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(54) **A liquid fuel-fired furnace appliance for fireplace**

Eine flüssigkeitsbrennstoffbetriebene Feuerung für Kamine

Un fourneau à combustible liquide pour une cheminée

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(56) References cited:
**EP-A1- 2 028 420 EP-A2- 1 612 480
WO-A1-2011/009872 DE-A1-102009 038 379
US-A1- 2011 171 587**

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EP 2 549 182 B1

Description

[0001] The invention consists of a liquid fuel-fired furnace appliance for a fireplace, where liquid fuel is an environment-friendly alcohol. This, burning in the furnace appliance in the fireplace emits heat used for heating the room, and creates also decorative effects of the flames.

[0002] A liquid fuel-fired furnace appliance for a fireplace and a method of its operation are known from the patent application PL 387513 A1, wherein only the vapours of liquid fuel are burned. Liquid fuel conducted from a tank to the combustion zone is previously heated to preset temperature in a heating chamber, until the fuel vapour of advantageous degree of vaporisation is received. Then under created pressure it is conducted in known way to the combustion zone, which is a surface of arbitrarily shaped distributing chamber with numerous holes, preferably shaped as slots, where outgoing fuel vapours are ignited and are a subject of controlled process of combustion. The furnace appliance in this solution consists of a fuel tank with an outlet joined by a pipeline to the heating chamber, which is connected to the distributing chamber with numerous shaped holes. The fuel tank in its upper part has a fuel filler, while in its bottom part it has an outlet equipped with a conduit conducting the fuel to the heating chamber furnished with an electric heater with a thermocouple.

[0003] The furnace appliance described in the patent application US 2011171587 A1 discloses the preamble of independent claim 1. Said appliance consists of four main parts, i.e. a fuel tank, a fuel vaporising fence, a fuel vapour distributing fence, and a stop valve, cutting-off the vapours flow. The fuel tank is connected to the fuel vaporising fence with a conduit, and the vaporising fence is furnished with the vapours outlet connected to the stop valve and it has a warming strip mounted outside with a fuel filler for ignition. The fuel vapour distributing fence is connected with an inlet connector pipe and in its upper part it has the shaped holes for emission of the fuel vapours. In this appliance the fuel is supplied gravitationally through a conduit to the vaporising fence on the basis of communicating vessels so, that the air layer is left above the surface of liquid fuel which is prevented from entering the connector pipe, then little dose of fuel is delivered to the fuel filler and it is ignited in the warming strip, quickly warming the vaporising fence together with the fuel contained inside. Resulting vapours of fuel because of vaporisation and elevated pressure move towards the connector pipe and through the inlet pipe towards the distributing fence, where they propagate and get out through the holes shaped in it above the fence on its entire length, and they ignite from the flame in the warming strip. When the amount of fuel in the warming strip runs out, the vapours combusting above the distributing fence warm it and the heat is transferred to the vaporising fence. This supports automatically the process of the fuel vaporisation and its combustion on preset level, until the fuel runs out from the tank. The furnace appliance in preferred

embodiment comprises two fuel tanks arranged parallel to each other and connected by a pipe conduit. The vaporising fence and the distributing fence are placed between them, and the main tank, apart from the fuel filler for ignition, is furnished with a dosing pump, and beneath the fuel filler the igniting gutter with a match is mounted, and all mentioned parts are closed in a housing with ventilation holes. In an automated embodiment, the furnace appliance is controlled with a remote controller, making possible automatic ignition by a spark from the spark generator, and automatic extinguishing. After the process of the vapours combustion is initiated, the furnace appliance is self-controlled automatically in a range of the combustion parameters, by detection of undesired concentration of generated gases, the system leakage or its unwanted fall or movement. Described furnace appliance has a shape of cuboid, metallic casing comprising all mentioned elements, and on its upper surface which is a metallic plate the only recess lays open the part of the distributing fence where the vapours are released and burned.

