present invention, which is illustrated in figures 1-2, comprises at least one body; at least one inner compartment (1) in the body, which is suitable for placing the items to be washed; at least one door for accessing into the inner compartment (1); at least one circulation line (2) connected with the inner compartment (1)

for circulating at least one washing liquid in the inner compartment (1); at least one circulation pump (3) provided in the circulation line (2) for moving the washing liquid in the circulation line (2). Here, the circulation line (2) comprises at least one metal pipe (2a), and the circulation pump (3) comprises at least one stator (3a); at least one rotor (3b) rotating with respect to the stator (3a); at least one impeller (3c) on at least one side of the rotor (3b), which is rotated by the rotor (3b) to move the washing liquid in the circulation line (2); at least one magnetic element (3d) located to face the metal pipe (2a) on at least another side of the rotor (3b) and which, when rotated by the rotor (3b), allows the metal pipe (2a) to be heated.

In an exemplary embodiment of the invention, the washing device is a dishwasher and the circulation line (2) is connected with the spray arms (5). Here, the washing liquid obtained from a lower part of the inner compartment (1) via the circulation line (2) is pressed upwards by the circulation pump (3) and sent to the spray arms (5). The washing process is carried out by spraying the washing liquid on the washed items by means of the spray arms (5). Here, during the operation of the circulation pump (3), the washing liquid is moved in the circulation line (2) by the rotation of the impeller (3c) by the rotor (3b). The rotor (3b) provides rotation of at least one magnetic element (3d) in addition to the propeller (3c). Here, during the rotational movement of the magnetic element (3d), the magnetic field generated by the magnetic element (3d) also performs the rotational movement. Such a rotational movement by the magnetic field heats the metal pipe (2a) positioned opposite the magnetic element (3d). Thus, the washing liquid passing through the metal pipe (2a) is also heated. Said circulation pump (3) is operated continuously while the washing process is carried out by the washing device. However, during the circulation of the washing liquid by the circulation pump (3), energy losses occur due to the insufficient operation of the circulation pump (3). In the washing device according to the present invention, this energy loss is converted into heat energy and used for heating the washing liquid passing through the circulation line (2). Thus, the energy efficiency of the washing device is high.

In a preferred embodiment of the invention, said magnetic element (3d) is in the form of a disc. Thus, the rotational movement of the magnetic element (3d) is realized in a more balanced manner. Here, the magnetic element (3d) preferably comprises at least one body in a disc form preferably containing a plastic material (made of a plastic material);

and at least one (preferably more) magnet provided on the body. Thus, the magnetic element (3d) can be produced easily, at a low cost.

In another preferred embodiment of the invention, the metal pipe (2a) is of a twisted structure (such as a piece of spiral). Thus, surface of the metal pipe (2a) exposed to the moveable magnetic field is increased, so that the heating process is carried out more efficiently.

In a further preferred embodiment of the invention, said metal pipe (2a) comprises aluminum (having an aluminum pipe structure). Thus, both the metal pipe (2a) can be produced easily and if the metal pipe (2a) is of a twisted structure, the twist shape is provided in an easy and reliable manner.

The heating process carried out by the magnetic element (3d) and the metal pipe (2a) provides a slow heating of the washing liquid. This causes the warm-up time to prolong, especially when washing at high temperatures is desired, and thus the washing process takes longer. In order to solve this problem, in a different preferred embodiment of the invention, the washing device preferably comprises at least one heating element (4) in the form of resistance. Thanks to the heating element (4) preferably located on the circulation line (2), the first heating process of the washing liquid is carried out quickly. In this embodiment, the heating element (4) stops to operate after the washing liquid obtains a desired temperature level. Here, the heating process carried out by the magnetic element (3d) and the metal pipe (2a) is used to recover the heat lost by the washing liquid, whose temperature level has decreased due to the heat absorbed by the external environment and the items being washed.

Although the heating process carried out by the magnetic element (3d) and the metal pipe (2a) provides a relatively slow heating, a temperature of the washing liquid may rise above the desired washing temperature, especially in the programs requiring a long period of time for the washing process. In such cases, the components of the washing device and/or the items being washed may be damaged. In order to prevent such an undesired situation, in another preferred embodiment of the invention, said washing device comprises at least one movement element for moving the metal pipe (2a) away from the magnetic element (3d) and towards the magnetic element (3d). Here, the washing device

may also comprise at least one temperature sensor for detecting a temperature of the washing liquid in the circulation line (2). In this embodiment, for example, when the temperature of the washing liquid through the circulation line (2) rises above a desired value, the metal pipe (2a) is moved away from the magnetic element (3d) by means of the movement element, in order to prevent further heating of the washing liquid. When the temperature of the washing liquid decreases and it is desired to be heated, the metal pipe (2a) is moved towards the magnetic element (3d). This ensures a reliable heating process. Said movement element may be, for example, a solenoid that provides linear movement, or it may also be a motor that moves the metal pipe (2a) by means of a gear system.

