



(51) International Patent Classification:

A47J 31/32 (2006.01)

A47J 31/40 (2006.01)

(21) International Application Number:

PCT/NL2020/050170

(22) International Filing Date:

13 March 2020 (13.03.2020)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2022775

20 March 2019 (20.03.2019)

NL

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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, 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: BEVERAGE EXTRACTING DEVICE

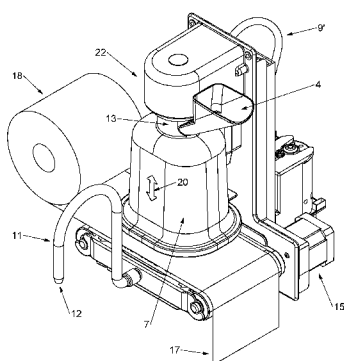


FIG. 3

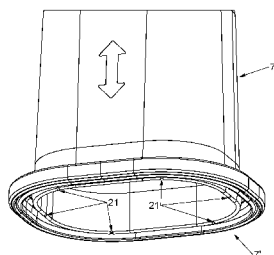


FIG. 5

(57) Abstract: Beverage extracting device (1) at least comprising a vessel (7) for receiving and mixing a powder material and hot liquid, a filter (8) beneath the vessel (7), a gas pump (9) that connects through a duct to the vessel (7) for supplying pressurized gas into the vessel (7), and an outlet (10) for extracted liquid at an outlet side of the filter (8) which is opposite to the vessel (7), wherein the outlet (10) connects to an outlet duct (11) for the extracted liquid, wherein the duct for supplying pressurized gas into the vessel (7) connects to a channel or channels within the vessel (7) having outflow openings (21) at a lower rim (7') of the vessel (7) to release gas into the vessel (7) and stir the mixture inside the vessel (7) from below in an upwards direction.



Beverage extracting device

The invention relates to a beverage extracting device at least comprising a vessel for receiving and mixing a powder material and hot liquid, a filter beneath the vessel, a gas pump that connects through a duct to the vessel for supplying pres-
5 surized gas into the vessel, and an outlet for extracted liquid at an outlet side of the filter which is opposite to the vessel, wherein the outlet connects to an outlet duct for the extracted liquid. The beverage is for instance coffee, but may also be another beverage such as tea.

10 Such a beverage extracting device is known from JP 3 138635 B2 and from EP-A-0 546 498.

JP 3 138635 B2 discloses a floor-standing machine for preparing a hot beverage.

EP-A-0 546 498 discloses a beverage extracting device,
15 which is part of a vending machine and includes a cylinder into which a mixture liquid of hot water and material powder flows through an inlet port. A valve opens and closes the inlet port of the cylinder, and a pressure device supplies pressurized air into the cylinder. A filter block is provided with a filter,
20 which block is biased downward by a return spring. A filter block drive mechanism is operable to move the filter block upward by rotating a vertically rotatable rotary lever upward for closing a lower opening of the cylinder. The mixture liquid in the cylinder is forcedly filtered through the filter by an inner
25 pressure in the cylinder, which is generated by supplying the pressurized air into the cylinder while closing the inlet port of the cylinder by the valve and closing the lower opening of the cylinder by the filter. The design of the known beverage extracting device uses gravity as a driving force assisting the
30 flow of ready liquid which eventually leave the machine, and as a consequence an users cup for receiving the liquid extracted in the machine is to be placed below the filter.

The known beverage extracting device has several disadvantages.

35 One disadvantage of the known beverage extracting device is that the top-down design requires a considerable height of the machine, which is disadvantageous when the available space for the beverage extracting device is limited.

Still another disadvantage of the known beverage extracting device is that the outlet duct for the extracted liquid tends to continue dripping for a while after the extracted liquid is poured into the users cup, unless a suitable valve is applied to perfectly close off this outlet duct.

Yet still another disadvantage of the known beverage extracting devices is that when it is embodied with the valve mentioned in the previous sentence, the heat capacity of the valve causes the liquid extracted by the device to cool down, which is particularly disadvantageous for the admirers of super-hot coffee.

It is an object of the invention to address one or more of the above problems and to realize further advantages as will become apparent hereinafter. In furtherance thereof a beverage extracting device is proposed according to the invention having the features of one or more of the appended claims.

It is noted that the different features of the beverage extracting device as discussed herein can be used independently from each other as well as in combination.

According to a first aspect of the invention the duct for supplying pressurized gas into the vessel connects to a channel or channels within the vessel having outflow openings at a lower rim of the vessel to stir the mixture inside the vessel from below in an upwards direction. With this feature the quality of the extracted liquid is improved due to an intense mixing of the mixture inside the vessel.

In another aspect of the invention at least a portion of the outlet duct is at least in part located above the vessel. This construction avoids the necessity of applying a valve to close off the outlet duct when the extraction is completed, yet ensures that dripping of the outlet duct is prevented. Furthermore, particularly with a first cup of extracted liquid, the temperature of the extracted liquid during pouring is better maintained. Another advantage of this construction is that the outlet opening of the outlet duct can be located above the outlet at the outlet side of the filter, which enhances the versatility of the machine of the invention, in particular by providing multiple location possibilities for the users cup that receives the extracted liquid. The overall height of the beverage extracting device can accordingly be reduced. Without departing from the invention it is however also possible that the outlet

opening of the outlet duct can be located below the outlet at the outlet side of the filter.