[0004] The aim of the invention is to provide a furnace appliance eliminating inconveniences of the prior art described before, namely:

- the fire size (the amount of the fuel used during a time unit) varies according to changes of the fuel levels in the tanks;
- univocal signalling of the fuel level in the tank is missing;
- the level of the temperature transfer to the elements of the vaporising fence is insufficient because of the heaters shape which forces small contact surface between adjacent elements;
- the difficulties appear with precise controlling of power of the heating system because of placing of the temperature sensor on the vaporising fence, the temperature of which is strongly dependent on the fuel vaporisation point, thus not reflecting the amount of the vapours production;
- the tanks system's protection against excessive increase of the fuel temperature inside the tanks is missing;
- at higher lengths of the furnace (above 1 m) deformations of the cover plate appear due to heating by the flame, which deflects towards back part of the plate because of the air flow in the housing;
- undesired heating of the elements occurs in vicinity of the heating system;
- self-cooling time of the appliance after switching-off is long;

- the tank and the vaporising fence have to be placed on the same level.

[0005] The inconveniences of prior art combustion appliances are solved by the features of independent claim 1.

[0006] According to a preferred embodiment flat elements are by entire surface in direct contact with the vaporising fence through applied thermo-conductive paste.

[0007] Another important feature of the invention is in that the guide is arranged perpendicularly to the cover plate of the furnace casing.

[0008] In another preferred embodiment of the invention, in the system delivering the fuel from the fuel tank the air pump and a chamber equalising the fuel level with a level in the vaporising fence are installed, and the fuel tank is placed on any level, whereas the sensor placed inside the chamber equalising the fuel level controls switching-on and switching-off of the air pump.

[0009] In another preferred embodiment the thermal shields surfaces facing the furnace elements are reflective.

[0010] The furnace appliance according to the invention shows numerous technical and applicative qualities. These virtues are mainly:

a) Placing inside the vaporising fence the insert from highly hygroscopic material causes, that irrespective of the fuel level in the tanks and in the distributing fence, it elevates the fuel on entire height of the element of the vaporising fence. Stabilisation of the amount of fuel being in contact with hot element of the vaporising fence effects in stable quantity of produced vapours and constant flame in whole range of the fuel levels set for normal work of the appliance. Additional virtue of this solution is in that the fuel depletion is clearly visible in reduction of the flame height, which facilitates calibration of the fuel level sensors.

b) Application of a set of flat heating elements of large contacting surface and the thermo-conductive pastes for the temperature sensor in this setup causes multiple reduction of the heating system temperature and better orientation of thermal energy, minimising undesired heating of the elements and reducing usage of electric energy. Additional quality of this solution is low heat capacity of the heating system resulting in moderate thermal inertia and short reaction time on regulation of the fire height. Increment of the flame is executed through elevation of the heating system temperature, whereas decrement of the fire is executed through diminution of the heating system temperature, which at high thermal inertia has been taking about 1-2 minutes. The invention ensures the reaction time on the fire height regulation in 2-5 seconds.

c) Introduction of a deflection along entire furnace length acting as the air guide solved the problem of deformations of the cover plate of the furnace housing. The air entering the housing containing the furnace rebounds from the guide without deflecting of the flame towards back part of the plate, and additionally the guide stiffens the cover plate.

d) Lack of univocal signalling of the fuel levels, causing the user's uncertainty of how much can he fill the fuel tank was solved by introduction to the appliance of the contact sensors set signalling maximal or minimal level of the fuel in the tanks. This solution assures that undesirable overfilling of the fuel tank should not happen, and in case of automatic appliance it makes possible to inform the user about unacceptably high fuel level and to block the appliance. Also aiming to additionally secure the fuel tanks, another temperature sensor was applied. The sensor coupled with an electronic system informs the user about dangerous temperature of the inside of the appliance, and in critical conditions it stops the appliance, automatically switching-on the cooling system.

e) Unwanted heating of the elements in vicinity of the heating system was also eliminated by thermal shields from smooth metal sheet reflecting thermal radiation. Additionally, the ventilation openings were made in the housing, making possible unrestricted flow of cooling air. Cooling fans were additionally mounted in the openings, used for faster cooling of the appliance after it is switched-off. In this case they are not used for regulation but for cooling during operation (unrestricted air flow) and during cooling after switching-off (the fans are switched-on - forced air flow).

f) Application in the fuel supply system of the air pump and equalising chamber enables installation of the fuel tank on any level.

