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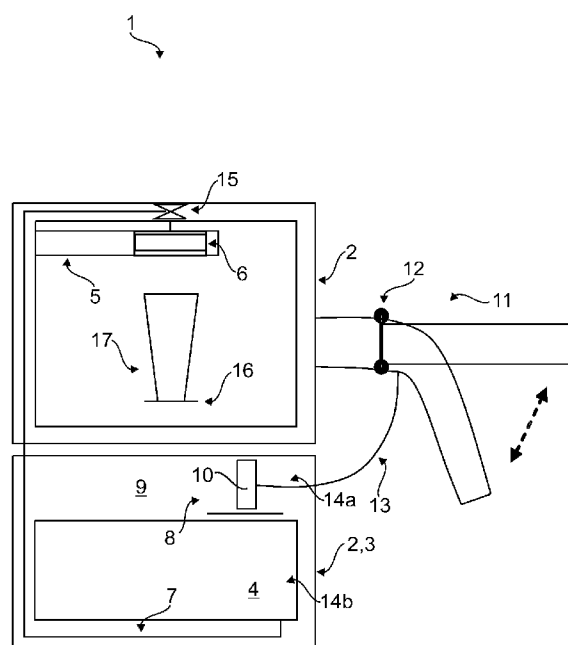
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(54) Title: PORTABLE COFFEE MACHINE WITH IMPROVED USABILITY

Fig. 1



(57) Abstract: The present invention relates to a portable coffee machine (1) comprising a refillable container (3) for storing cold/hot water (4), a heater unit for heating the water inside the container (3), a brewing chamber (5) for holding a coffee pod (6) and a conduit (7) for conveying pressurized hot water (4) from the container (3) into the brewing chamber (5) and an electrical air pump (8) for pressurizing the air (9) above the hot water (4) inside the container (3) by means of a piston mechanism (10) arranged to reciprocate inside the housing (2).

Description**PORTABLE COFFEE MACHINE WITH IMPROVED USABILITY**

- [0001] The present invention relates to a coffee machine, in particular a coffee machine which is portable.
- [0002] Several techniques for brewing coffee are commonly known. In order to meet the preferences and needs of different customers, different types of coffee machines are available on the markets which brew coffee in accordance with one of the commonly known techniques. In general, coffee machines are either designed for manual operation or electrical operation.
- [0003] US 2009/0000488 A1 discloses an electrically operated coffee machine for brewing coffee by using coffee pods. This coffee machine has a through-flow electrical heater and an electrical pump which conveys the water to through the electrical heater.
- [0004] CN103479224 (A) discloses a manually operated coffee machine for brewing coffee by using coffee pods. This coffee machine has a container for storing hot water and a piston which is arranged inside the container so as to allow a user to manually press the hot water into the brewing chamber.
- [0005] Manual coffee machines and electrical coffee machines have their advantages and disadvantages. In contrast to a manual coffee machine, an electrical coffee machine has the advantage that the steps such as heating of the water and conveying of the hot water into the brewing chamber are generally automated, thus the consumer can save time and labor. In contrast to an electrical coffee machine, a manual coffee machine has the advantage that it saves a certain amount of electric power, thus being more environment-friendly. In addition, a manual coffee machine is typically light weight and small sized due to the omitted electrical units and can be easily transported and installed anywhere irrespective of whether there is an electrical mains connection available in the proximity.
- [0006] Thus, when considering the above-mentioned advantages and disadvantages, a consumer might find that both of the electrical coffee machine and the manual coffee machine have a limited usability.

- [0007] An objective of the present invention is to provide a portable coffee machine which overcomes the aforementioned drawbacks of the prior art in a cost effective way and which has an improved usability.
- [0008] This objective has been achieved by the portable coffee machine as defined in claim 1. Further achievements have been attained by the subject-matters respectively defined in the dependent claims.
- [0009] The portable coffee machine of the present invention has an electrical air pump for pressurizing the air above the hot water inside a container. The electrical air pump has a piston mechanism which is arranged to reciprocate inside the housing. The electrical air pump has a manual mode for allowing hand driven operation by a user. The portable coffee machine of the present invention has a handle for holding the housing. The handle is pivotably mounted via a hinge onto the housing so as to allow a user to reciprocatingly move the same. The portable coffee machine of the present invention has a transmission mechanism for transmitting the reciprocating movement of the handle to the piston mechanism of the electrical air pump so as to pressurize, in the manual mode the air above the hot water inside the container.
- [0010] In an embodiment, the piston mechanism is arranged in an upper partition of the container so as to pressurize the air immediately above the hot water which is filled into the lower partition of the container.
- [0011] In another embodiment, the coffee machine has a manual lock means for blocking movement of the handle.
- [0012] In another embodiment, the portable coffee machine has a valve which can be manually opened/closed so as to control the flow of the pressurized hot water into brewing chamber.
- [0013] In another embodiment, the portable coffee machine is operable with electric power supplied from the mains power source, or optionally with the electric power supplied from its rechargeable battery unit, for instance when the mains power source is disconnected.
- [0014] In another embodiment, the heater unit includes a temperature sensor for sensing the temperature of the water inside the container, and two separate electrical heaters, one for heating the water inside the container

