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(71) Applicant: **MATE T SP. Z.O.O.** [PL/PL]; ul. E. Kwiatkowskiego 5, 52-407 Wrocław (PL).

(72) Inventor: **HAPEL, Grzegorz**; ul. Sokoła 37 lok. 5, 59-300 Lubin (PL).

(74) Agent: **GÓRNICKI, Paweł**; Biuro Ochrony Własności Intelektualnej, "PATENT-SERVICE", ul. Rybojadzka 16, 60 443 Poznań (PL).

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(54) **Title:** METHOD AND APPLIANCE FOR THE PREPARATION OF SINGLE SERVINGS OF FRESHLY BREWED HERBAL INFUSIONS, TEA IN PARTICULAR

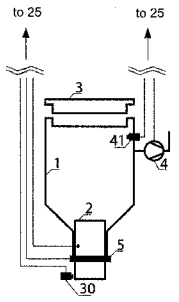

Fig. 9

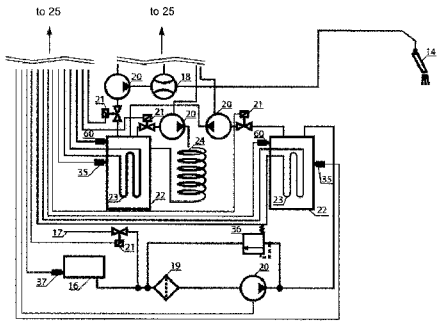

Fig. 10

(57) **Abstract:** The subject of the invention is a method and an appliance for the preparation of single servings of freshly brewed herbal infusions, particularly leaf teas, including fully automatic: storage and dispensing of any leaf teas, heating and dispensing of water at a specific amount and temperature. Method: by means of a user communication interface (26) selects the type of tea, type of infusion (relaxing or stimulating), and the intensity of the infusion; the selected tea at a specific amount is then dispensed from the tea tray (1), and with at least one water dispenser nozzle (14), water is added in an amount from 190 ml to 250 ml and at a temperature from 60 °C to 90 °C; brewing time is from 2 to 10 min. The appliance is equipped with an electronic controller (25) connected to at least one tea dispensing unit (51), water dispensing unit (52), brewing unit (50), and the communication interface (26). Each tea dispensing unit (51) has a tea tray (1) with a lid (3), which is connected to the tea dispenser (2) equipped with a no-tea sensor (30). Whereas the water dispensing unit (52) is equipped with heating modules, each of which has a water heating compartment (22) equipped with a heater (23) and temperature sensors (35) connected to an electronic controller (25), wherein water heating compartment outlet (22) is connected by a solenoid valve (21) with a water dispenser nozzle (14).

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Method and appliance for the preparation of single servings of freshly brewed herbal infusions, tea in particular

The subject of the invention is a method and an appliance for the preparation of single servings of freshly brewed herbal infusions, particularly leaf teas, including fully automatic: storage and dispensing of any leaf teas, heating and dispensing of water at a specific amount and temperature.

Appliance with hot air circulation system for the preparation of beverages with brewing compartments, known from the European patent no. EP1764014, consists of at least one water tank, at least two fluid-combined thermoblocks with at least one water tank, at least two brewing compartments, where each brewing compartment is heated with water from thermoblocks and contains infusion ingredient, and is connected to an outlet for pouring freshly made beverage. The appliance is also fitted with an outlet for hot water adapted to selective connection to each of at least two thermoblocks.

Method and appliance for the preparation of a beverage under controlled pressure is known from the European patent No. EP2001343. Beverage preparation method involving steps of feeding of water to a closed preparation compartment, where the compartment is being selected from a closed rigid cartridge and a brewing compartment with a valve for opening the compartment and dispensing the beverage from the compartment outlet, characterized in that it comprises the following steps: feeding water to the beverage preparation compartment until a pressure of at least 3 bar is reached, interrupting at least once the flow of water into the compartment (pump), keeping the beverage preparation compartment closed at the above pressure throughout pressure holding time, which ranges from 1 to 60 seconds, opening the outlet of the beverage preparation compartment and dispensing the beverage. The appliance consists of a beverage preparation compartment; a system for feeding water into the compartment; the means to interrupt at least once the flow of water to the preparation compartment, when the first pressure point is reached; the means to resume the flow of water within the previously mentioned set time interval, and the means to open the compartment after the set time has elapsed, whereas the

preparation compartment is selected from a closed rigid cartridge and the brewing compartment with a valve for keeping the compartment closed and keeping the first pressure point for previously set pressure holding time before opening the compartment.

Hybrid appliance for the preparation of hot beverages, in particular coffee or tea, known from the European Patent no. EP2254448, consists of a liquid circulation system, such as water, liquid resources for the beverage dispensing outlet; - means for heating, such as a burner, for supplying combustion heat to the liquid that is circulated to the dispensing outlet, where the combustion means for heating are combined with electrical means for heating to provide electrical heating of liquid flowing towards the dispensing outlet, where at least one type of the combustion means for heating and the electrical means for heating is combined with means for the adjustment of heat supplied to the liquid from the aforementioned at least one type of combustion means for heating and electrical heating means, wherein the adjustment means include a temperature sensor. Temperature sensor was designed for direct or indirect measurement of temperature of the heated liquid in order to compare the measured temperature with the target temperature; where the temperature sensor is combined with: electrical means for heating to adjust the supplied heat by electrical heating according to the difference between the measured temperature and the target temperature, where the combustion means for heating were designed to supply the combustion heat to the liquid at a level below the required heat value for liquid to reach its target temperature; or the combustion means for heating to adjust the supplied combustion heat according to the difference between the measured temperature and the target temperature, where the electrical means for heating were designed to supply heat by electrical heating of liquid at a level below the required heat value for the liquid to reach its target temperature.

The essence of the method, according to the invention is that: by means of a user communication interface, the user selects the type of tea, type of infusion (relaxing or stimulating), and the intensity of the infusion; the selected tea at a specific amount is then dispensed from the tea storage tray, and with at least one water dispenser nozzle, water is added in an amount from 190 ml to

250 ml and at a temperature from 60 °C to 90 °C; brewing time is from 2 to 10 min.

Conveniently, from the tea storage tray the selected tea at a specific amount is dispensed into the brewing compartment, where the infusion is brewed and then filtered on the brewing compartment filter.

Conveniently, the selected tea at a specific amount is dispensed into a cup or cup with a filter.

Conveniently, a brewing timer is dispensed into the cup from the brewing timer dispenser.

The essence of the appliance, according to the invention, is that it is fitted with an electronic controller connected to at least one tea dispensing unit, water dispensing unit, brewing unit, and the communication interface. Each tea dispensing unit has a tea storage tray with a lid, which is connected to the tea dispenser equipped with a no-tea sensor. Water dispensing unit is equipped with heating modules, each of which has a water heating compartment equipped with a heater and temperature sensors connected to an electronic controller, wherein water heating compartment outlet is connected by a solenoid valve with a water dispenser nozzle.

Where the water tanks are located above the inlets to the subsequent components of the system, it is possible to skip the pumps.

When connecting the outlet from the water tank to another component of the system prevents the free flow of water, it is possible to skip the solenoid valves.

Conveniently, electronic controller is connected to the cup dispensing unit equipped with a cup storage tray with a cup dispenser and no-cup sensor.

Conveniently, electronic controller is connected to the filter dispensing unit equipped with a filter storage tray with filter dispenser and no-filter sensor. Filter dispensing unit may also be connected when the appliance is fitted with a cup dispensing unit.

Conveniently, electronic controller is connected to the cup with filter dispensing unit equipped with a cup with filter storage tray and a cup with filter dispenser, and no-cup with filter sensor.

Conveniently, in the storage tray for cups with filters there are cups with

filters, and each cup with a filter has a cup with a filter combined with a filter by means of a snap connection.

Conveniently, electronic controller is connected to the dried tea leaves packaging unit with a storage tray comprising a roll of film. Dried tea leaves packaging unit is also fitted with a tea dispensing outlet splitter with a position sensor, sachet close and separate device, no sachet sensor, no tea sachet sensor, and the collecting compartment with access from the outside of the appliance for ready-packaged, previously dispensed portions of a given type of tea.

Conveniently, electronic controller is connected to the tea aromas emitting module with at least one fan, air valve, and a tube for discharging the aromas out of the appliance; each fan is located between the dried tea leaves storage tray, which also may serve as a tea storage tray, and an air valve. The number of fans corresponds to the number of tea dispenser modules.

Conveniently, electronic controller is connected to the brewing timer dispensing unit equipped with a brewing timer storage tray with a brewing timer dispenser and no-brewing timer sensor.

Conveniently, electronic controller is connected to the payment module.

Conveniently, electronic controller is connected to the remote control module.

Conveniently, electronic controller is connected to the monitoring and the appliance operating condition module.

Conveniently, the inlet of water heating compartment is connected to the water tank with water level sensor, which is connected to the electronic controller and/or water heating compartment inlet is connected by a solenoid valve with a running water supply, and between the water tank and the water heating compartment there are water filter, pump, and safety valve. The pump is connected to an electronic controller, and the pump in one section is connected to another section via a solenoid valve and to the electronic controller, while the pump in the second section is connected via a solenoid valve and flow meter to the water dispenser nozzle and to the electronic controller. The second section is also connected to the cooler inlet and outlet via a solenoid valve, and between

the solenoid valve and the cooler there is a pump.

Conveniently, the brewing unit is equipped with no-cup in the brewing zone sensor connected to the electronic controller.

Conveniently, the brewing unit is equipped with a brewing compartment with a brewing compartment filter inside, and the brewing compartment is equipped with the brewing compartment drain nozzle in the lower part, and at the top is connected to the electronic controller via a brewing compartment cleaning module with waste tray with a full storage tray sensor connected to the electronic controller.

Conveniently, tea storage tray of the tea dispensing unit is equipped with a vacuum pump and a pressure sensor at the top, and is closed with a vacuum valve at the bottom; and the vacuum pump, pressure sensor, and vacuum valve are connected to the electronic controller.