Desirably the outlet opening of the outlet duct is oriented downwards and is positioned below the portion of the outlet duct which is located above the vessel. Particularly the portion of the outlet duct that is located above the vessel ensures that dripping of extracted liquid stops immediately when the users cup is filled up with extracted liquid and the machine has stopped to expel further liquid into the users cup.

A particular feature which can be applied independent from any of the other features mentioned herein is that expelling the extracted liquid through the outlet duct requires operation of the gas pump. The gas pump is then instrumental in the operation of the machine, so that by a dedicated manner of operation of the gas pump, the complete operation of the beverage extracting device can be defined. It is remarked that usually the gas pump is used for pumping air, but it is also possible to pump nitrogen which has benefits in terms of securing the quality of the extracted liquid, particularly when it concerns coffee. It is also possible to supply an aerosol to provide the extracted liquid with a desired flavour, for instance whiskey or cognac when brewing coffee.

In the device known from EP-A-0 546 498, the vessel has a closable opening at its upper side for supply of the powder material and hot liquid, which closable opening is provided with a valve for opening and closing of said opening, wherein the valve is arranged to provide an airtight closure of the opening of the vessel such that the vessel is enabled to be pressurized by the operation of the gas pump.

A preferred embodiment of the beverage extracting device of the invention employs the feature that the valve is closable simultaneously with the operation of the gas pump so as to pressurize the vessel and drive the liquid within the vessel through the filter beneath the vessel. The duration of operation of the gas pump then exactly defines the duration that liquid is expelled through the filter beneath the vessel to fill up the users cup that is supposed to be placed below the outlet opening of the outlet duct. Also this feature can be applied independently from any of the other features of the invention, or in combination therewith.

To support the expelling of liquid through the filter,

it is preferred that the vessel is up-and-down movable so as to enable engaging a lower rim of the vessel with the filter thereby acting as a seal. Again this feature can be applied independently from any of the other features of the invention, or in combination therewith.

According to another aspect of the invention the filter is embodied as a movable endless belt, therewith arranging that a clean part of the endless belt is always available when extracting a new cup of liquid.

Preferably the belt is rotatable when the vessel is lifted from the belt for disposing of the powder material that remains on the belt after extraction.

It is further preferred that a scraper engages the belt from below for scraping off remains of the powder material.

Although the beverage extracting device of the invention can be operated with only the belt acting as a filter, it is also possible that the filter further comprises a paper filter part. At times applying such a paper filter part is desired to block certain fine and potentially damaging particles.

Suitably the paper filter part is supported by the endless belt.

In one particular embodiment of the beverage extracting device of the invention, a measurement device or devices connect to one of the vessel and the gas pump to measure at least one of the pressure in the vessel and the power of the gas pump. This information can be used to prevent unnecessary operation of the gas pump, and can be used to restrict the extraction time to the time that is actually needed. The information may indicate also that the filter may require cleaning for removal of pollution that partially blocks the filter. It may even indicate that the feedstock for the beverage extracting device in a canister of the device is nearly empty.

It is further desirable that a temperature sensor monitors a temperature at the outlet for extracted liquid at the outlet side of the filter. The information from the temperature sensor may be used to stop operation of the gas pump when the temperature drops, which is an indication that all fluid has been expelled through the filter.

As an alternative it is possible that an optical sensor is provided for monitoring the presence of fluid at the outlet for extracted liquid at the outlet side of the filter.

The measurement device or devices, and the temperature sensor or optical sensor may be applied independent from any of the other features as discussed herein, or in combination therewith.

5 The invention will hereinafter further be elucidated with reference to the drawing pertaining to a beverage extracting device according to the invention.

In the drawing:

10 -figure 1 shows a frontal view of an embodiment of the beverage extracting device of the invention;

-figure 2 shows relevant parts of a first embodiment of the beverage extracting device of figure 1;

-figure 3 shows relevant parts of a second embodiment of the beverage extracting device of figure 1;

15 -figure 4 shows a frame part of the beverage extracting device of figure 1;

-figure 5 shows a 3D view from below at the vessel used in the beverage extracting device of figure 1;

20 -figure 6 shows a side view at a frame carrying the belt that acts as a filter forming part of the beverage extracting device of figure 1; and

-figure 7 shows a 3D view from above at the frame of figure 6.

25 Whenever in the figures the same reference numerals are applied, these numerals refer to the same parts.

In figure 1 the beverage extracting device 1 is shown to comprise a canister 2 for beans, for instance coffee beans. Below the canister 2 is a grinder 3 that provides grinded beans to a chute 4, as also shown in figures 2 and 3. The chute 4 also receives hot water from a duct 5 that receives the hot water from a heater 6 to which the duct 5 is connected. The hot water ensures that the grinded beans from the grinder 3 are transported and received in a vessel 7 to which the chute 4 connects. To accommodate one and another the vessel 7 has a closable opening at a location 13 at the upper side of the vessel 7 for receiving both the powder material and the hot liquid.