[0011] Preferred embodiments of the appliance according to the invention are shown on the drawings, where:

fig. 1 illustrates schematically the furnace appliance powered from the power grid, with remote control showing the inside of the furnace housing in cross-section;

fig. 2 shows in schematic cross-section flat heating elements of the heating system and a coupling of the vaporising fence with distributing fence of the furnace;

fig. 3 explains schematically the furnace appliance with one fuel tank mounted on any H level of the fuel, showing the inside of the furnace housing in cross-section.

[0012] Example 1. The combustion appliance (A1) shown on Fig. 1 is powered from the power grid (S) with voltage of 230-250 V or 110-115 V. The appliance is fit with two fuel tanks (2, 21), which together with the vaporising fence (3) form a system of communicating vessels. Along with consumption of the fuel (4) in the fuel tanks (2, 21), the level of the fuel (4) also decreases in the vaporising fence (3), where the process of vaporisation of the fuel (4) is run under influence of the temperature of the heating system (5). The vaporising fence (3) which is a closed vessel has limited volume and as the fuel (4) level decreases, the volume of boiling ethyl fuel also decreases. This reduces production of vapours, which are later exposed to the process of combustion. This results in visually apparent reduction of the fire size while the combustion appliance (A1) is still working. To eliminate this event, the insert made from highly hygroscopic material (6), e.g. hygroscopic wool, is put inside the vaporising fence (3). The insert made of hygroscopic wool (6) effects in that irrespective of the fuel (4) level in the tanks (2, 21) and the vaporising fence (3), it elevates the fuel (4) on entire height of the element of the vaporising fence (3). Stabilisation of the amount of fuel (4) being in contact with hot element of the vaporising fence (3) effects in stable quantity of produced vapours and constant flame in whole range of the fuel levels set for normal work of the combustion appliance (A1). Additional virtue of this solution is in that the fuel (4) depletion is clearly visible in quick reduction of the flame height, which facilitates calibration of the fuel level sensors (C7, C71). The heating system (5), presented on Fig. 2, contains flat heating elements (51) and built-in temperature sensor (C8) for measurement of temperature of the heating system (5). Flat heating elements (51) are by entire surface (52) in direct contact with the surface (31) of the vaporising fence (3) through applied thermo-conductive paste (53). Fig. 2 also shows in magnified cross-section the structure of the furnace (P), the insert of hygroscopic wool (6) placed inside the vaporising fence (3), and connection of the vaporising fence (3) with the distributing fence (9) through the valve (10) placed between the outlet (31) of the vaporizing fence (3), and the inlet (91) of the distributing fence (9). Fig. 2 shows also the inlet (32) of the fuel (4) to the vaporising fence (3) and its level (41). The cover plate (111) of the housing (11) of the furnace (P), as shown in Fig. 1, is fit with the guide (112) arranged perpendicularly to the cover plate (111) along the entire length of the furnace (P). The guide (112) causes the air which enters the housing containing the furnace appliance (A1) to rebound from the guide (112) without deflecting of the flame towards back part of the cover plate (111), and thus eliminating deformations of this plate. The metallic housing (11) in its bottom part has the ventilation openings with built-in ventilation fans (12). Inside the metallic housing (11) are placed thermal shields (113) made from metal sheet, reflecting thermal radiation, which eliminates undesired heating of the elements in vicinity of the heating system (5). The fuel tanks (2, 21)

contain the temperature sensor (C9) coupled with the electronic system, and a set of the fuel level contact sensors (C7, C71) indicating minimal and maximal levels of the fuel (4). The combustion appliance (A1) illustrated on Fig. 1 is equipped with the electronic system (E) containing the controllers coupled with the fuel level sensors (C7, C71) and the temperature sensors (C8, C9), and additionally coupled with the spill sensor (C10) indicating spill of the fuel (4) under the tanks (2, 21), and with the gases concentration sensor (C11) measuring concentrations of carbon monoxide CO, carbon dioxide CO₂ and oxygen O₂, also with the tilt sensor (C12) indicating angular position (tilt) of the appliance, then with the movement sensor (C13) indicating movement of the appliance, and the filler opening sensor (C14) sensing opening of the filler, then the fuel overflow sensor (C15) detecting spill of the fuel around the fuel tank filler, also the deaeration sensors (C16) signalling the fuel spill during deaeration, and the temperature sensor (C17) measuring the temperature of the distributing fence (9). The combustion appliance (A1) contains also the control panel (PS) fit with sockets (not shown on the drawing) to connect a computer, the remote device (PZ) for remote control of the combustion appliance (A1), and the spark generator (G) for ignition of the fuel vapours in the pilot-spark starting unit (IZ) above the distributing fence (9).