This method and the appliance allow the user to specify the taste of the desired tea in a simple and intuitive way, and automatically adjust the appliance operating parameters, each time preparing single servings of freshly brewed tea. Moreover, this method and the appliance for automatic preparation of single servings of freshly brewed infusion from any type of leaf tea that were presented above may be expanded with any of the following modules: a storage tray and dispenser for filters for the separation of dried tea leaves, a storage tray and dispenser for cup dispensing, and a storage tray and dispenser for brewing timers, a storage tray and dispenser for dispensing cups with the filters, sealed or non-sealed tea storage trays with peripherals, payment module, remote control module, appliance operating status monitoring module, thus introducing a range of useful functions for the user.

The examples of invention design is shown in Fig. 1 - a schematic drawing of an appliance for the preparation of single servings of freshly brewed herbal infusions with three tea dispensing modules, Fig. 2 - schematic drawing of an appliance for the preparation of single servings of freshly brewed herbal infusions with three tea dispensing modules and a cup dispensing module, Fig. 3 - schematic drawing of an appliance for the preparation of single servings of freshly brewed herbal infusions with three tea dispensing modules, cup dispensing and

filter dispensing modules, Fig. 4 - schematic drawing of an appliance for the preparation of single servings of freshly brewed herbal infusions with three tea dispensing modules, and cup with filter dispensing module, Fig. 5 - schematic drawing of an appliance for the preparation of single servings of freshly brewed herbal infusions with three tea dispensing modules, cup with filter dispensing module, and a brewing timer dispensing module, Fig. 6 - schematic drawing of an appliance for the preparation of single servings of freshly brewed herbal infusions with three tea dispensing modules, cup dispensing module, filter dispensing module, and brewing timer dispensing module, Fig. 7 - brewing module, Fig. 8 - brewing module with brewing compartment, Fig. 9 - tea dispensing module, Fig. 10 - water dispensing module, Fig. 11 - cup dispensing module, Fig. 12 - filter dispensing module, Fig. 13 - cup with filter dispensing module, Fig. 14 - brewing timer dispensing module, Fig. 15 - cup with filter, Fig. 16 - schematic drawing of an appliance for the preparation of single servings of freshly brewed herbal infusions with three tea dispensing modules, cup with filter dispensing module, and dried tea leaves to go module, Fig. 17 - schematic drawing of an appliance for the preparation of single servings of freshly brewed herbal infusions with tea dispensing modules, cup with filter dispensing module, and tea aromas emitting module, Fig. 18 - schematic drawing of dried tea leaves to go module, Fig. 19 - schematic drawing of tea aromas emitting module

Example 1

A method of preparing single servings of freshly brewed herbal infusions, in particular tea, is that the user, by means of the communication interface (26), selects green tea and specifies its properties as a relaxing infusion of low intensity, and then, the selected tea at a specific amount is dispensed from the tea storage tray (1) into the brewing compartment (43), where tea is being brewed. Then 250 ml water at a temperature of 70°C is added from the water dispenser nozzle (14); brewing time is 5 minutes, and after brewing tea is filtered on the brewing compartment filter (4).

Example 2

A method of preparing single servings of freshly brewed herbal infusions, in particular tea, is the same as in Example 1, except that black tea at a specific

amount is dispensed from the tea storage tray (1) into the cup (10). 190 ml of water at a temperature of 90°C is added, and the brewing time is 3 min. The obtained tea is strong and stimulating.

Example 3

A method of preparing single servings of freshly brewed herbal infusions, in particular tea, is the same as in Example 1, except that green tea with cherry at a specific amount is dispensed from the tea storage tray (1) into the cup (10) with filter (11). 200 ml of water at a temperature of 75 °C is added, and the brewing time is 2 min. In addition, a brewing timer (15) is dispensed into the cup (10) from the brewing timer dispenser (13). The obtained tea is strong and relaxing.

Example 4

The appliance for the preparation of single servings of freshly brewed herbal infusions, tea in particular, is equipped with an electronic controller (25) connected to three tea dispensing units (51), water dispensing unit (52), brewing unit (50), and the communication interface (26). Each tea dispensing unit (51) has a tea storage tray (1) with a hermetically sealed lid (3), which is connected to the tea dispenser (2) equipped with no-tea sensor (30). Tea storage tray (1) of the tea dispensing unit (51) is equipped with a vacuum pump (4) and a pressure sensor (41) at the top, and is closed with a vacuum valve (5) at the bottom; and the vacuum pump (4), pressure sensor (41), and vacuum valve (5) are connected to the electronic controller (25). Water dispensing unit (52) is equipped with heating modules, each of which has a water heating compartment (22) equipped with a heater (23) and temperature sensors (35), and a water level sensor (60), all connected to an electronic controller (25), wherein water heating compartment outlet (22) is connected by a solenoid valve (21) with a pump (20). The pump (20) in one section is connected to the second section via a solenoid valve (21) and to the electronic controller (25). The pump (20) in the second section is connected via a solenoid valve (21) and flow meter (18) to the water dispenser nozzle (14) and the electronic controller (25). The flow meter (18) and the solenoid valve (21) are also connected to the electronic controller (25).

Water heating compartment inlet (22) is connected to the water tank (16)

equipped with water level sensor (37), which is connected to the electronic controller (25). In addition, water heating compartment inlet (22) is connected via a solenoid valve (21) to the running water supply (17). Solenoid valve (21) is connected to the electronic controller (25). Between the water tank (16) and water supply (17) and the water heating section (22) there are water filter (19) and a pump (20), and a safety valve (36); and the pump (20) is connected to the electronic controller (25). And the second water section is connected to the cooler inlet and outlet (24) via a solenoid valve (21) connected to the electronic controller (25), and between the solenoid valve (21) and the cooler (24) there is a pump (20), which is also connected to the electronic controller (25).

Water dispensing system (52) operates in such a way that the first water heating compartment (22) the water is preheated. In the second compartment (22) it is brought to the boiling temperature and then, depending on the selected type of tea, it is dispensed into a cup or cooled to a lower temperature. Sensors (60) control water level in the tanks. In this appliance, the brewing module (50) is equipped with no-cup in the brewing zone sensor (34) connected to the electronic controller (25).

Example 5

An appliance for the preparation of single servings of freshly brewed herbal infusions, especially tea, is designed as in Example 4, except that the electronic controller (25) is connected to the cup dispensing module (53) with cup storage tray (6) and cup dispenser (7), and no cup sensor (31). In this appliance, brewing module (50) equipped with a brewing compartment (43) with a brewing compartment filter inside (45), where the brewing compartment (43) is equipped with the brewing compartment drain nozzle in the lower part (44), and at the top is connected to the electronic controller (25) via a brewing compartment cleaning module (46), with waste tray (47) with a full storage tray sensor (48) connected to the electronic controller (25).

Example 6

An appliance for the preparation of single servings of freshly brewed herbal infusions, especially tea, is designed as in Example 4, except that the electronic controller (25) is connected to the cup dispensing module (53) with cup storage

tray (6) and cup dispenser (7), and no cup sensor (31); and the electronic controller (25) is connected to the filter dispensing unit (54) with filter storage tray (8), filter dispenser (9), and no filter sensor (32).

Example 7

An appliance for the preparation of single servings of freshly brewed herbal infusions, especially tea, is designed as in Example 4, except that the electronic controller (25) is connected to the cup with filter dispensing module (55) with cup with filter storage tray (38), cup with filter dispenser (39), and no cup with filter sensor (40). In the storage tray for cups with filters (38) there are cups with filters (42), and each cup with a filter (42) has a cup (10) with a filter (11) combined with a filter by means of a snap connection (57). The surface of the filter (11) is well fitted to the shape of the cup (10), which allows brewing in the entire volume of water in the cup (10) in order to improve the taste of tea.

Example 8

An appliance for the preparation of single servings of freshly brewed herbal infusions, especially tea, is designed as in Example 4, except that the electronic controller (25) is connected to the filter dispensing module (54) with filter storage tray (8), filter dispenser (9), and no filter sensor (32).

Example 9

An appliance for the preparation of single servings of freshly brewed herbal infusions, especially tea, is designed as in Example 4, except that the electronic controller (25) is connected to the tea aromas emitting module with three fans (62), three air valves (61), and a tube for discharging aromas out of the appliance. Each air valve (61) is located between the fan (62) and the tea storage tray (1). Correctly controlled air valve (61) allows the dried tea aroma to penetrate from the tea storage tray (1) into the discharge tube and out of the appliance, and cuts off the uncontrolled escape of dried tea aroma and prevents mixing of different aromas.

Example 10

An appliance for the preparation of single servings of freshly brewed herbal infusions, in particular tea, as in Example 4, except that the electronic controller (25) is connected to a dried tea packaging module (58) with no sachet sensor (68)

and sachet storage tray (64) with a roll of film, from which the film is unrolled and shaped into a suitable sachet, previously filled with the desired portion of dried tea leaves dispensed from the tea storage tray (1), and delivered to a sachet (70) via tea dispenser outlet splitter (63). The signal from the splitter position sensor (67) prevents dried tea leaves from entering the brewing module (50). When no tea sensor (69) detects that the correct amount of dried tea leaves are in the sachet (70), sachet close and separate device (65) seals the sachet (70), which is then passed to the collecting compartment (66). From this compartment, the customer collects a sachet of tea to go. Dried tea leaves packaging module (58) may additionally comprise a labelling device to attach labels with the selected tea name on the sachet (70). It may also comprise a unit to pump out the air and create vacuum before closing the sachet (70).

Example 11

An appliance for the preparation of single servings of freshly brewed herbal infusions, especially tea, is designed as in Example 4, except that the electronic controller (25) is connected to the brewing timer dispensing module (56) with brewing timer storage tray (12) and brewing timer dispenser (13), and no brewing timer sensor (33).