with the electric power to be supplied from the mains power source, and the other one for heating the water inside the container with the electric power to be supplied from the rechargeable battery unit, for instance when the mains power source is disconnected.

- [0015] In another embodiment, the latter of the above electrical heaters is preferably a Peltier element which maintains the temperature of the water inside the container at an ideal water temperature for brewing coffee, for instance when the mains power source is disconnected.
- [0016] In another embodiment, the portable coffee machine visually indicates the temperature of the water inside the container.
- [0017] In another embodiment, the portable coffee machine comprises phase change material (PCM) and also thermal insulation material so as to prevent dropping of the temperature of the water inside the container.
- [0018] In another embodiment, the portable coffee machine further comprises a support for a mug.
- [0019] In another embodiment, the mug has a rechargeable battery unit which is directly or inductively connectable to a charging unit of the portable coffee machine. The mug of the present invention also has a temperature sensor and an electrical heater, preferably a Peltier element for heating, on the basis of the sensed temperature the coffee inside the mug with the electric power to be supplied from its own rechargeable battery unit.
- [0020] In another embodiment, the mug maintains the temperature of the coffee at an ideal drinking temperature.
- [0021] With the present invention, a portable coffee machine has been provided which has an improved usability and a compact configuration. With the present invention, particularly by virtue of electrical air pump, more particularly by virtue of the single piston mechanism which can be optionally operated electrically via the electric power unit or driven manually via the linked handle on the housing, the configuration of the coffee has been rendered light weight, small sized and cost effective. With the present invention, particularly by virtue of the manual mode of the electrical air pump, the user has been enabled to convey the hot water from the container into the brewing chamber without depending on

electricity. Thereby, with the present invention, the user has been enabled to brew coffee immediately prior to consuming it at any remote location where an electrical mains connection is not available. The user can, for instance previously fill the container of the portable coffee machine with hot water obtained by using a gas oven or by means of any auxiliary means such as an electric kettle or, alternatively heat the water using the heater unit of the portable coffee machine itself, and subsequently transport the portable coffee machine to a non-electrified remote location such as a garden, terrace or the like where he or she conveys the hot water from the container into the brewing chamber by manually operating the piston mechanism via the handle for a few times. With the present invention, the user has also been enabled to occasionally save electric power so as to preserve the nature. Thereby, a consumer satisfaction can be increased.

[0022] Additional advantages of the portable coffee machine of the present invention will become apparent with the detailed description of the embodiments with reference to the accompanying drawings in which:

[0023] Figure 1 – is a schematic view of a portable coffee machine and a mug according to an embodiment of the present invention.

[0024] The reference signs appearing on the drawings relate to the following technical features.

1. Portable coffee machine
2. Housing
3. Container
4. Water
5. Brewing chamber
6. Coffee pod
7. Conduit
8. Electrical air pump
9. Air
10. Piston mechanism
11. Handle
12. Hinge

13. Transmission mechanism

[0025] 14a. Upper partition

14b. Lower partition

15. Valve

16. Support

17. Mug

[0026] The portable coffee machine (1) comprises a housing (2) which includes: a refillable container (3) for storing cold/hot water (4), a heater unit for heating the water inside the container (3), a brewing chamber (5) for releasably holding a coffee pod (6), and a conduit (7) for conveying pressurized hot water (4) from the container (3) to the coffee pod (6) inside the brewing chamber (5) (Fig. 1).

In the portable coffee machine (1) of the present invention, the housing (2) further includes: an electrical air pump (8) for pressurizing the air (9) immediately above the hot water (4) inside the container (3), wherein the electrical pump (8) has a piston mechanism (10) which is arranged to reciprocate inside the housing (2), and wherein the electrical pump (8) has a manual mode for allowing hand driven operation by a user, a handle (11) for holding/transporting the housing (2), wherein the handle (11) is pivotably mounted via a hinge (12) onto the housing (2) so as to allow the user to reciprocatingly move the same, and a transmission mechanism (13) for transmitting the reciprocating movement of the handle (11) to the piston mechanism (10) of the electrical pump (8) so as to pressurize, in the manual mode the air (9) immediately above the hot water (4) inside the container (3).