[0013] Example 2. The furnace appliance (A2) shown in Fig. 3 differs from the furnace appliance (A1) shown in Fig. 1 and 2 in that its construction makes possible to supply the fuel (4) from the fuel tank (22), where the fuel level (41) is not necessarily the same as in the vaporising fence (3). In this embodiment, in the system delivering the fuel (4) to the vaporising fence (3) from the fuel tank (22) the air pump (13) and the equalising chamber (14) equalising the fuel (4) level with a level in the vaporising fence (3) are installed, and the fuel (4) is delivered by a conduit (15) to the equalising chamber (14). This solution is additionally advantageous if compared to the furnace appliance (A1) described beforehand in the Example 1, because:

- minimal volume (size) of the equalising chamber (14) enables free shaping of the housing (11) and reduction of its dimensions. The volume of the equalising chamber (14) should be slightly greater or equal to the volume of the vaporising fence (3);
- the insert from the hygroscopic material (6) is no longer needed, because the fuel (4) level is kept constant by the fuel level sensor (C18) controlling the work of the air pump (13);
- the filler is removed from the housing (11), thus minimising a risk of the fuel (4) spill during filling of the fuel tanks (2, 21), as may happen in previously described embodiment of the furnace appliance (A1). In this embodiment of the furnace appliance (A2) the user connects to the fuel delivery system a dispos-

able fuel tank (22), which is discarded when emptied;

- elimination of a possibility of heating of the fuel tank (22) by placing it outside of the housing (11).

[0014] The furnace appliance (A2) apart from changes described above, has identical both electronic outfit and the housing (11) as the combustion appliance (A1). The housing (11) on its cover plate (111) has the guide (112), and the appliance is fit with the electronic system with the controllers of the sensors (C8, C9, C10, C11, C12, C13, C16, C17 and C18). It is also fit with the spark generator (G) for ignition in the pilot-spark starting unit (IZ), the control panel (PS) and the remote device (PZ) for remote control.

[0015] Operation of the furnace appliance (A2) is as follows. The fuel tank (22) shall be placed in any place below the equalising chamber (14). The air pump (13) generates pressure in the fuel tank (22) thus making the fuel (4) to flow into the equalising chamber (14). The fuel level sensor (C18) mounted in the equalising chamber (14) controls switching-on and switching-off of the air pump (13), ensuring constant level of the fuel (4) in the equalising chamber (14). From the equalising chamber (14) the fuel moves by gravity to the vaporising fence (3), where after being heated it vaporises, and the vapours are delivered through the valve (10) to the distributing fence (9), and combusted above it.

Claims

1. A liquid fuel-fired furnace appliance for a fireplace, containing at least one fuel tank (2, 21, 22), a furnace (P) in the form of a metallic housing (11) wherein a vaporising fence (3) and a distributing fence (9) for distribution of the fuel vapours are mounted, a heating system (5) and a stop valve (10) blocking the vapours flow, and an electronic system (E) containing controllers coupled with sensors supervising combustion parameters and furnace (P) switch-on/switch-off elements, wherein at least one fuel tank (2, 21, 22) is connected through a conduit to the vaporising fence (3), and the vaporising fence (3) is fit with the vapours outlet (31) connected to the stop valve (10) placed between the outlet of the vaporising fence (3) and an inlet of the distributing fence; **characterised in that** in the inside of the vaporising fence (3) an insert made from highly hygroscopic material (6) is placed, and the heating system (5) contains flat heating elements (51) and a built-in temperature sensor (C8) wherein the entire surface of the flat heating elements (51) is in direct contact to the vaporising fence (3), whereas a cover plate (111) of the metallic housing (11) of the furnace (P) is fit out with a guide (112), and the metallic housing (11) contains ventilation openings with built-in cooling fans (12) placed inside thermal shields (113), where-

as at least one fuel tank (2, 21, 22) contains a temperature sensor (C9) coupled with the electronic system (E) and a set of the fuel level contact sensors (C7, C71) signalling minimal and maximal levels of the fuel (4).