Example 12

An appliance for the preparation of single servings of freshly brewed herbal infusions, especially tea, is designed as in Example 4, except that the electronic controller (25) is connected to the cup dispensing module (53) with cup storage tray (6) and cup dispenser (7), and no cup sensor (31); and the electronic controller (25) is connected to the filter dispensing unit (54) with filter storage tray (8), filter dispenser (9), and no filter sensor (32). Electronic controller (25) is also connected to the brewing timer dispensing unit (56) equipped with a brewing timer storage tray (12) with a brewing timer dispenser (13), and no-brewing timer sensor (33). Electronic controller (25) is also connected to the payment module (27), remote control module (28), and an appliance operating status monitoring module (29). Furthermore, water heating compartment inlet (22) is connected via a solenoid valve (21) to the water supply (17), and between the solenoid valve (21) and the water heating compartment (22) there are water filter (19), flow

meter (18), and a pump (20), and also a safety valve (36), also the flow meter (18) and the pump (20) are connected to the electronic controller (25), whereas the water dispensing module (52) is equipped with a water cooler (24) incorporated into one of the water heating sections between the two water heating compartments (22).

The appliance for automatic preparation of single servings of freshly brewed tea from any type of tea (leaves) consists of the following basic components: housing, electronic control system, user communication interface. Furthermore, basic systems are connected by means of an electrical and hydraulic installations: water supply, tea storage and dispensing. Tea storage and dispensing system can be installed in any number. Moreover, this appliance for automatic preparation of single servings of freshly brewed infusion from any type of leaf tea may be expanded with any of the following modules: a storage tray and dispenser for filters for the separation of dried tea leaves, a storage tray and dispenser for cup dispensing, and a storage tray and dispenser for brewing timers, a storage tray and dispenser for dispensing cups with the filters, aroma emitting module, payment module, remote control module, appliance operating status monitoring module, brewing compartment module.

Water supply system consists of: water tank (16) and/or solenoid valve (21) connected to the water supply source (17) connected via water filter (19) with a flow meter (18), and a pump (20). At the pump outlet, a safety valve (36) is connected to protect other components from damage, excess water from the safety valve is returned to the system. Next are the water heating sections that consist of water heating compartments (22) equipped with a heater (23). At the water heating compartment outlet (22) a solenoid valve (21) is installed, which dispenses water via a water dispenser nozzle (14). Water temperature is controlled in the feedback loop by temperature sensors (35). The amount of dispensed water is controlled by means of a flow meter (19). It is possible to connect several water heating section. In addition, water heating sections can be expanded with water coolers (24). Water level sensor (37) indicates the minimum water level in the water tank (16). Signals from temperature sensors (35), water level sensor (16) and the flow meter (18) are connected to the electronic controller

(25). Using these signals, electronic controller (25) controls the solenoid valves (21), pump (20), and heater (23), automatically adjusting the amount and temperature of water, depending on the selected type of tea and user's preferences as to the infusion taste.

Tea storage and dispensing module consists of: tea storage tray (1) connected to the tea dispenser (2) and ~~a hermetically sealed lid (3)~~ for the tea storage tray. Tea dispenser (2) is equipped with no tea sensor (30). Tea dispenser (2) does not damage tea leaves and accurately dispenses the required amount of dried tea leaves. Any number of tea storage and dispensing units can be installed in the appliance. Tea storage system can be expanded with a vacuum valve (5), vacuum pump (4), and pressure sensor (41) for dried tea leaves storage without the presence of air, which effectively extends the shelf-life of tea and improves its taste. Signals from no tea sensor (30) and pressure sensor (41) are connected to an electronic controller (25). Using these signals, electronic controller (25) controls the operation of the tea dispenser (2) and the vacuum pump (4). The amount of tea and water is automatically adjusted to the type of tea and user preferences.

The cup storage tray and dispenser module consists of: cup storage tray (6) connected to the cup dispenser (7) and no cup sensor (31). Signal from no cup sensor (31) is connected to an electronic controller (25). Using the signal from no cup sensor (31), electronic controller (25) controls the operation of the cup dispenser (7). Cup dispenser (7) puts the cup (10) in the brewing zone (49).

Filter storage tray and dispenser module for the separation of leaf tea consists of: filter storage tray (8) connected to the filter dispenser (9) and no filter sensor (32). Signal from no filter sensor (32) is connected to an electronic controller (25). Using the signal from no filter sensor (32), electronic controller (25) controls the operation of the filter dispenser (9). Filter dispenser (9) puts the filter (11) in any cup in the brewing zone (49) after prior check by no cup sensor (34) connected to the electronic controller (25). When no cup sensor (34) detects the cup (10) and after inserting the filter (11) dried tea leaves are put in the filter via tea dispenser (2). Next, the correct amount of water at a given temperature is added to the cup via water dispenser nozzle (14) and the entire water system

nozzle.

The cup with filter storage tray and dispenser module consists of: cup with filter storage tray (38) connected to the cup with filter dispenser (39) and no cup with filter sensor (40). Signal from no cup with filter sensor (40) is connected to an electronic controller (25). Using the signal from no cup with filter sensor (40), electronic controller (25) controls the operation of the cup with filter dispenser (39). Cup with filter dispenser (39) puts the cup with filter (42) in the brewing zone (49). Using the cup with filter storage tray and dispenser simplifies the design of the appliance and eliminates two other modules: cup storage tray and dispenser, and filter storage tray and dispenser. When no cup sensor (34) detects the cup with filter (42) dried tea leaves are put in the cup via tea dispenser (2). Next, the correct amount of water at a given temperature is added to the cup via water dispenser nozzle (14) and the entire water system nozzle.

Tea aroma emitting module consists of at least one fan (62), at least one air valve (61), and a tube discharging aromas outside the appliance. Each air valve (61) is located between the fan (62) and the tea storage tray (1), however, it is not limited to that tray, this can be any tray with dried tea leaves. Correctly controlled air valve (61) allows the dried tea aroma to penetrate from the tea storage tray (1) into the discharge tube and out of the appliance, and cuts off the uncontrolled escape of dried tea aroma and prevents mixing of different aromas.

Dried tea leaves packaging module consists of a storage tray (64), from which the film is unrolled and shaped into a sachet. When no sachet sensor (68) has confirmed the presence of a sachet, it is filled with previously set amount of dried tea dispensed from the tea storage tray (1) and delivered via teat dispenser outlet splitter (63) to the sachet (70). The signal from the splitter position sensor (67) prevents dried tea leaves from entering the brewing module (50). When no tea sensor (69) detects that dried tea leaves are in the sachet (70), sachet close and separate device (65) seals the sachet (70), which is then passed to the collecting compartment (66). From this compartment, the customer collects a sachet of tea to go. Dried tea leaves packaging module may additionally comprise a labelling device to attach labels with the selected tea name on the sachet (70). It may also comprise a unit to pump out the air and create vacuum before closing

the sachet (70).

Brewing timer module consists of: brewing timer storage tray (12) combined with brewing timer dispenser (13) and no brewing timer sensor (33). Signal from no brewing timer sensor (33) is connected to an electronic controller (25). Using the signal from no brewing timer sensor (33), electronic controller (25) controls the operation of the brewing timer dispenser (13). Brewing timer dispenser (13), after adding water inserts an appropriate brewing timer (15) in the filter (11) in any cup. Furthermore, brewing timers (15) can be integrated with cups (10), filters (11) or cups with filters (42), which significantly simplifies the design of the appliance for automatic preparation of single servings of freshly brewed tea from any type of leaf tea.

Brewing module (50) can be in one of two versions, the first one according to Fig. 9, consists of: brewing compartment (43) equipped with a brewing compartment filter (45) and connected to the brewing compartment drain nozzle (44) via a solenoid valve (21). Furthermore, in the brewing compartment (43) there is a brewing compartment cleaner (46) connected to the waste tray (47) and the waste level sensor (48). Signal from the waste tray is connected to the electronic controller (25). Moreover, electronic controller is connected to the solenoid valve (21) and the brewing compartment cleaner (46). Solenoid valve (21) controls emptying the brewing compartment (43) of the freshly made tea. The user has the option to decide whether draining is to occur only after the confirmation of the presence of any cup on the base (49). This is done based on a signal from no cup sensor (34), previously processed by an electronic controller (25). Brewing compartment cleaner (46) controls emptying of the brewing compartment (43) of the used dried tea leaves. The compartment is emptied after receiving a signal from the electronic controller (25) that the brewing process has ended. Waste dried tea leaves got the waste tray (47), which is emptied periodically by the user when the appliance indicates the tray is full. Brewing compartment filter (45) separates dried tea leaves from tea after brewing. In the second version according to Fig. 8, the brewing module (50) is equipped with a base (49) and no cup sensor (34). The user has the option to decide whether draining is to occur only after the confirmation of the presence of any cup on the

base (49). This is done based on a signal from no cup sensor (34), previously processed by an electronic controller (25).

The base (49) serves as a preparation area to prepare the components required for the beverage and/or its brewing. Brewing process can be done in cups (10) (disposable or conventional), cups with filters (42) or in the brewing module (50). An exemplary process of leaf tea brewing takes from 2 to 10 minutes. Using a cup (10) or cup with filter (42) skipping the brewing compartment (43) allows the user to walk away from the machine with tea and save time needed to make a cup of tea. If the machine is used at home or any other confined space, it is possible to equip the appliance for an automatic preparation of single servings of freshly brewed infusions from any type of leaf tea with a brewing compartment (43) to obtain the beverage without dried tea and other components, and use the same dried tea portion several times, thereby obtaining different tastes. The machine equipped with the brewing compartment (43) will inform the user via an electronic controller (25) and the communication interface (26) that the prepared beverage is ready.