35 40 With reference also to the figures 2 and 3, the closable opening is provided with a (not shown) valve at the height of arrow 13 for opening and closing of said opening, wherein the valve is arranged to provide an airtight closure of the opening of the vessel 7 such that the vessel 7 is enabled to be pressur-

ized by the operation of an gas pump 9. The location and operation of the valve is also known from the prior art document EP-A-0 546 498; it is therefore superfluous to further show this in the drawing. The gas pump 9 connects through a duct 9' as shown in figures 2 and 3 to the vessel 7 for supplying pressurized gas into the vessel 7.

In connection with the pressurization of the vessel 7, it is preferred that the vessel 7 is movable up-and-down as symbolized by the double arrow 20, to enable that in the down position the vessel 7 can engage a filter 8 beneath the vessel 7 and act on that filter 8 as a seal. The importance of this will become clear from a discussion later in this description.

In another aspect the beverage extracting device 1 also has an outlet 10 as clearly shown in the detail of figure 7, which outlet 10 is intended for release of extracted liquid at an outlet side of the filter 8 which is opposite to the vessel 7. Said outlet 10 connects to an outlet duct 11 as shown in figures 1, 2 and 3 for the extracted liquid, wherein the outlet duct 11 has an outlet opening 12 distant from the outlet 10, which outlet opening 12 -as the figures show- is positioned above the outlet 10 at the outlet side of the filter 8.

The figures 1 - 3 further show that at least a portion 11' of the outlet duct 11 is located above the vessel 7, and that the outlet opening 12 of the outlet duct 11 is oriented downwards and is positioned below the portion 11' of the outlet duct 11 which is at least in part above the vessel 7.

In use expelling of extracted liquid through the outlet duct 11 requires operation of the gas pump 9, as will become apparent from the following discussion.

The duct 9' for supplying pressurized gas into the vessel 7 connects via a duct outlet 9'' shown in figure 4 to a channel or channels (not shown) within the vessel 7 having outflow openings 21 at a lower rim 7' of the vessel 7 that are inwards directed to release gas into the vessel 7 and stir the mixture inside the vessel 7 from below in an upwards direction. These outflow openings 21 at the lower rim 7' of the vessel 7 are shown in figure 5.

As already mentioned the vessel 7 has an opening at a location 13 at the upper side of the vessel 7 for receiving the powder material and hot liquid, which opening is closable with a valve. A drive 22 for this valve can be operated to close the

valve during the operation of the gas pump 9 so as to pressurize the vessel 7 and drive the liquid within the vessel 7 through the filter 8 beneath the vessel 7, when the lower rim 7' of the vessel 7 is brought into tight engagement with the filter 8 thereby acting as a seal on this filter 8. The only escape for the liquid is then indeed through the filter 8.

In the embodiments shown in the figures 1 - 3, the filter 8 is embodied as a movable endless belt 14, which is preferably driven by a motor 15. The belt 14 is rotatable when the vessel 7 is lifted from the belt 8 which serves then for disposing of the powder material that remains on the belt 8 after extraction is completed. This remainder of powder material is collected in a waste bin 19. To promote removal of the powder material from the belt 14 it is preferable that a scraper 16 engages the belt 14 from below for scraping off the remains of the powder material. This is best shown in figure 6.

Figures 1 and 3 further show that as an option the filter may comprise a paper filter part 17, which can be supplied from a paper filter drum 18. The paper filter part 17 is then preferably supported by the endless belt 14.

In an embodiment a measurement device connects to one of the vessel 7 and the gas pump 9 to measure one of the pressure in the vessel 7 and the power of the gas pump 9.

In another embodiment a temperature sensor monitors a temperature at the outlet 10 for extracted liquid at the outlet side of the filter 8.

In an alternative embodiment an optical sensor is provided for monitoring the presence of fluid at the outlet 10 for extracted liquid at the outlet side of the filter 8.

Although the invention has been discussed in the foregoing with reference to exemplary embodiments of the beverage extracting device of the invention, the invention is not restricted to these embodiments which can be varied in many ways without departing from the invention. The discussed exemplary embodiments shall therefore not be used to construe the appended claims strictly in accordance therewith.

On the contrary the embodiments are merely intended to explain the wording of the appended claims without intent to limit the claims. The scope of protection of the invention shall therefore be construed in accordance with the appended claims only, where-
5 in a possible ambiguity in the wording of the claims shall be resolved using these exemplary embodiments.

CLAIMS

1. Beverage extracting device (1) at least comprising a vessel (7) for receiving and mixing a powder material and hot liquid, a filter (8) beneath the vessel (7), a gas pump (9) that connects through a duct to the vessel (7) for supplying pressurized gas into the vessel (7), and an outlet (10) for extracted liquid at an outlet side of the filter (8) which is opposite to the vessel (7), wherein the outlet (10) connects to an outlet duct (11) for the extracted liquid, **characterized in that** the duct for supplying pressurized gas into the vessel (7) connects to a channel or channels within the vessel (7) having outflow openings (21) at a lower rim (7') of the vessel (7) to release gas into the vessel (7) and stir the mixture inside the vessel (7) from below in an upwards direction.

2. Beverage extracting device according to claim 1, **characterized in that** at least a portion (11') of the outlet duct (11) is at least in part located above the vessel (7).