[0027] In an embodiment, the container (3) has an upper partition (14a) and a lower partition (14b). The piston mechanism (10) is arranged to reciprocate inside the upper partition (14a). Hot or cold water (4) is refillable into the lower partition (14b). The upper partition (14a) and the lower partition (14b) are fluidly connected by a check valve (not shown). Also the upper partition (14a) is fluidly connected to the outside by another check valve (not shown).

[0028] In another embodiment, the handle (11) has a manual lock means (not

shown) for blocking movement thereof when the handle (11) is not to be used for the purpose of pressurizing the air (9) above the hot water (4). Thus, when the user decides to hold the handle (11) for transporting the portable coffee machine (1), the lock means can be actuated in order to block movement thereof. In a version of this embodiment, the lock means comprises a pin (not shown) and a groove (not shown). In an alternative version of this embodiment, the lock means comprises a screw (not shown) and a threaded hole (not shown).

[0029] In another embodiment, the portable coffee machine (1) comprises a valve (15) for controlling the flow of the pressurized hot water (4) through the conduit (7). In this embodiment, the valve (15) is located on the downstream side of the container (3) and on the upstream side of the brewing chamber (5). The valve (15) can be manually opened/closed by the user.

[0030] In another embodiment, the portable coffee machine (1) comprises an electric power unit (not shown) for connecting to the mains power source, a first battery unit (not shown) for receiving one or more than one rechargeable battery, a charging unit (not shown) for recharging each battery in the first battery unit with the electric power to be supplied from the electric power unit, a user interface (not shown) for receiving user inputs, and a first control unit (not shown) for controlling the electric power unit, the first battery unit, the charging unit, the heater unit, and the electrical pump (8). In this embodiment, the portable coffee machine (1) is operated with the electric power supplied from the electric power unit when it is connected to the mains power source. The portable coffee machine (1) is operated with the electric power supplied from the first battery unit when it is disconnected from the mains power source.

[0031] In another embodiment, the heater unit includes: a first electrical heater (not shown) for heating the water (4) inside the container (3) with the electric power to be supplied from the electric power unit, and a second electrical heater (not shown) for heating the water (4) inside the container (3) with the electric power to be supplied from the first battery unit, a first temperature sensor (not shown) for sensing the temperature of the water

(4) inside the container (3). In this embodiment, the first control unit is adapted to operate, on the basis of the temperature of the water (4) inside the container (3) either the first electrical heater when the electric power unit is connected to the mains power source or the second electrical heater when the electric power unit is disconnected from the mains power source.

- [0032] In another embodiment, the first control unit is adapted to operate the second electrical heater so as to maintain the temperature of the water (4) inside the container (3) within a first predetermined range when the electric power unit is disconnected from the mains power source. In this embodiment, the first predetermined range corresponds to an ideal water temperature for brewing coffee.
- [0033] In another embodiment, the second electrical heater comprises a Peltier element (not shown).
- [0034] In another embodiment, the portable coffee machine (1) further comprises means (not shown) for visually indicating the temperature of the water (4) inside the container (3). In a version of this embodiment, said means comprises one or more than one light emitting diode (LED) (not shown). In another version of this embodiment, said means comprises a display (not shown).
- [0035] In another embodiment, the portable coffee machine (1) further comprises: phase change material (PCM) (not shown) which is arranged in heat exchange with the container (3), and thermal insulation material (not shown) which is arranged to thermally insulate the phase change material and the container (3) from the environment.
- [0036] In another embodiment, the portable coffee machine (1) further comprises a support (16) for placing a mug (17) to be filled with the coffee dripping from the brewing chamber (5).
- [0037] In another embodiment, the portable coffee machine (1) further comprises a mug (17) which includes: a second battery unit (not shown) for receiving one or more than one rechargeable battery, wherein the second battery unit is directly or inductively connectable to the charging unit of the portable coffee machine (1), and wherein the first control unit is adapted to

recharge each battery of the second battery unit with the electric power to be supplied from the electric power unit, a third electrical heater (not shown) for heating the coffee inside the mug (17) with the electric power to be supplied from the second battery unit, a second temperature sensor (not shown) for detecting the temperature of the coffee inside the mug (17), and a second control unit (not shown) which is adapted to operate the third electrical heater on the basis of the temperature of the coffee inside the mug (17).

[0038] In another embodiment, the second control unit is adapted to operate the third electrical heater so as to maintain the temperature of the coffee inside the mug (17) within a second predetermined range. The coffee inside the mug (17) has preferably an initial temperature of 90°C to 95°C. After a while the temperature drops to the ideal drinking temperature. In this embodiment, the second predetermined range corresponds to the ideal drinking temperature.