Electronic control system processes the signals from: no tea sensors (30), no cup sensors (31), no filter sensors (32), brewing timer sensors (33), no cup in the brewing zone sensors (34), temperature sensors (35), water level sensors (37), no cup with filter sensor (40), pressure sensors (41), waste level sensors, flow meter (18) and gives commands to the operating components: tea dispensers (2), vacuum pumps (4), vacuum valves (5), cup dispensers (7), filter dispensers (9), brewing timer dispensers (13), pump (20), solenoid valves (21), heaters (23), cup with filter dispenser (39), brewing compartment cleaner (46). The most important component of the control system is an electronic controller (25). It controls the execution of control algorithms. Electronic controller (25) is connected to the user communication interface (26) that transmits user commands to the electronic controller (25) for the operation of the appliance for automatic preparation of single servings of freshly brewed infusions from any type of leaf tea. Its second function is to inform the user about the current progress of the brewing process prompting any necessary operations to be performed by the user to ensure proper operation of the appliance for automatic preparation of

single servings of freshly brewed infusions from any type of leaf tea. User communication interface (26) can be equipped with control buttons, display, touch screen or a combination thereof. Furthermore, the electronic controller (25) can be connected to a payment module (27) for receiving payment for tea. Cash or card payments are possible. Moreover, electronic controller (25) can be connected to the remote control module (28) for controlling the appliance for automatic preparation of single servings of freshly brewed infusions from any type of leaf tea via any wireless electronic device, e.g. mobile phone, tablet, notebook, etc. Moreover, Service Technician can use the remote control module (28) to perform remote maintenance and testing, for example, cleaning the circuit for water heating and dispensing, emptying the brewing compartment, appliance restart, etc. Electronic controller (25) can also be connected to the appliance operating status monitoring module (29). This component transmits current information to the database on the operating parameters, e.g.: the remaining amount of dried tea, number of beverages made, number of remaining cups, which is done via an independent communication channel, e.g. via mobile network. Another function of the appliance operating status monitoring module (29) is continuous observation and recording the machine condition.

All systems and modules are connected to each other via an electrical and hydraulic or air installations. Moreover, the components are located and installed inside the housing made of metal and plastic.

A method of automatic preparation of single servings of freshly brewed infusions from any type of leaf tea, is that based on the user's preferences and selection, the machine automatically prepares tea of any aroma and various properties, e.g. relaxing, stimulating, low or high intensity. Taste can be modified with the following parameters: amount of water, water temperature, amount of tea, brewing time. The combination of these four parameters also depends on the type of tea. Moreover, the machine equipped with an aroma emitting module is able to, before brewing, provide the customer with a sample of the selected tea aroma, so that the user can accept or reject the selected type of tea. And with dried tea packaging module, the customer can buy any amount of freshly packed bags with any type of dried tea leaves for use at a later time.

The list of designations in the drawing:

1. Tea storage tray,
2. Tea dispenser,
3. Tea storage tray lid,
4. Vacuum pump,
5. Vacuum valve,
6. Cup storage tray,
7. Cup dispenser,
8. Filter storage tray,
9. Filter dispenser,
10. Cup,
11. Filter,
12. Brewing timer storage tray,
13. Brewing timer dispenser,
14. Water dispenser nozzle,
15. Brewing timer,
16. Water tank,
17. Water supply source,
18. Flow meter,
19. Water filter,
20. Pump,
21. Solenoid valve,
22. Water heating compartment,
23. Heater,
24. Water cooler,
25. Electronic controller,
26. User communication interface,
27. Payment module,
28. Remote control module,
29. Machine operating status monitoring module,
30. no tea sensor,
31. no cup sensor,

32. no filter sensor,
33. no brewing timer sensor,
34. no cup in the brewing zone sensor,
35. Temperature sensor,
36. Safety valve,
37. Water level sensor,
38. Cup with filter storage tray,
39. Cup with filter dispenser,
40. No cup with filter sensor,
41. Pressure sensor,
42. Cup with filter,
43. Brewing compartment,
44. Brewing compartment drain nozzle,
45. Brewing compartment filter,
46. Brewing compartment cleaner,
47. Waste tray,
48. Waste level sensor,
49. Base,
50. Brewing module,
51. Tea dispensing module,
52. Water dispensing module,
53. Cup dispensing module,
54. Filter dispensing module,
55. Cup with filter dispensing module,
56. Brewing timer dispensing module,
57. Snap connection.
58. Dried tea to go packaging module
59. Tea aroma emitting module
60. Water level sensor
61. Air valve
62. Fan
63. Tea dispenser outlet splitter

64. Sachet storage tray
65. Sachet close and separate device
66. Collecting compartment
67. Splitter position sensor
68. No sachet sensor
69. No tea sensor
70. Sachets

Claims

1. A method for the preparation of single servings of freshly-brewed herbal infusions, **characterised by the fact that** : by means of a user communication interface (26) selects the type of tea, type of infusion (relaxing or stimulating), and the intensity of the infusion; the selected tea at a specific amount is then dispensed from the tea tray (1), and with at least one water dispenser nozzle (14), water is added in an amount from 190 ml to 250 ml and at a temperature from 60 °C to 90 °C; brewing time is from 2 to 10 min.
2. A method, according to Claim 1, **characterised by the fact that** from the tea tray (1) the selected tea in a specific amount is dispensed into the brewing compartment (43), where the infusion is brewed and then filtered on the brewing compartment filter (45).
3. A method, according to Claim 1, **characterised by the fact** that from the tea tray (1) the selected tea in a specific amount is dispensed into the cup (10).
4. A method, according to Claim 1, **characterised by the fact** that from the tea tray (1) the selected tea in a specific amount is dispensed into the cup (10) with a filter (11), and then filtered on a filter (11).
5. A method, according to Claim 3 or 4, **characterised by the fact** that the brewing timer (15) is dispensed from the brewing timer dispenser (13).
6. An appliance for the preparation of single servings of freshly brewed herbal infusions, especially tea, **characterised by the fact that** it is equipped with an electronic controller (25) connected to at least one tea dispensing unit (51), water dispensing unit (52), brewing unit (50), and the communication interface (26), where each tea dispensing unit (51) has a tea tray (1) with a lid (3), which is connected to a tea dispenser (2) equipped with no-tea sensor (30), and water dispensing unit (52) is equipped with heating modules, each of which has a water heating compartment (22) equipped with a heater (23) and temperature sensors (35) connected to an electronic controller (25), wherein the water heating compartment outlet (22) is

connected by a solenoid valve (21) to the water dispenser nozzle (14).

7. An appliance, according to Claim 6, **featured with an** electronic controller (25) connected to the cup dispensing unit (53) equipped with a cup tray (6) with a cup dispenser (7) and no-cup sensor (31).
8. An appliance, according to Claim 6 or 7, **featured with an** electronic controller (25) connected to a filter dispensing unit (54) equipped with a filter tray (8) with a filter dispenser (9) and no-filter sensor (32).
9. An appliance, according to Claim 6, **featured with an** electronic controller (25) connected to the cup with filter dispensing unit (55) equipped with a cup with filter tray (38) with a cup with filter dispenser (39) and no-cup with filter sensor (40).
10. An appliance, according to Claim 9, **featured** with a tray for cups with filters (38) with cups equipped with a filter (42), and each cup equipped with a filter (42) has a cup (10) with a filter (11) combined with a filter (11) by means of a snap connection.
11. An appliance, according to Claim 6, **featured with** an electronic controller (25) connected to the dried tea leaves packaging unit (58) with a packaging tray (64) equipped with a film roll and a tea outlet splitter (63) with a splitter position sensor (67), packaging close-split device (65), no packaging sensor (68), tea in the packaging (70) sensor (69), and the receiving compartment (66) with access from the outside of the appliance, for the packaged, previously measured portions of a given type of tea.
12. An appliance, according to Claim 6, **featured with an** electronic controller (25) connected to a tea aroma emitting unit (59) equipped with at least one fan (62), valve (61), and a tube for discharging aromas out of the appliance, this fan (62) is located between the dried tea compartment, which may serve as a tea tray (1) and the valve (61), and the number of fans (62) corresponds to the number of tea dispenser units (51).
13. An appliance, according to Claim 6, **featured with an** electronic controller (25) connected to the brewing timer dispensing unit (56) equipped with a brewing timer tray (12) with a brewing timer dispenser (13) and no-brewing timer sensor (33).

14. An appliance, according to Claim 6, **featured** with an electronic controller (25) connected to the payment module (27).
15. An appliance, according to Claim 6, **featured** with an electronic controller (25) connected to the remote control module (28).
16. An appliance, according to Claim 6, **featured** with an electronic controller (25) connected to the monitoring and operating status module (29).
17. An appliance, according to Claim 6, **featured with** a water heating compartment inlet (22) connected to the water tank (16) with a water level sensor (37), which is connected to an electronic controller (25) and/or water heating compartment inlet (22) connected by a solenoid valve (21) to the running water supply (17), and between the water tank (16) and water heating compartment (22) there are water filter (19), pump (20), and the safety valve (36), and the pump (20) is connected to an electronic controller (25), and the pump (20) in one compartment is connected to the second compartment via a solenoid valve (21) and to the electronic controller (25), and the pump (20) in the second compartment is connected via a solenoid valve (21) and a flow meter (18) to the water dispenser nozzle (14) and the electronic controller (25), to the second water compartment, inlet and outlet of the cooler (24) are connected through a solenoid valve (21), while between the solenoid valve (21) and cooler (24), a pump (20) is connected.
18. An appliance, according to Claim 6, **featured with a** brewing unit (50) equipped with no-cup in the brewing zone sensor (34) connected to the electronic controller (25).
19. An appliance, according to Claim 18, **featured with a** brewing unit (50) equipped with a brewing compartment (43) with a brewing compartment filter inside (45), where the brewing compartment (43) is equipped with the brewing compartment drain nozzle in the lower part (44), and at the top is connected to the electronic controller (25) via a brewing compartment cleaning module (46), with waste tray (47) with a full tray sensor (48) connected to the electronic controller (25).
20. An appliance, according to Claim 6, **featured with a** tea tray (1) of the tea dispensing unit (51) is equipped with a vacuum pump (4) and pressure

sensor (41) at the top, and is closed with a vacuum valve (5) at the bottom, and the vacuum pump (4), pressure sensor (41), and vacuum valve (5) are connected to the electronic controller (25).