3. Beverage extracting device according to claim 1 or 2, **characterized in that** the outlet duct (11) has an outlet opening (12) distant from the outlet (10), which outlet opening (12) is positioned above the outlet (10) at the outlet side of the filter (8).

4. Beverage extracting device according to claim 3, **characterized in that** the outlet opening (12) of the outlet duct (11) is oriented downwards and is positioned below the portion (11') of the outlet duct (11) which is located above the vessel (7).

5. Beverage extracting device according to the preamble of claim 1, or according to any one of claims 1 - 4, **characterized in that** expelling the extracted liquid through the outlet duct (11) requires operation of the gas pump (9).

6. Beverage extracting device according to the preamble of claim 1, or according to any one of claims 1 - 5, wherein the vessel (7) has a closable opening at its upper side for supply of the powder material and hot liquid, which closable opening is provided with a valve for opening and closing said opening, wherein the valve is arranged to provide an airtight closure of the opening of the vessel (7) such that the vessel (7) is enabled to be pressurized by the operation of the gas pump (9),

characterized in that the valve is closable during the operation of the gas pump (9) so as to pressurize the vessel (7) and drive the liquid within the vessel (7) through the filter (8) beneath the vessel (7).

5 7. Beverage extracting device according to the preamble of claim 1, or according to any one of claims 5 - 6, **characterized in that** the vessel (7) is up-and-down movable so as to enable engaging a lower rim (7') of the vessel (7) with the filter (8) thereby acting as a seal.

10 8. Beverage extracting device according to any one of claims 1 - 7, **characterized in that** the filter (8) is embodied as a movable endless belt (14).

15 9. Beverage extracting device according to claim 8, **characterized in that** the belt (8) is rotatable when the vessel (7) is lifted from the belt (8) for disposing of the powder material that remains on the belt (8) after extraction.

 10. Beverage extracting device according to claim 8 or 9, **characterized in that** a scraper (16) engages the belt (8) from below for scraping off remains of the powder material.

20 11. Beverage extracting device according to any one of claims 1 - 10, **characterized in that** the filter (8) comprises optionally a paper filter part (17).

25 12. Beverage extracting device according to any one of claims 8 - 10 and claim 11, **characterized in that** the paper filter part (17) is supported by the endless belt (8).

30 13. Beverage extracting device according to the preamble of claim 1, or according to any one of claims 1 - 12, **characterized in that** a measurement device or devices connect to at least one of the vessel (7) and the gas pump (9) to measure at least one of the group comprising the pressure in the vessel (7), and the power consumed by the gas pump (9).

35 14. Beverage extracting device according to the preamble of claim 1, or according to any one of claims 1 - 13, **characterized in that** a temperature sensor monitors a temperature at the outlet (10) for extracted liquid at the outlet side of the filter (8).

40 15. Beverage extracting device according to the preamble of claim 1, or according to any one of claims 1 - 13, **characterized in that** an optical sensor is provided for monitoring the presence and/or quality of fluid at the outlet (10) for extracted liquid at the outlet side of the filter (8).