2. The furnace appliance according to claim 1 **characterised in that** the flat heating elements (51) are by entire surface (52) in direct contact with a surface (31) of the vaporising fence (3) through applied thermo-conductive paste (53).
3. The furnace appliance according to claim 1 **characterised in that** the guide (112) is arranged perpendicularly to the cover plate (111) of the metallic housing (11) of the furnace (P).
4. The furnace appliance according to claim 1 **characterised in that** the surfaces of the thermal shields (113) facing the furnace (P) elements are reflective.
5. The furnace appliance according to claim 1 **characterised in that** in the system delivering the fuel (4) from the fuel tank (22) to the furnace (P) an air pump (13) and an equalising chamber (14) equalising the fuel level with the fuel (4) level in the vaporising fence (3) are installed, and the fuel tank (22) is placed on any level, whereas a sensor (C18) placed inside the equalising chamber (14) equalising the fuel level controls switching-on and switching-off of the air pump (13).

Patentansprüche

1. Eine flüssigkeitsbrennstoffbetriebene Feuerungsanlage für Kamine, ausgestattet mit mindestens einem Kraftstoffbehälter (2, 21, 22), einer Feuerung (P) in Form des Metallgehäuses (11) mit eingebauter kraftstoffverdampfender Leiste (3) und mit dampfverteilender Leiste (9), mit dem Heizsystem (5) und dem Absperrventil (10), der die Dampfströmung absperrt sowie mit dem Schaltplan (E), der mit den Sensoren ausgestattet ist, die die Verbrennungsparameter, die Komponente für die Inbetriebnahme und die Auslöschung der Feuerung (P) überwachen, wobei mindestens ein Kraftstoffbehälter (2, 21, 22) durch eine Leitung mit der verdampfenden Leiste (3) verbunden ist, und die verdampfende Leiste (3) mit dem Dampfaustritt (31) ausgestattet ist, der mit dem zwischen dem Ausgang der verdampfenden Leiste (3) und dem Eingang der verteilenden Leiste vorhandenen Absperrventil (10) verbunden ist, **gekennzeichnet dadurch, dass** sich eine Stoffeinlage (6) mit hoher Hygroskopizität in der verdampfenden Leiste (3) befindet, und das Heizsystem (5) mit flachen Heizelementen (51) und dem eingebauten Temperaturfühler (C8) ausgestattet ist, wobei die

komplette Fläche der flachen Heizelemente (51) im direkten Kontakt zur verdampfenden Leiste (3) steht, hingegen die obere Platte (111) des Metallgehäuses (11) der Feuerung (P) ist mit dem Lenkrad (112) ausgestattet ist, und das Metallgehäuse (11) ist mit den Lüftungsöffnungen mit eingebauten Kühllüftern (12), die sich in den Wärmeabschirmungen (113) befinden, ausgestattet und mindestens ein Kraftstoffbehälter (2, 21, 22) ist mit einem Temperaturfühler (C9), der mit dem Schaltplan (E) verbunden ist, und mit dem Kontaktfühlersystem für den Kraftstoffstand (C7, C71), der minimalen und maximalen Kraftstoffstand (4) anzeigt, ausgestattet.