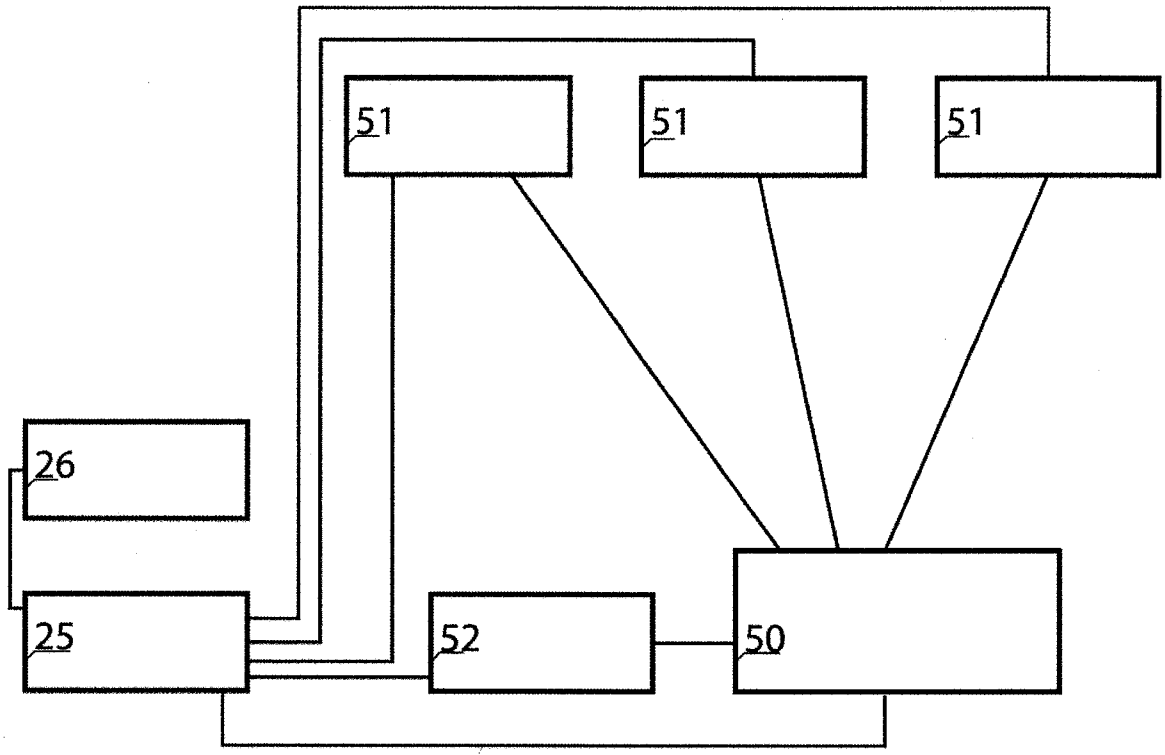

Fig. 1

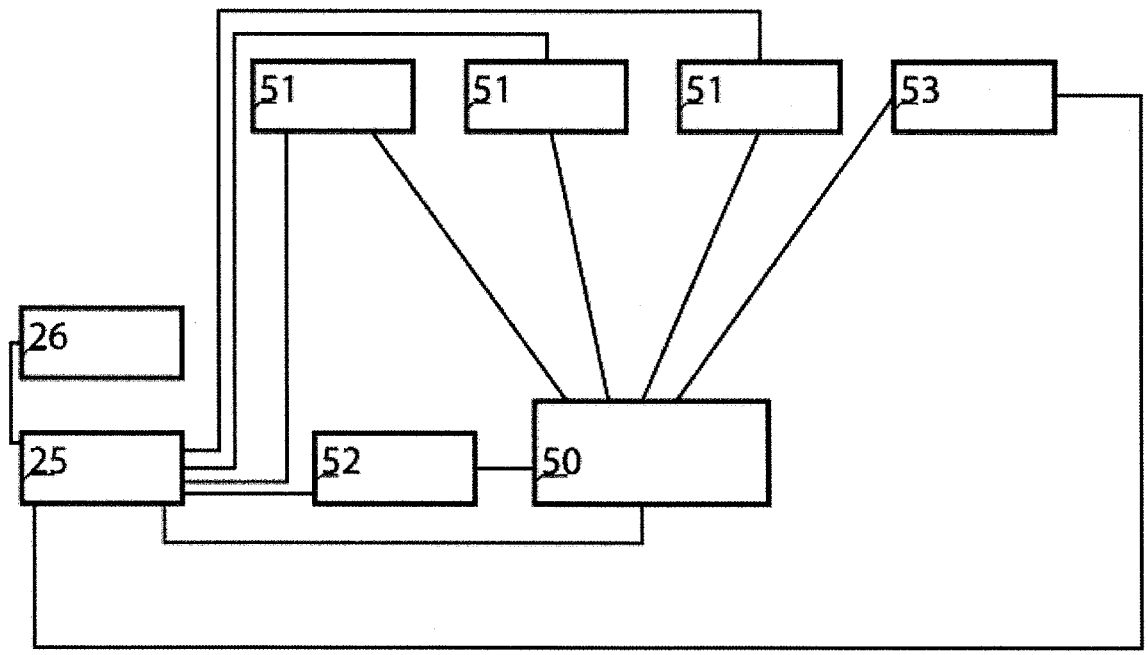

Fig. 2

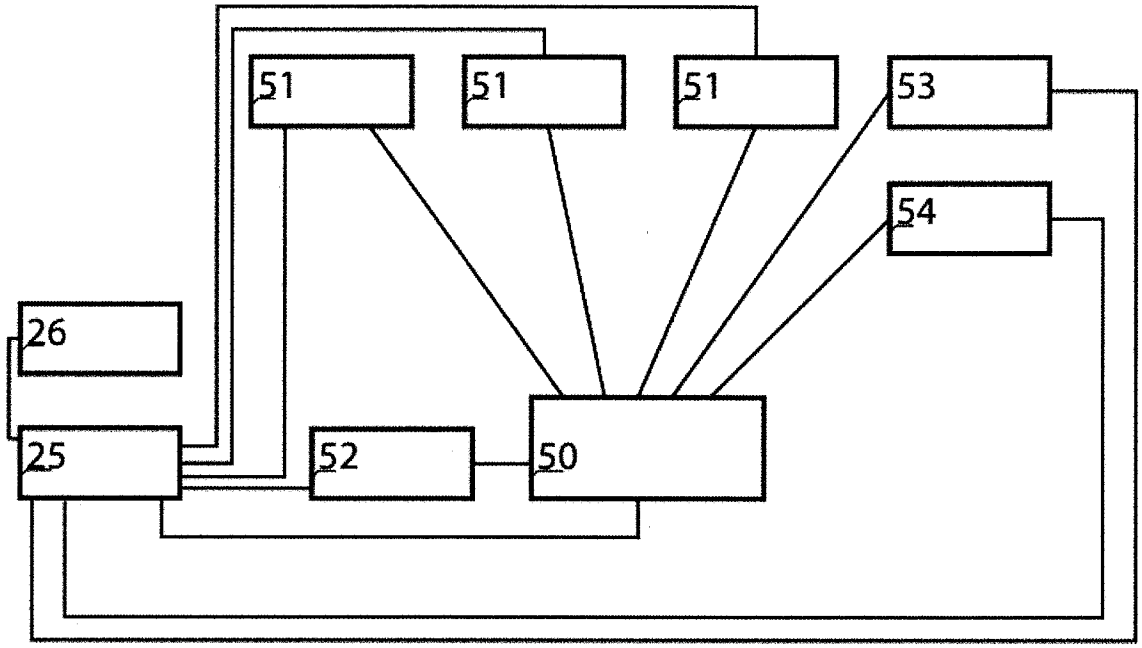

Fig. 3

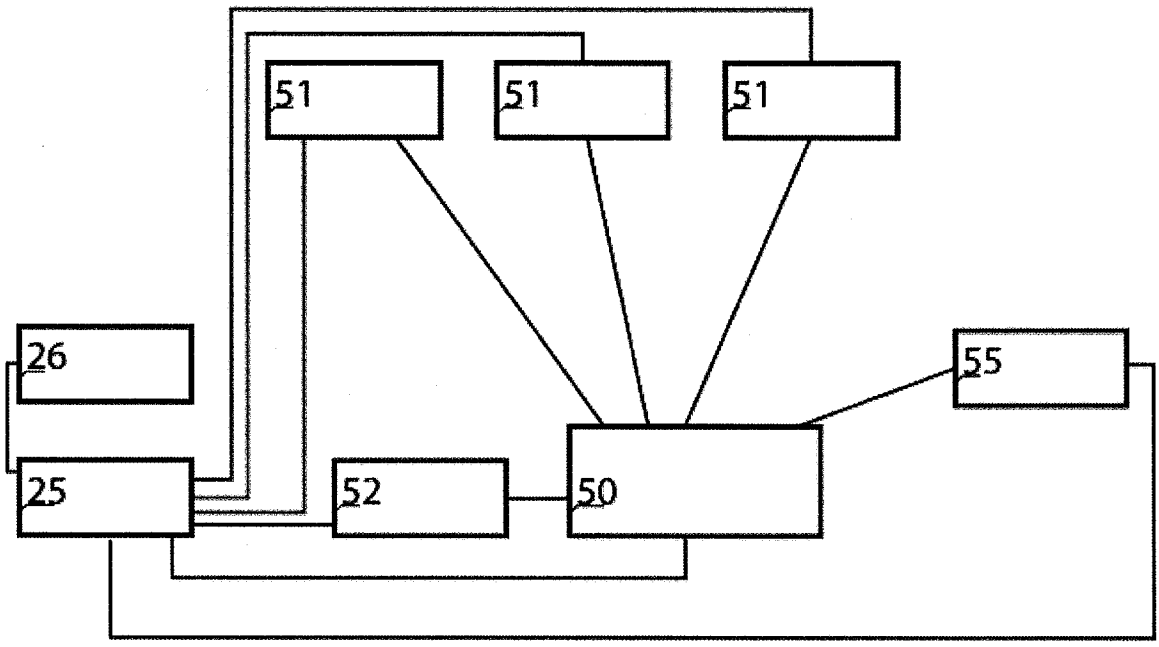

Fig. 4

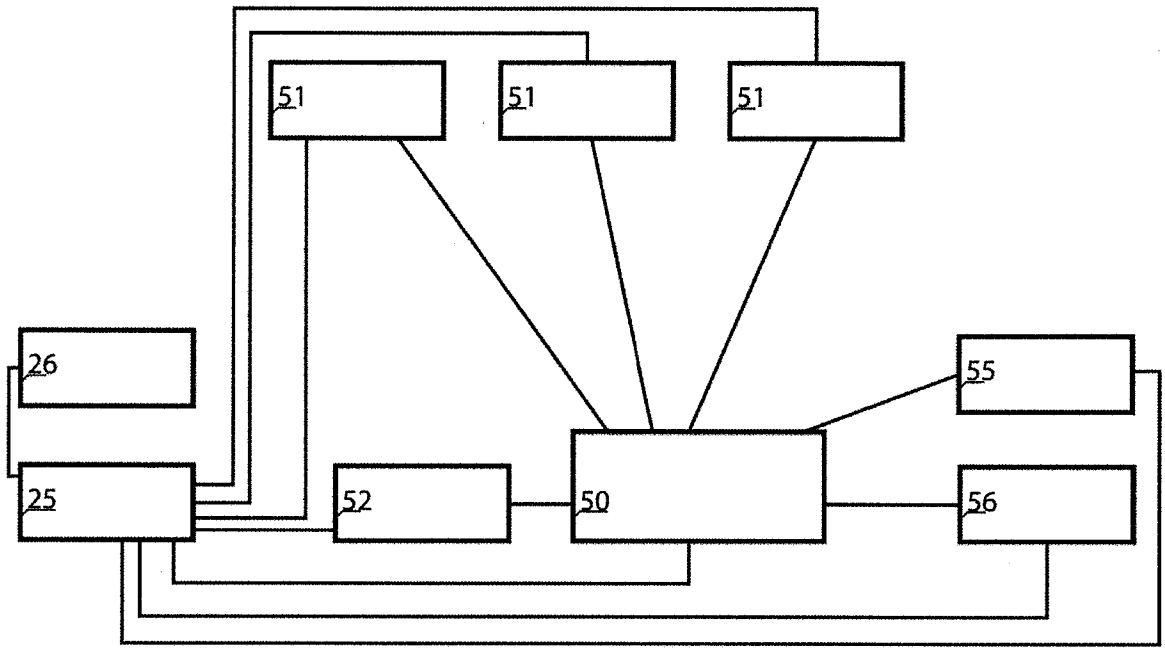

Fig. 5

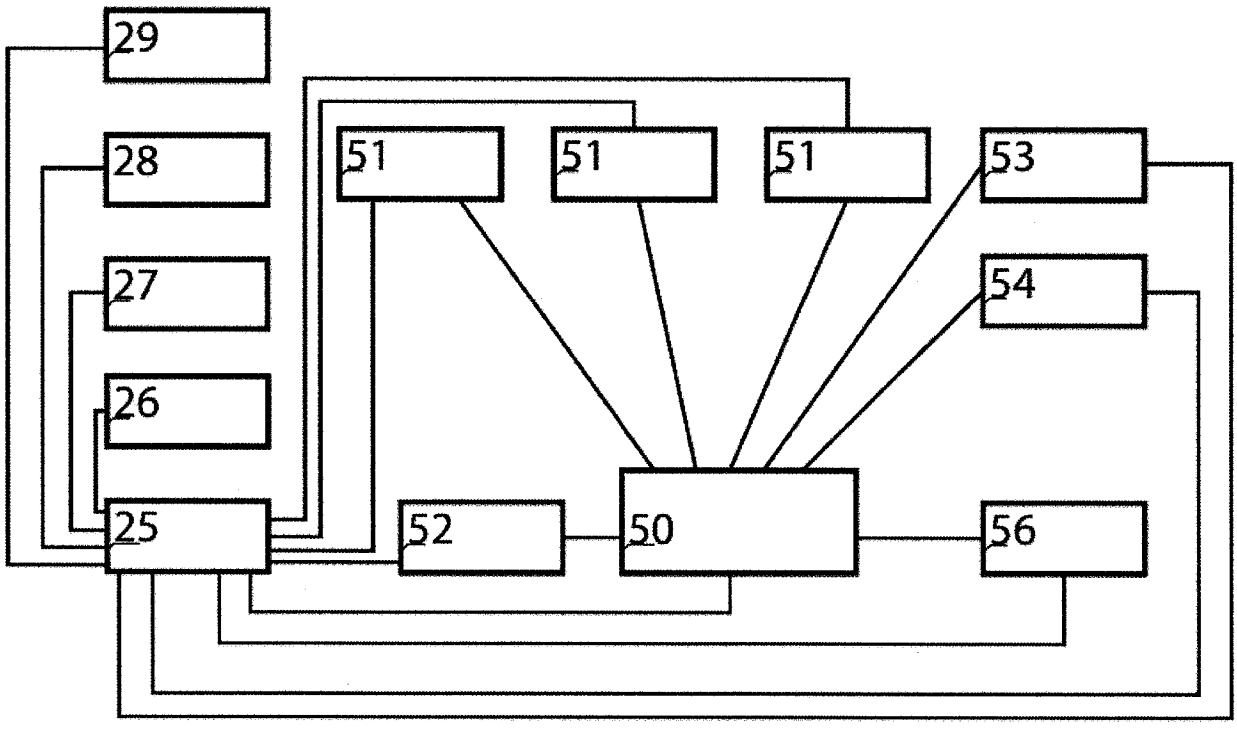