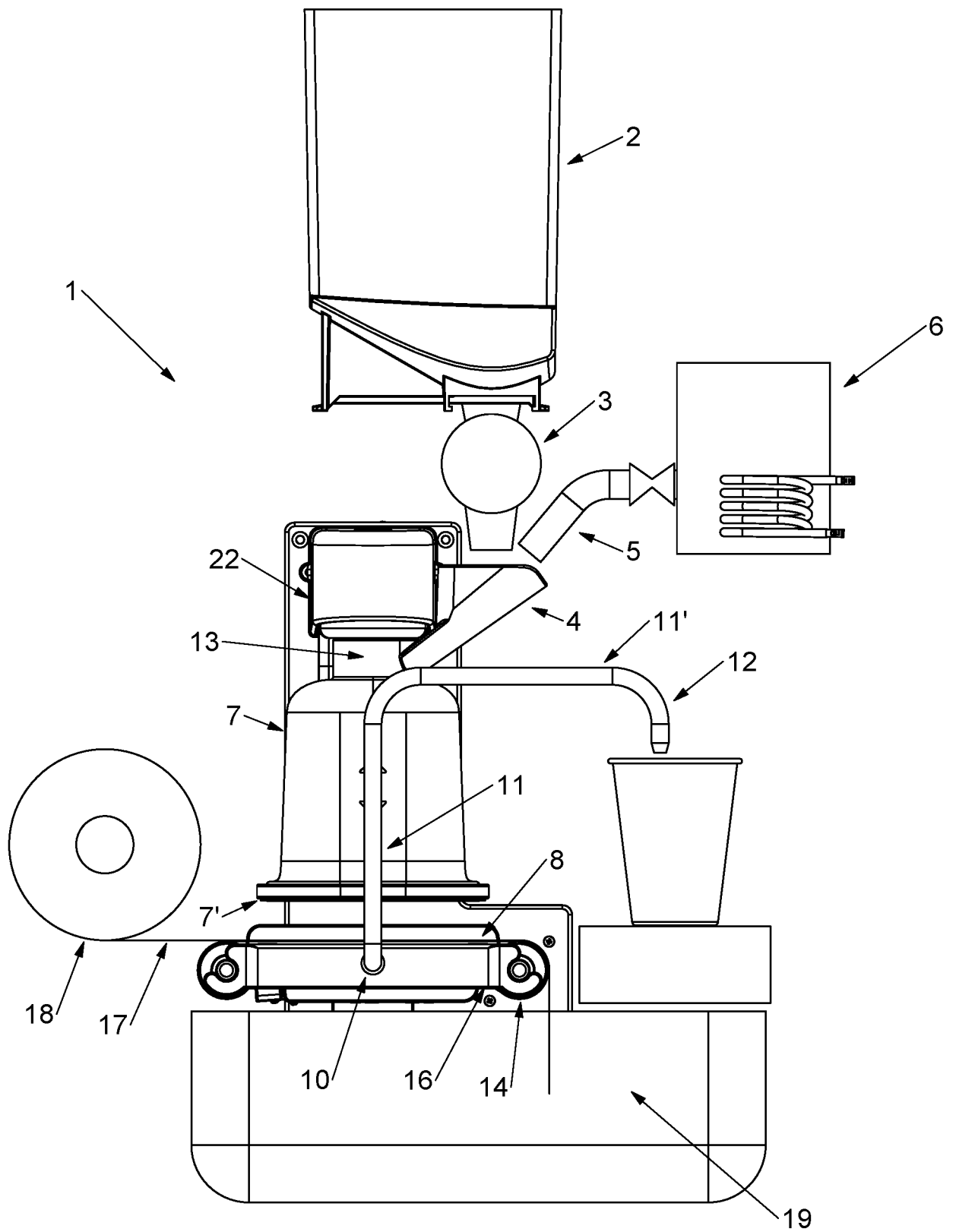


FIG. 1

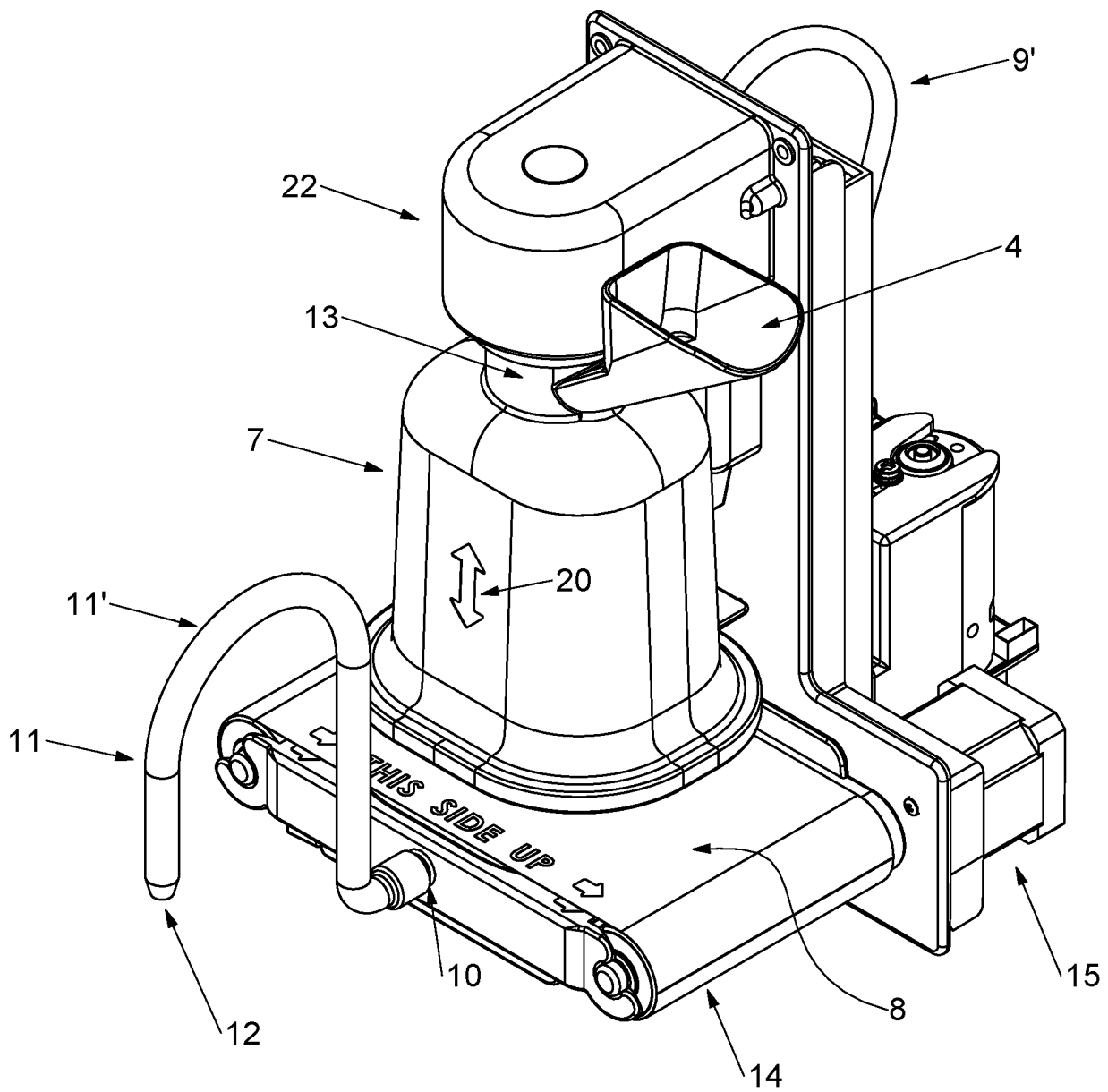


FIG. 2

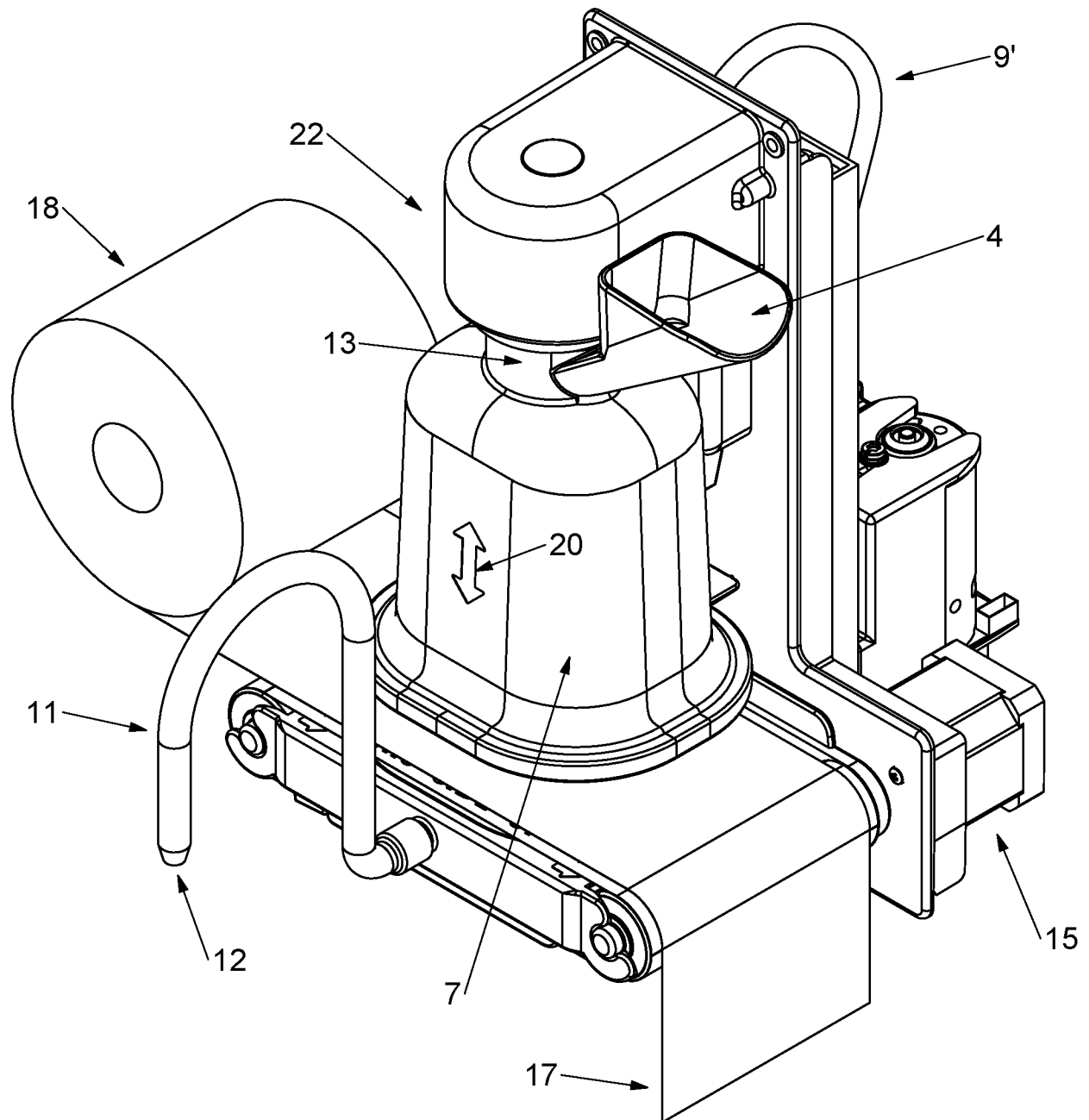


FIG. 3

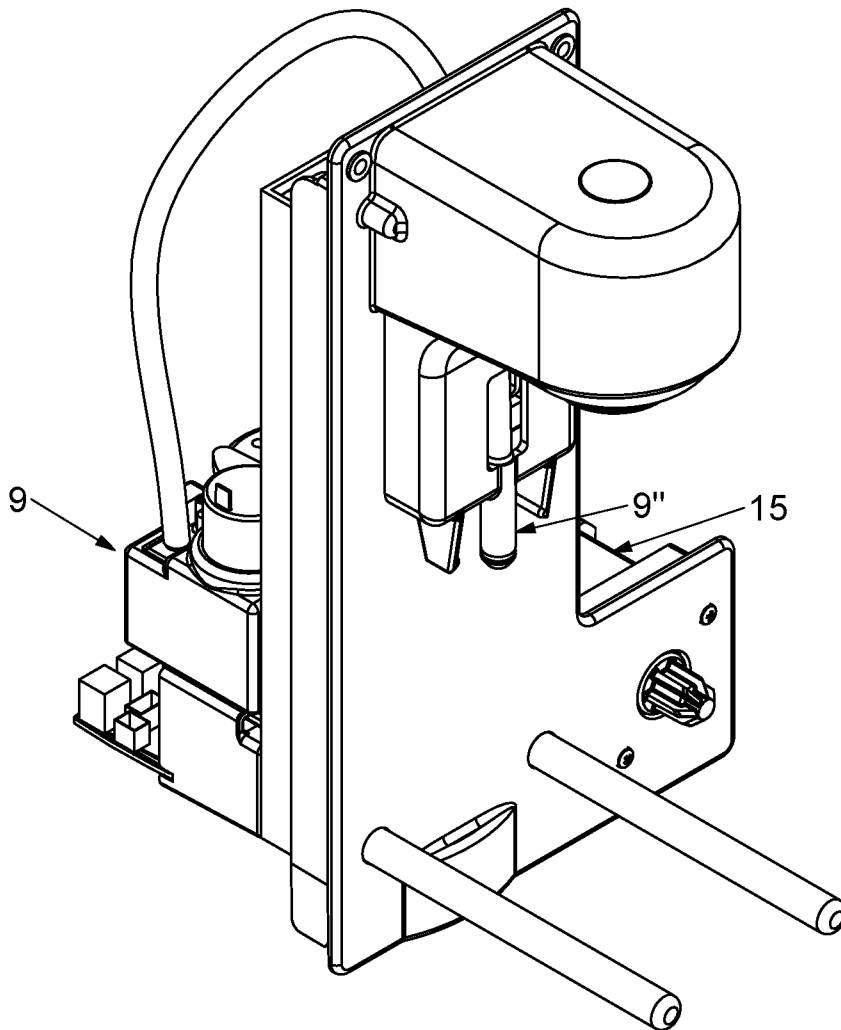


FIG. 4

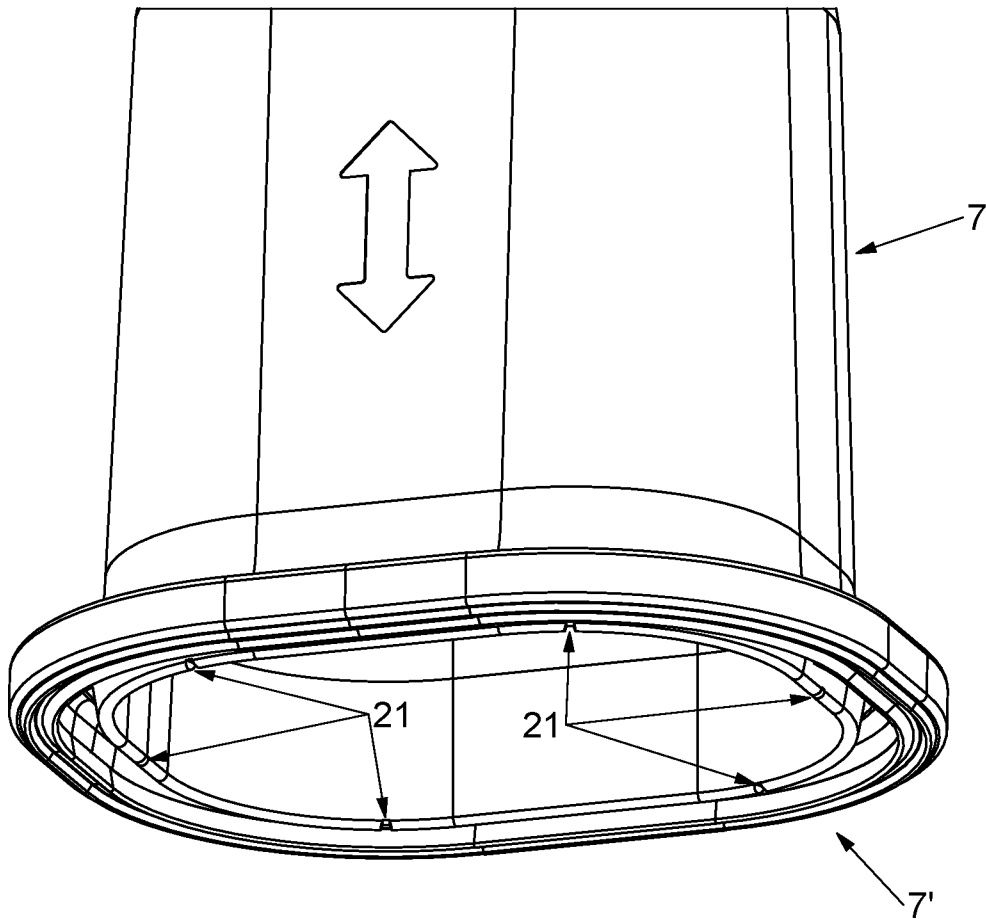
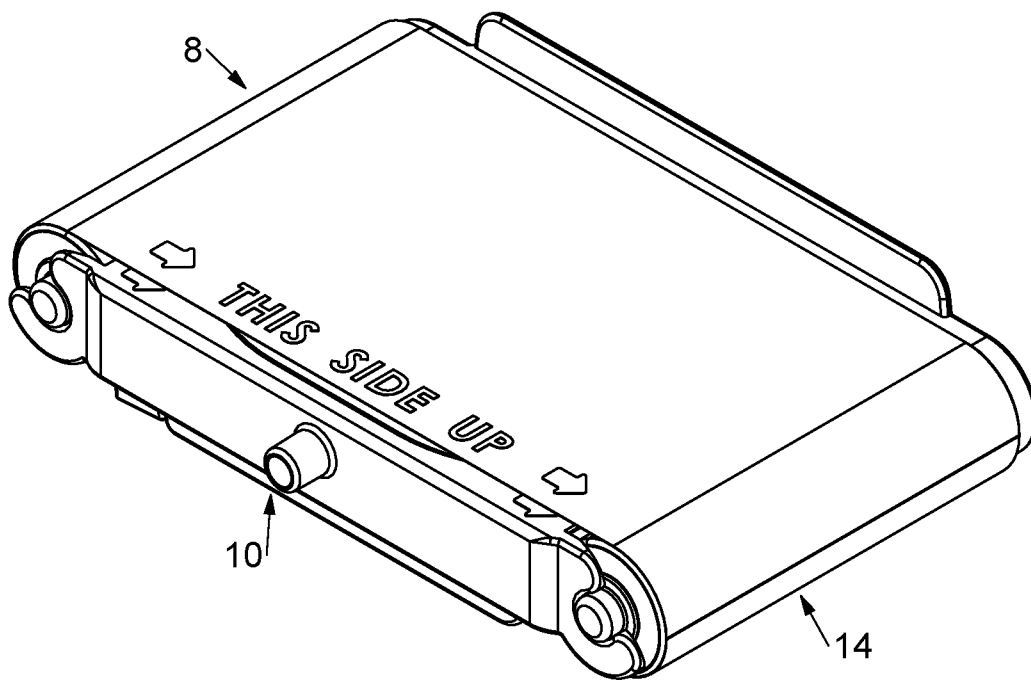
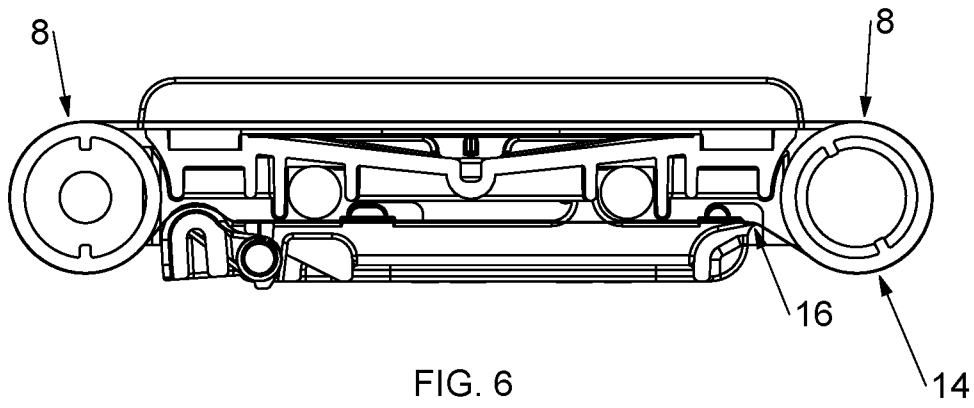


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2020/050170

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47J31/32 A47J31/40
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)
A47J

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	US 8 286 547 B1 (LASSOTA ZBIGNIEW G) 16 October 2012 (2012-10-16) figures 1,8	1,5