2. Die Feuerungsanlage nach Anspruch 1, **gekennzeichnet dadurch, dass** die flachen Heizelemente (51) an der kompletten Fläche (52) im direkten Kontakt zur Fläche (31) der verdampfenden Leiste (3) über die aufgetragene Wärmeleitpaste (53) stehen.
3. Die Feuerungsanlage nach Anspruch 1, **gekennzeichnet dadurch, dass** sich das Lenkrad (112) vertikal zur oberen Platte (111) des Metallgehäuses (11) der Feuerung (P) befindet.
4. Die Feuerungsanlage nach Anspruch 1, **gekennzeichnet dadurch, dass** die in die Richtung der Feuerungsteile (P) gerichteten Flächen der Wärmeabschirmungen (113) verspiegelt sind.
5. Die Feuerungsanlage nach Anspruch 1, **gekennzeichnet dadurch, dass** die Luftpumpe (13) und die Ausgleichskammer (14), die den Kraftstoffstand (4) in der verdampfenden Leiste (3) ausgleicht, und sich der Kraftstoffbehälter (22) am beliebigen Stand befindet, in der die Speiseschaltung der Feuerung (P) mit dem Kraftstoff (4) aus dem Kraftstoffbehälter eingebaut sind, wobei der in der den Kraftstoffstand ausgleichenden Ausgleichskammer (14) vorhandene Fühler (C18) die Ein- und Ausschaltung der Luftpumpe (13) regelt.

Revendications

1. Un fourneau à combustible liquide pour une cheminée, comprenant au moins un réservoir de combustible (2, 21, 22), un foyer (P) sous la forme d'une enceinte métallique (11) équipée d'un chemin (3) d'évaporation de combustible et d'un chemin (9) de distribution des vapeurs de combustible, d'un système de chauffage (5) et d'une vanne d'arrêt (10) coupant le flux de vapeur, ainsi que d'un circuit électronique (E) comportant les contrôleurs reliés aux capteurs qui surveillent les paramètres de combustion et les éléments destinés à allumer et à éteindre le foyer (P), étant donné qu'au moins un réservoir de combustible (2, 21, 22) est relié par un conduit avec

le chemin d'évaporation (3) et que le chemin d'évaporation (3) est équipé d'une sortie (31) de vapeurs, reliée à la vanne d'arrêt (10) située entre la sortie du chemin d'évaporation (3) et l'entrée du chemin de distribution, **caractérisé en ce que**, à l'intérieur du chemin d'évaporation (3) se trouve un insert constitué d'un matériau (6) à forte hygroscopicité et que le système de chauffage (5) contient des éléments chauffants plats (51) et un capteur de température intégré (C8), étant donné que toute la surface des éléments chauffants plats (51) est en contact direct avec le chemin d'évaporation (3), tandis que la plaque de recouvrement (111) de l'enceinte métallique (11) du foyer (P) est équipée d'un volant de direction (112) et que l'enceinte métallique (11) comporte des trous de ventilation avec ventilateurs de refroidissement intégrés (12), installés à l'intérieur des écrans thermiques (113), alors qu'au moins un réservoir de combustible (2, 21, 22) contient un capteur de température (C9) couplé au circuit électronique (E) et un système de capteurs de contact du niveau de combustible (C7, C71) indiquant les niveaux minimum et maximum de combustible (4).

2. Fourneau selon la revendication 1, **caractérisé en ce que** toute la surface (52) des éléments chauffants plats (51) est en contact direct avec la surface (31) du chemin d'évaporation (3) par l'intermédiaire de la pâte thermoconductrice appliquée (53).
3. Fourneau selon la revendication 1, **caractérisé en ce que** le volant de direction (112) est situé perpendiculairement à la plaque de recouvrement (111) de l'enceinte métallique (11) du foyer (P).
4. Fourneau selon la revendication 1, **caractérisé en ce que** les surfaces des écrans thermiques (113), orientées vers les éléments du foyer (P), sont réfléchissantes.
5. Fourneau selon la revendication 1, **caractérisé en ce que**, dans le système d'alimentation du foyer (P) en combustible (4) à partir du réservoir de combustible (22), sont installées la pompe à air (13) et la chambre de compensation (14), destinée à égaliser le niveau du combustible avec celui du combustible (4) dans le chemin d'évaporation (3), et que le réservoir de combustible (22) est situé à un niveau quelconque, étant donné que le capteur (C18) contenu dans la chambre de compensation (14) destinée à égaliser le niveau de combustible, contrôle l'activation et la désactivation de la pompe à air (13).