[0039] In another embodiment, the third electrical heater comprises a Peltier element.

[0040] With the present invention, a portable coffee machine (1) and a mug (17) has been provided which have an improved usability. Thereby, a consumer satisfaction can be increased.

Claims

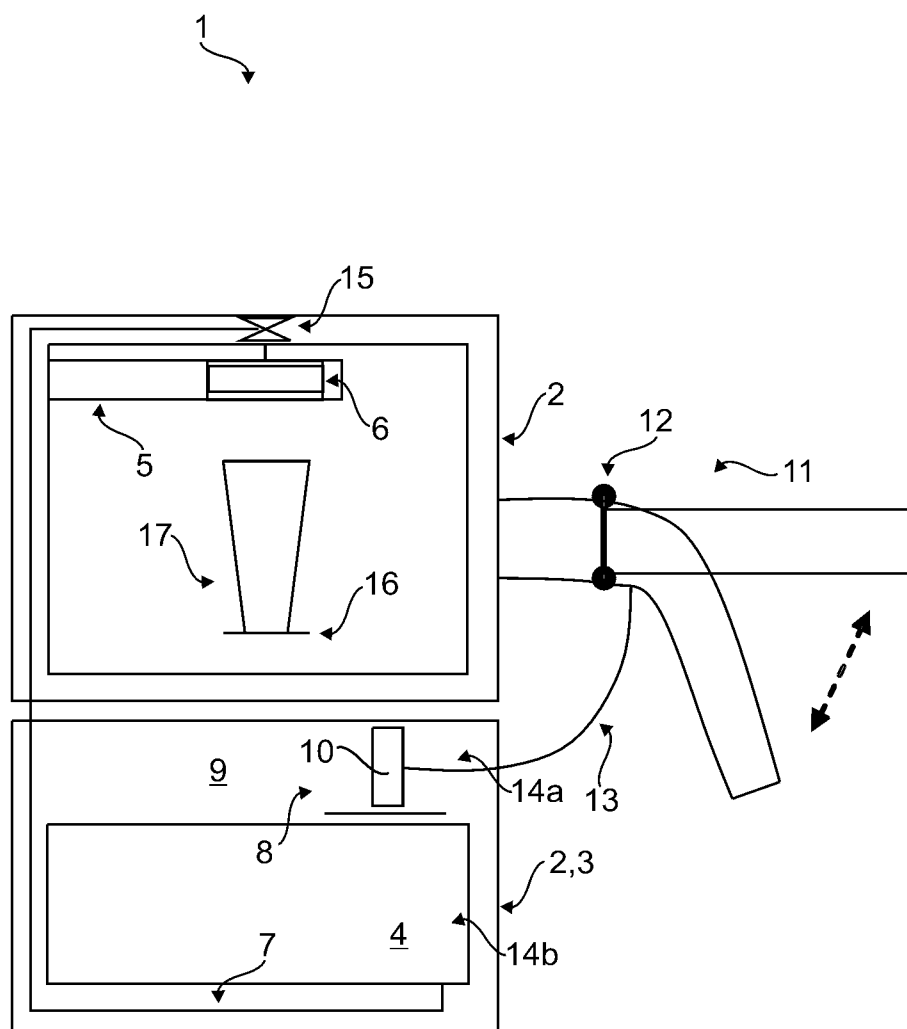
1. A portable coffee machine (1) comprising
a housing (2) comprising a refillable container (3) for storing water (4), a heater unit for heating the water inside the container (3), a brewing chamber (5) for releasably holding a coffee pod (6), and a conduit (7) for conveying pressurized hot water (4) from the container (3) to the coffee pod (6) inside the brewing chamber (5),
characterized in that the housing (2) further comprising
 - an electrical air pump (8) for pressurizing the air (9) above the hot water (4) inside the container (3), wherein the electrical pump (8) has a piston mechanism (10) which is arranged to reciprocate inside the housing (2), and wherein the electrical pump (8) has a manual mode for allowing hand driven operation by a user,
 - a handle (11) for holding/transporting the housing (2), wherein the handle (11) is pivotably mounted via a hinge (12) onto the housing (2) so as to allow the user to reciprocatingly move the same and
 - a transmission mechanism (13) for transmitting the reciprocating movement of the handle (11) to the piston mechanism (10) of the electrical pump (8) so as to pressurize, in the manual mode the air (9) above the hot water (4) inside the container (3).
2. The portable coffee machine (1) according to claim 1, **characterized in that** the piston mechanism (10) is arranged to reciprocate inside an upper partition (14a) of the container (3), wherein the water (4) is refillable into a lower partition (14b) of the container (3).
3. The portable coffee machine (1) according to claim 1 or 2, **characterized in that** the handle (11) has a manual lock means for blocking movement thereof when the handle (11) is not to be used for the purpose of pressurizing the air (9) above the hot water (4).
4. The portable coffee machine (1) according to any one claims 1 to 3, **characterized in that** a valve (15) for controlling the flow of the pressurized hot water (4) through the conduit (7), wherein the valve (15) is located on the downstream side of the container (3) and on the upstream side of the brewing chamber (5), and wherein the valve (15) can be manually opened/closed by