In the washing device according to the present invention, the washing liquid passing through the circulation line (2) is heated by the magnetic element (3d) and the metal pipe (2a). The heating process does not require an additional heater while circulating the washing liquid, since the circulation pump (3d), which ensures rotation of the magnetic element (3d), is already running. Thus, the washing device can be efficiently operated.

CLAIMS

1. A washing device comprising at least one body; at least one inner compartment (1) in the body, which is suitable for placing the items to be washed; at least one door for accessing into the inner compartment (1); at least one circulation line (2) connected with the inner compartment (1) for circulating at least one washing liquid in the inner compartment (1); at least one circulation pump (3) provided in the circulation line (2) for moving the washing liquid in the circulation line (2), **characterized in that**
   - the circulation line (2) comprises at least one metal pipe (2a), and
   - the circulation pump (3) comprises at least one stator (3a); at least one rotor (3b) rotating with respect to the stator (3a); at least one impeller (3c) on at least one side of the rotor (3b), which is rotated by the rotor (3b) to move the washing liquid in the circulation line (2); at least one magnetic element (3d) located to face the metal pipe (2a) on at least another side of the rotor (3b) and which, when rotated by the rotor (3b), allows the metal pipe (2a) to be heated.

2. A washing device according to claim 1, **characterized in that** said magnetic element (3d) is in the form of a disc.

3. A washing device according to claim 1 or 2, **characterized in that** the magnetic element (3d) comprises at least one body in a disc form containing a plastic material; and at least one magnet provided on the body.

4. A washing device according to any of the preceding claims, **characterized in that** the metal pipe (2a) is of a twisted structure.

5. A washing device according to any of the preceding claims, **characterized in that** the metal pipe (2a) comprises aluminum.

6. A washing device according to any of the preceding claims, **characterized in that** the washing device comprises at least one heating element (4).

7. A washing device according to claim 6, **characterized in that** the heating element (4) is in the form of resistance.

8. A washing device according to any of the preceding claims, **characterized in that** the washing device comprises at least one movement element for moving the metal pipe (2a) away from the magnetic element (3d) and towards the magnetic element (3d).

9. A washing device according to any of the preceding claims, **characterized in that** the washing device comprises at least one temperature sensor for detecting a temperature of the washing liquid in the circulation line (2).

10. A washing device according to any of the preceding claims, **characterized in that** the washing device is a dishwasher.

11. A washing device according to claim 10, **characterized in that** the washing device comprises at least one spray arm (5) connected with the circulation line (2).