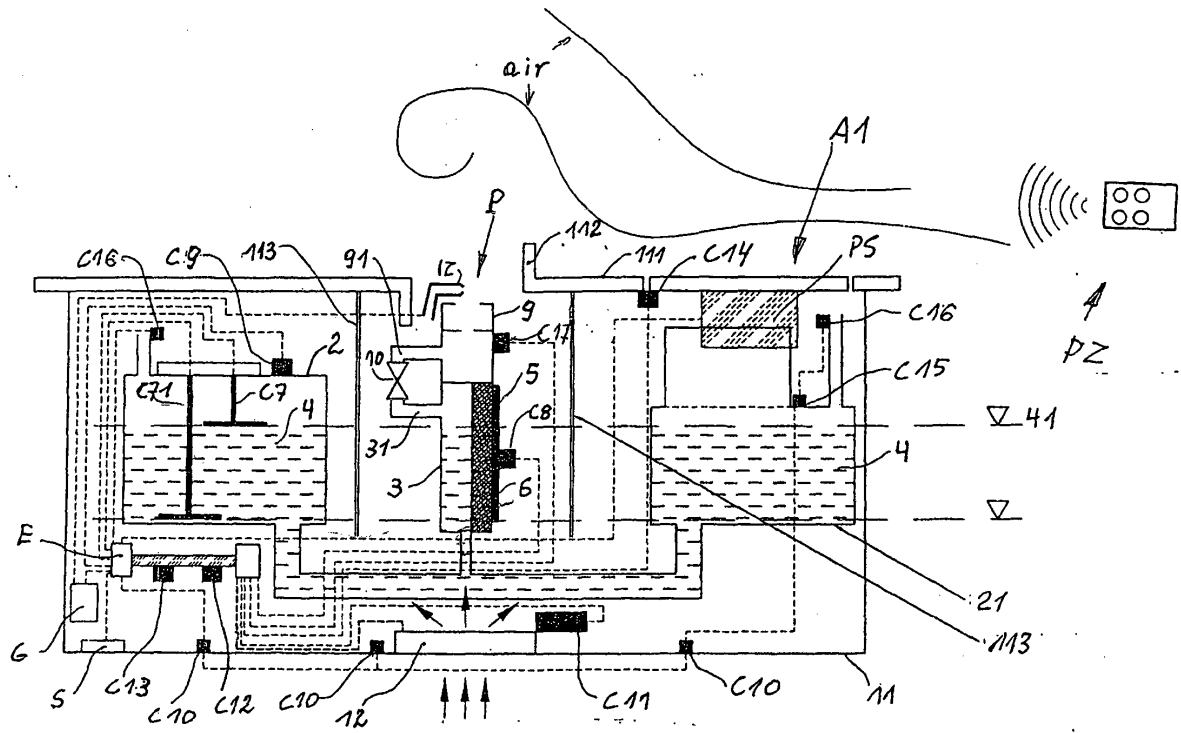


Fig. 1

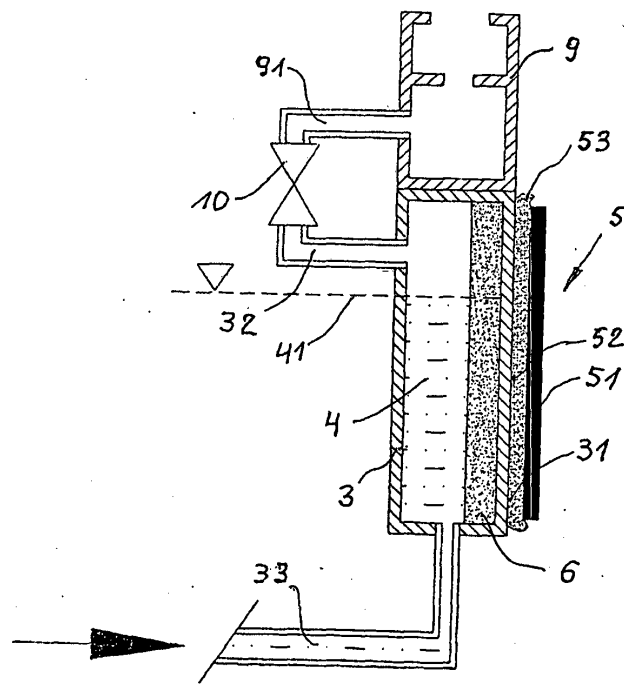
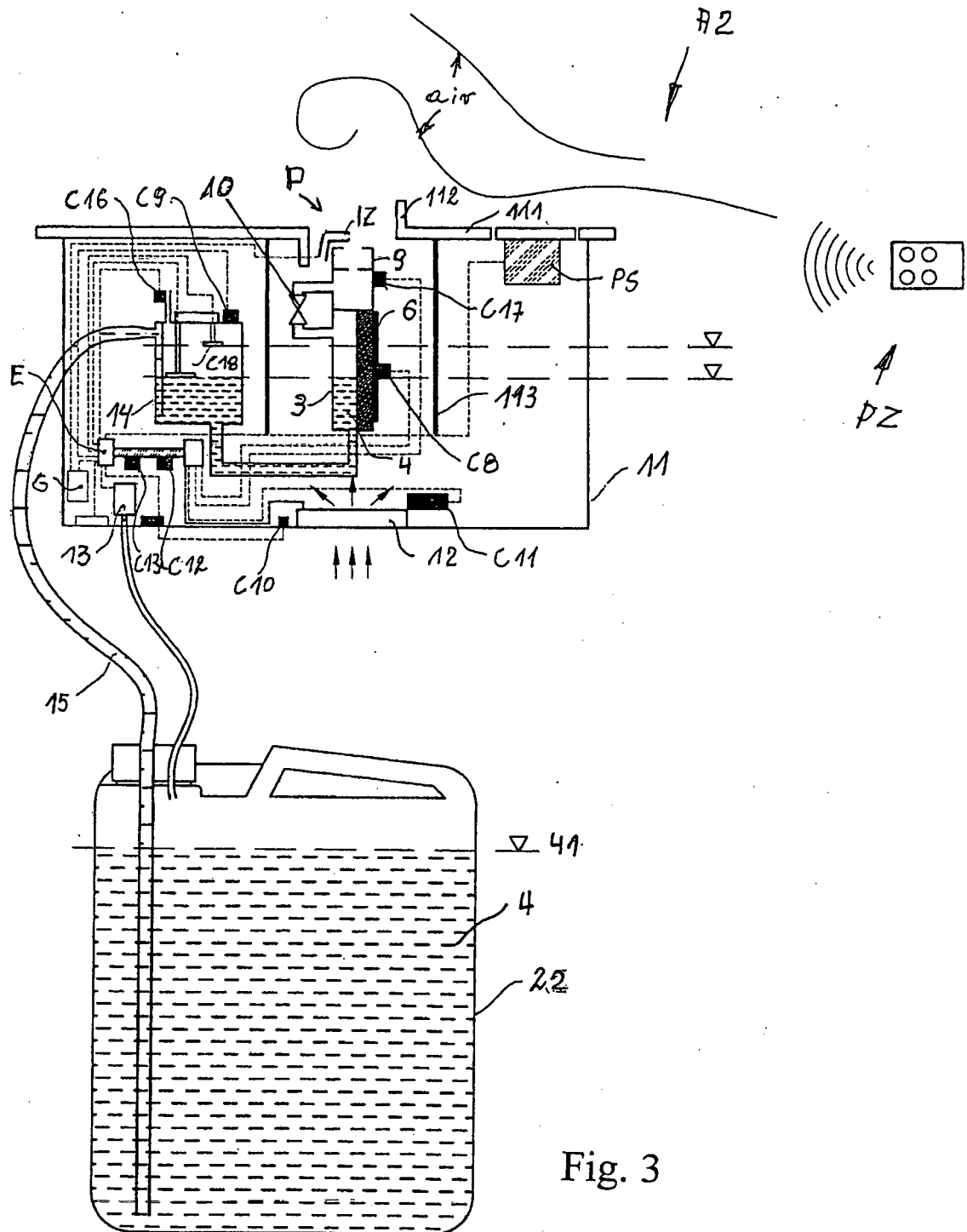


Fig. 2



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- PL 387513 A1 [0002]
- US 2011171587 A1 [0003]