X	JP H08 63663 A (FUJI ELECTRIC CO LTD) 8 March 1996 (1996-03-08) paragraph [0027]; figure 5B	1,3,5,6, 8,9
A	JP 3 138635 B2 (SANDEN CORP) 26 February 2001 (2001-02-26) cited in the application figure 3	1-6,8-10
A	EP 0 546 498 A1 (SANDEN CORP) 16 June 1993 (1993-06-16) cited in the application figure 3	1,5,6, 8-10



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

16 April 2020

Date of mailing of the international search report

23/06/2020

Name and mailing address of the ISA/

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Authorized officer

Reichhardt, Otto

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NL2020/050170

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.:
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:

see additional sheet

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 an 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.:

1-4(completely); 5-15(partially)

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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/NL2020/050170

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 8286547	B1	16-10-2012	US 8286547 B1 16-10-2012
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			JP 2603334 Y2 06-03-2000
			JP H0552991 U 13-07-1993

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4(completely); 5-15(partially)

Beverage extraction device comprising outflow openings at a lower rim of the vessel

2. claims: 5-15(partially)

Beverage extraction device wherein the expulsion of the extracted liquid requires the operation of the gas pump

3. claims: 6-15(partially)

Beverage extraction device comprising a valve to close the upper opening of the vessel

4. claims: 7-15(partially)

Beverage extraction device wherein the vessel is movable up and down

5. claims: 13-15(partially)

Beverage extraction device comprising measurement devices for vessel pressure and/or gas pump power consumption

6. claim: 14(partially)

Beverage extraction device comprising a temperature sensor

7. claim: 15(partially)

Beverage extraction device comprising an optical sensor