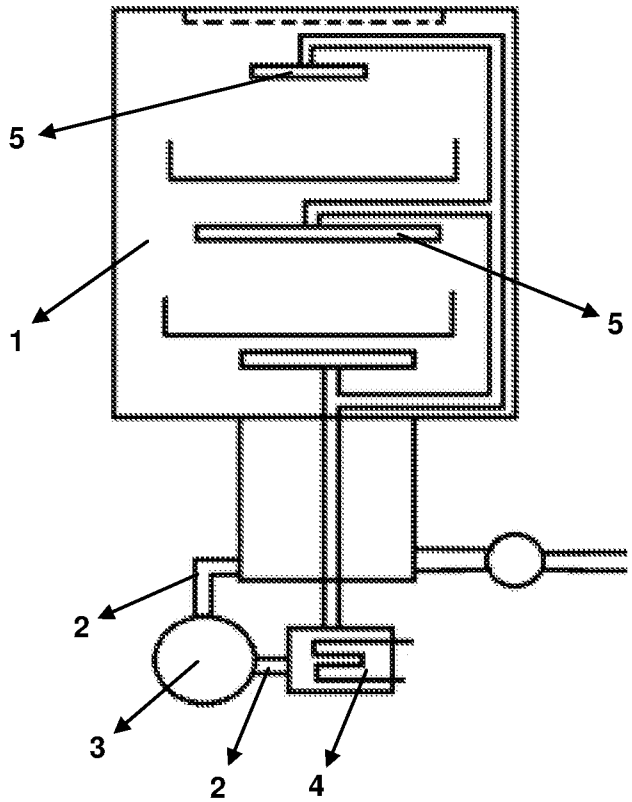

Figure – 1

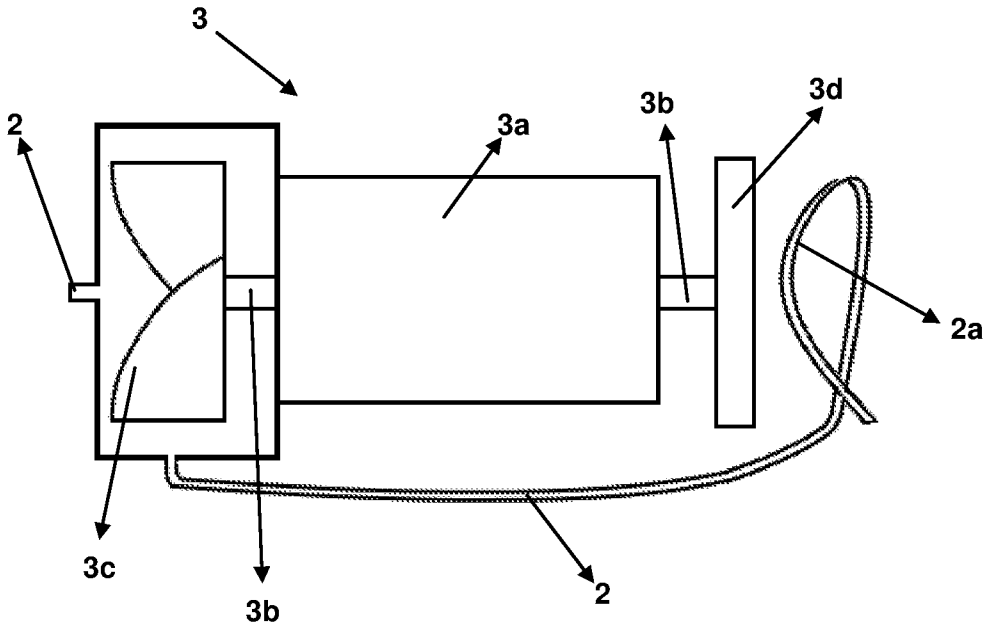

Figure – 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/TR2023/050806

A. CLASSIFICATION OF SUBJECT MATTER

A47L 15/42 (2006.01)i

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)

A47L 15/42

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

TURKPATENT Patent Database

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

EPO Abstract & Fulltext Databases & Keywords: wash, compartment, pump, metal, pipe, stator, rotor, magnet, heat, impel, propel, electro, coil, cycle, circulate, water, disc, disk, conduct, hot

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 208203595 U (SANHUA YAWEIKE ELECTRIC EQUIPMENT WUHU CO LTD) 07 December 2018 (2018-12-07) Abstract; Paragraphs 5, 12, 13, 75, 76, 78, 87, 88	1-11
X	EP 3798353 A1 (WHIRLPOOL CO [US]) 31 March 2021 (2021-03-31) Abstract; Paragraphs 22-24	1-11
X	ES 2635385 T3 (BSH HAUSGERAETE GMBH [DE]) 03 October 2017 (2017-10-03) Abstract; Paragraphs 172-174, 176, 177	1-11
X	CN 204357719 U (CHANGZHOU LEILI ELECTRICAL EQUIPMENT CO LTD) 27 May 2015 (2015-05-27) Abstract; Paragraphs 6,7, 37, 39	1-11
X	CN 110529392 A (SANHUA AWECO ELECTRICAL APPLIANCE EQUIPMENT WUHU CO LTD) 03 December 2019 (2019-12-03) Abstract; Paragraphs 5,86	1-11

☐ 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
"D" document cited by the applicant in the international application
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"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
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"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	Date of mailing of the international search report
18 December 2023	**18 December 2023**

Name and mailing address of the ISA/TR	Authorized officer
Turkish Patent and Trademark Office (Turkpatent) **Hipodrom Caddesi No. 13** **06560 Yenimahalle** **Ankara** **Türkiye** Telephone No. **+903123031000** Facsimile No. **+903123031220**	**Rabia Nurgül ÖZBAYLANLI** Telephone No. **+903123031594**

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/TR2023/050806

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
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		CN 112575499 A	30 March 2021
		US 2021095411 A1	01 April 2021
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		US 11814774 B2	14 November 2023
ES 2635385 T3	03 October 2017	NONE	
CN 204357719 U	27 May 2015	NONE	
CN 110529392 A	03 December 2019	NONE	