the user.

5. The portable coffee machine (1) according to any one of claims 1 to 4, **characterized in that**
 - an electric power unit for connecting to the mains power source,
 - a first battery unit for receiving one or more than one rechargeable battery,
 - a charging unit for recharging each battery in the first battery unit with the electric power to be supplied from the electric power unit,
 - a user interface for receiving user inputs and
 - a first control unit which is adapted to control the electric power unit, the first battery unit, the charging unit, the user interface, the heater unit, and the electrical pump (8).
6. The portable coffee machine (1) according to claim 5, **characterized in that** the heater unit comprising
 - a first electrical heater for heating the water (4) inside the container (3) with the electric power to be supplied from the electric power unit, and
 - a second electrical heater for heating the water (4) inside the container (3) with the electric power to be supplied from the first battery unit,
 - a first temperature sensor for sensing the temperature of the water (4) inside the container (3),wherein the first control unit is further adapted to operate, on the basis of the temperature of the water (4) inside the container (3) either the first electrical heater when the electric power unit is connected to the mains power source or the second electrical heater when the electric power unit is disconnected from the mains power source.
7. The portable coffee machine (1) according to claim 6, **characterized in that** the first control unit is adapted to operate the second electrical heater so as to maintain the temperature of the water (4) inside the container (3) within a first predetermined range.
8. The portable coffee machine (1) according to claim 6 or 7, **characterized in that** the second electrical heater comprises a Peltier element.
9. The portable coffee machine (1) according to any one of claims 1 to 8, **characterized in that** means for visually indicating the temperature of the water (4) inside the container (3).

10. The portable coffee machine (1) according to any one of claims 1 to 9,
characterized in that
- phase change material which is arranged in heat exchange with the container (3), and
 - thermal insulation material which is arranged to thermally insulate the phase change material and the container (3) from the environment.
11. The portable coffee machine (1) according to any one of claims 1 to 10,
characterized in that a support (16) for placing a mug (17) to be filled with the coffee dripping from the brewing chamber (5).
12. The portable coffee machine (1) according to any one of claims 1 to 11,
characterized in that
- a mug (17) comprising
- a second battery unit for receiving one or more than one rechargeable battery, wherein the second battery unit is directly or inductively connectable to the charging unit of the portable coffee machine (1), wherein the first control unit is adapted to recharge each battery of the second battery unit with the electric power to be supplied from the electric power unit,
 - a third electrical heater for heating the coffee inside the mug (17) with the electric power to be supplied from the second battery unit,
 - a second temperature sensor for detecting the temperature of the coffee inside the mug (17) and
 - a second control unit adapted to operate the third electrical heater on the basis of the temperature of the coffee inside the mug (17).
13. The portable coffee machine (1) according to claim 12, **characterized in that** the second control unit is adapted to operate the third electrical heater so as to maintain the temperature of the coffee inside the mug (17) within a second predetermined range.
14. The portable coffee machine (1) according to claim 12 or 13, **characterized in that** the third electrical heater comprises a Peltier element.

Fig. 1



INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2014/063897

A. CLASSIFICATION OF SUBJECT MATTER

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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.
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A	DE 197 06 005 A1 (TCHIBO FRISCH ROEST KAFFEE [DE]) 13 August 1998 (1998-08-13) the whole document	1-14
A	GB 786 423 A (BENIAMINO ROTA) 20 November 1957 (1957-11-20) the whole document	1-14
A	EP 2 742 833 A1 (MINIMMA ESPRESSO S L [ES]) 18 June 2014 (2014-06-18) the whole document	1-14
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Further documents are listed in the continuation of Box C.



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"&" document member of the same patent family

Date of the actual completion of the international search

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Behammer, Frank

INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	EP 2 353 470 A1 (MORGAN CURT [US]; CHEN VINCENT [US]) 10 August 2011 (2011-08-10) the whole document -----	1-14
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Information on patent family members

International application No

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