Fig. 6

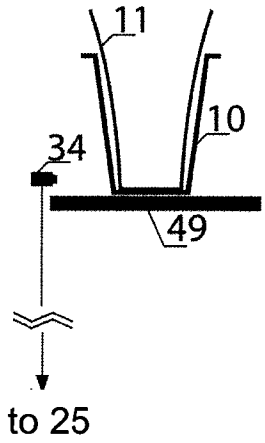

Fig. 7

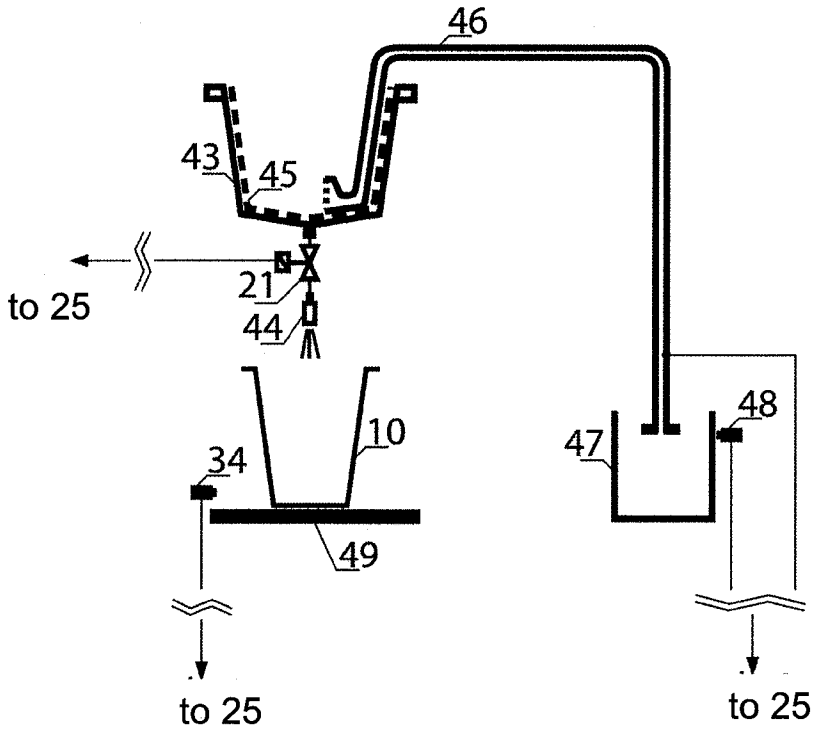

Fig. 8

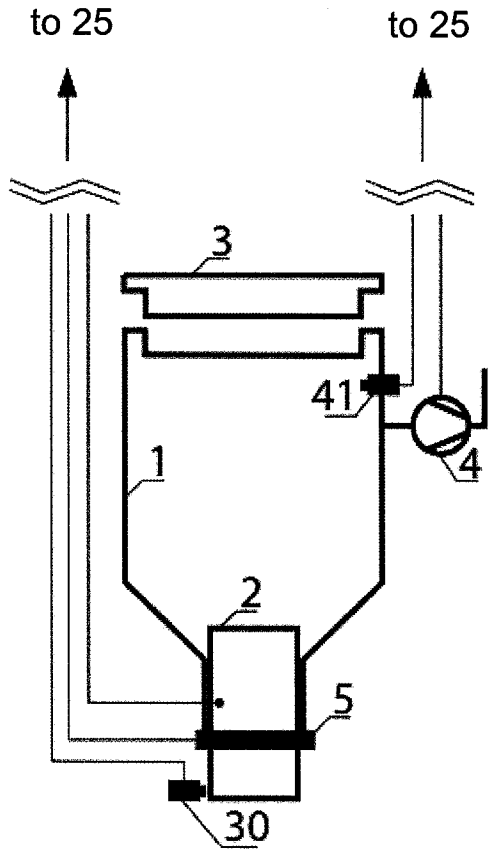

Fig. 9

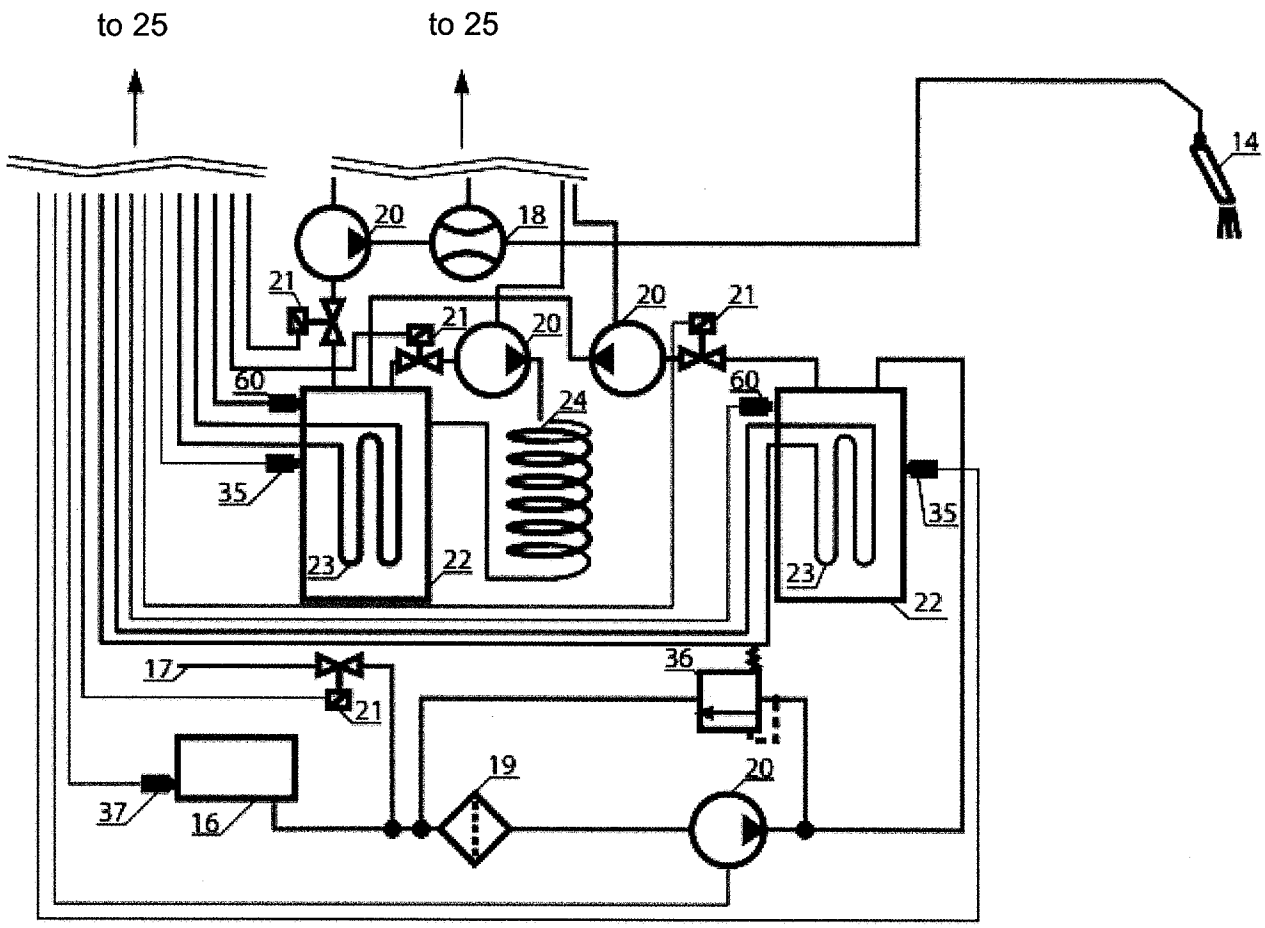
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Fig. 10

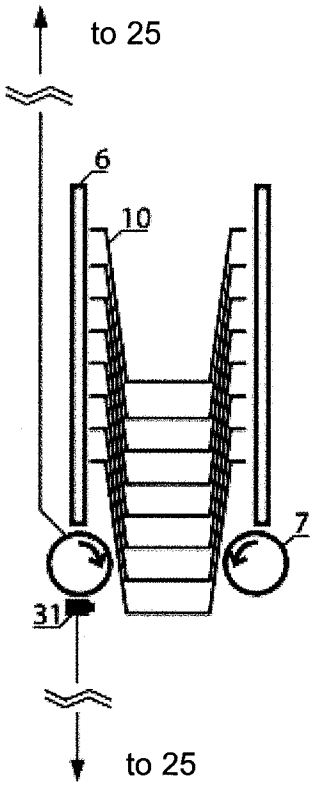

Fig. 11

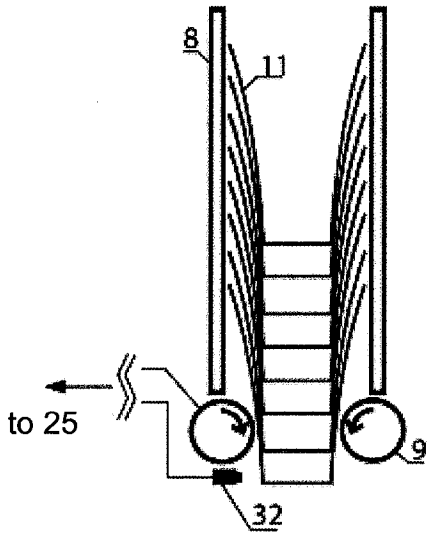

Fig. 12

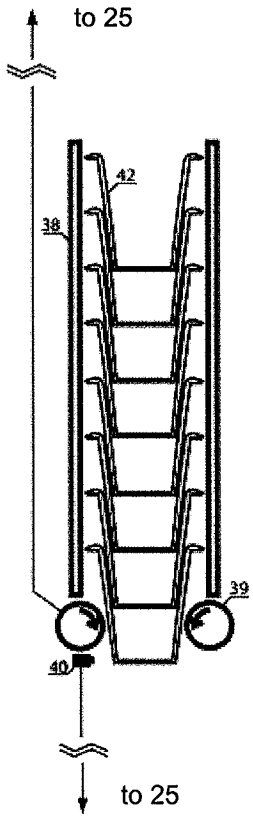

Fig. 13

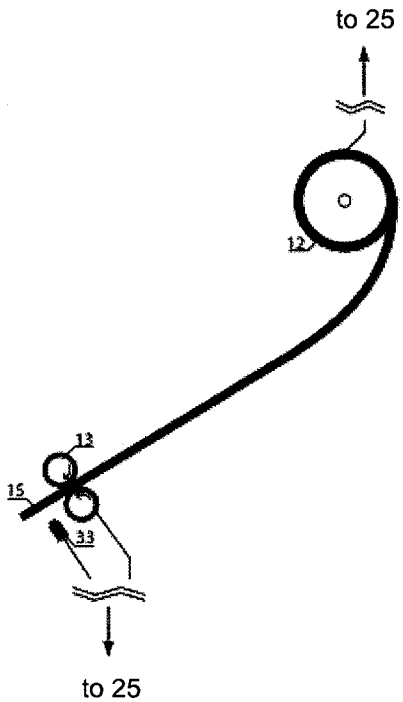

Fig. 14

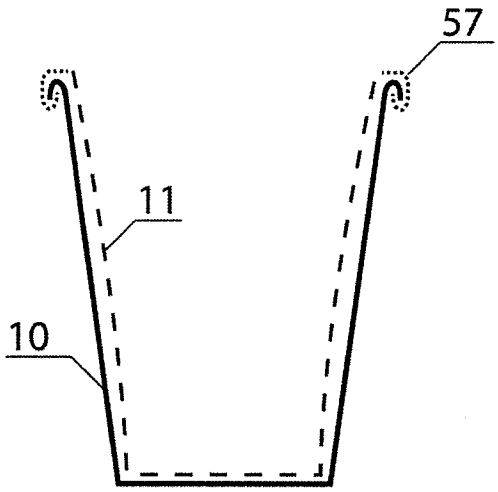

Fig. 15

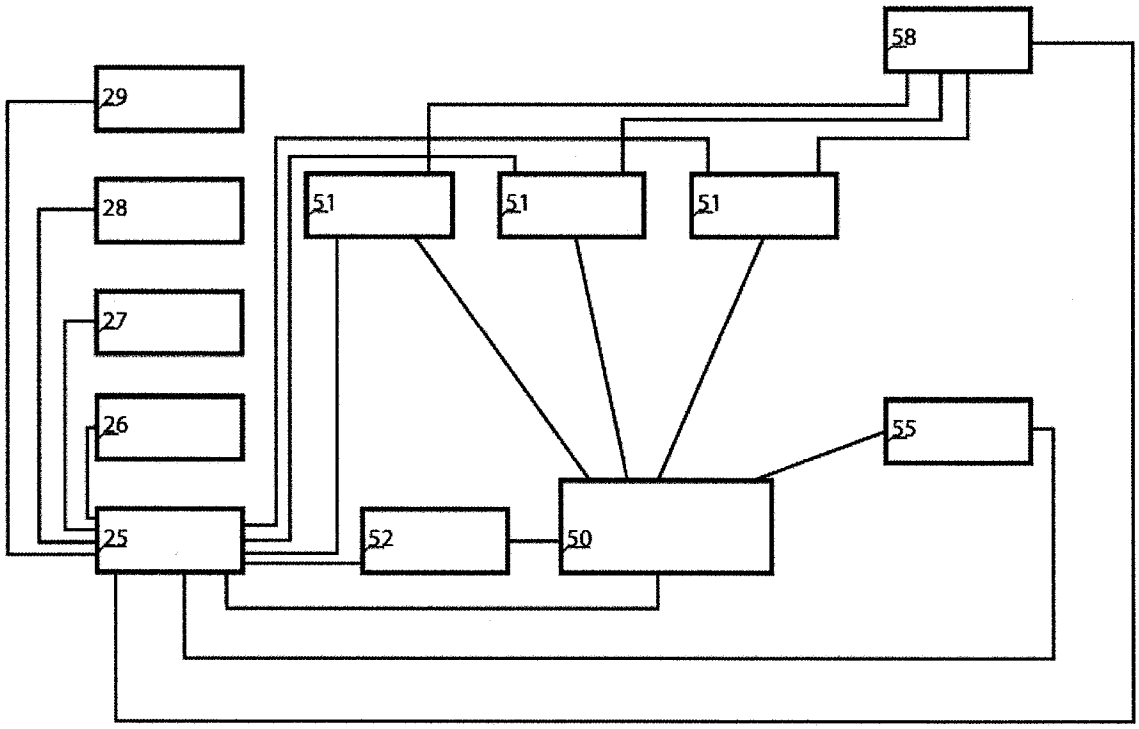

Fig. 16

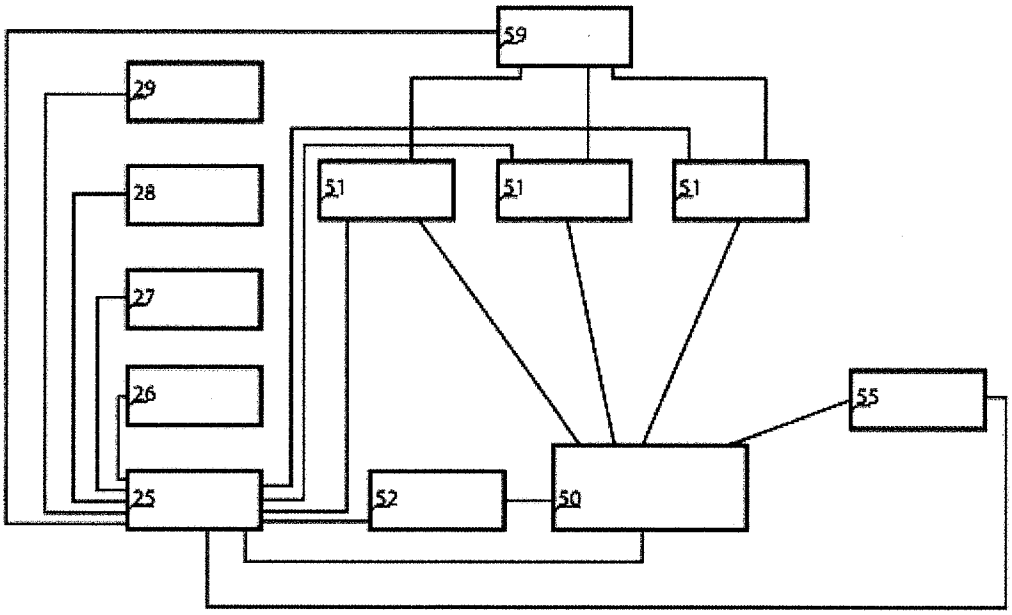

Fig. 17

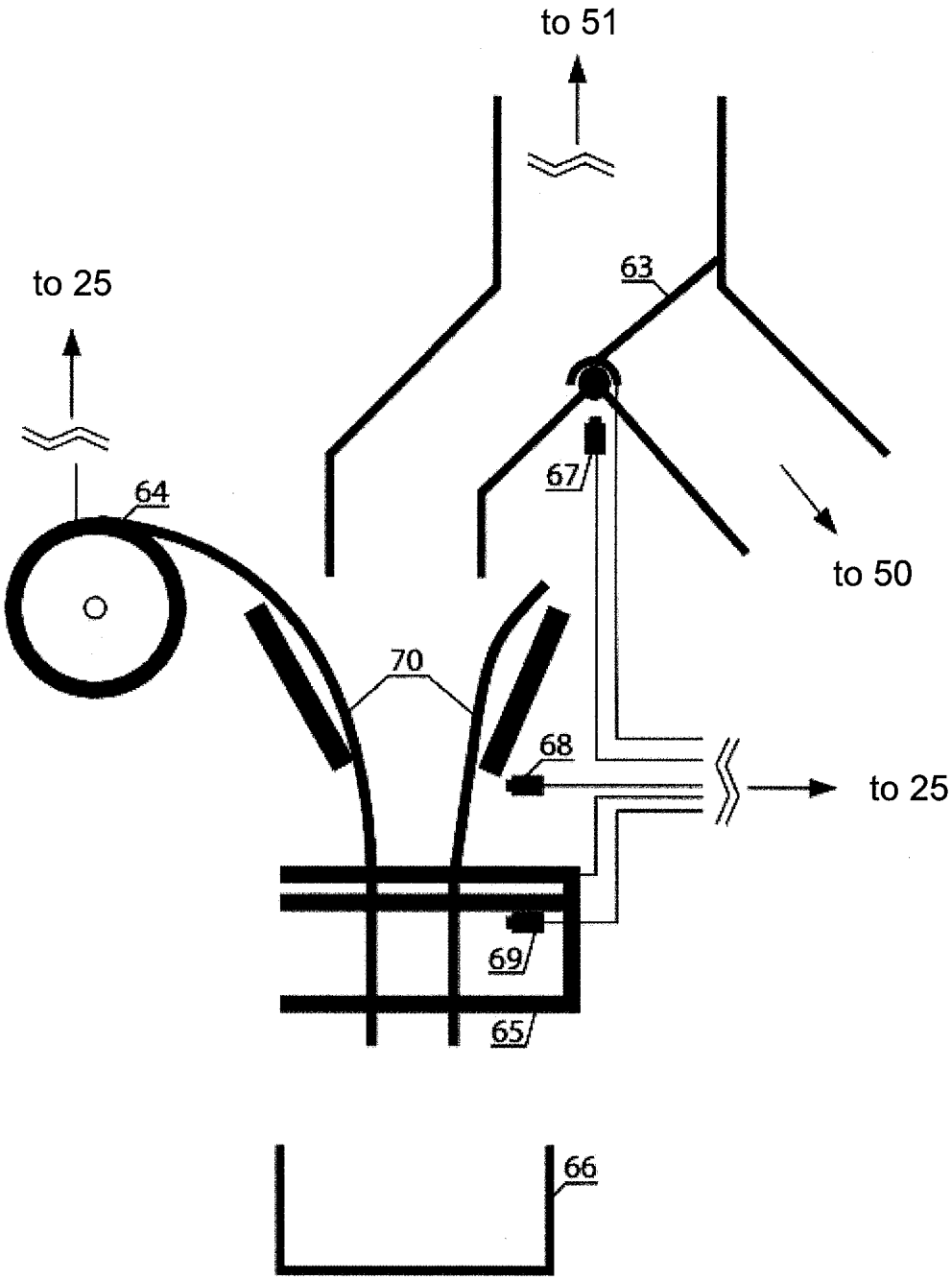

Fig. 18

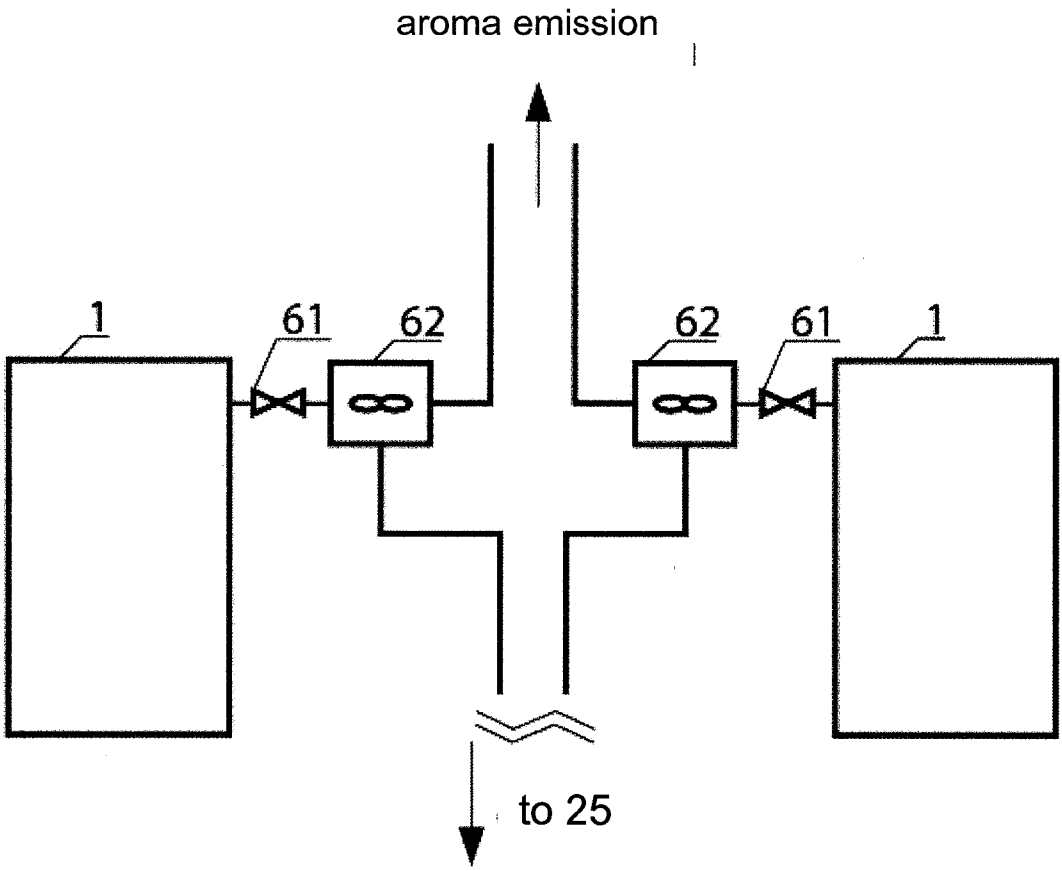

Fig. 19

INTERNATIONAL SEARCH REPORT

International application No
PCT/PL2018/000060

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47J31/06
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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/121197 A1 (MERCIER PIERRE ET AL) 5 September 2002 (2002-09-05) figures 5A,5B,5C -----	1,3
X	US 5 265 518 A (REESE ROBERT J ET AL) 30 November 1993 (1993-11-30) figures 1,3,5 -----	6-10,14, 16,18

☐ 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	Date of mailing of the international search report
12 September 2018	20/09/2018

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Reichhardt, Otto

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/PL2018/000060

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