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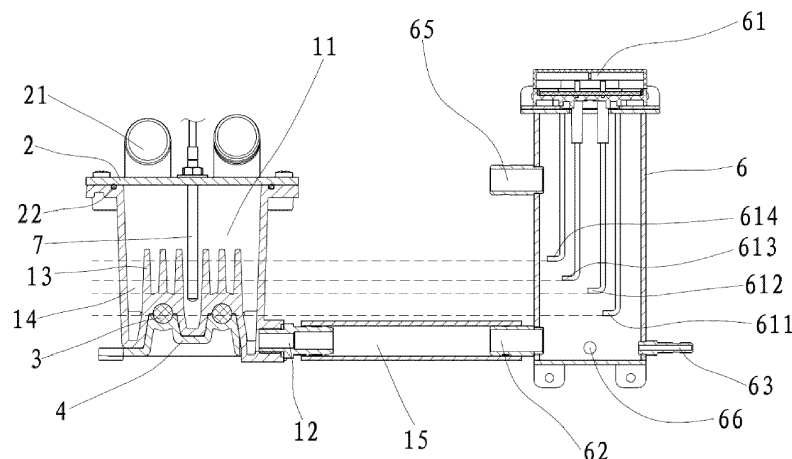
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(54) GASIFICATION DEVICE FOR GASIFICATION COMBUSTION FIREPLACE

(57) The present invention provides a gasification device for a gasification combustion fireplace. The gasification device comprises a gasification chamber, a gasification chamber lid, electric heating elements, a base, and a controller. The gasification chamber is a container structure containing a gasification chamber inner cavity, the base is below the gasification chamber, and the electric heating elements are sandwiched between a lower surface of the gasification chamber and the base. Several cooling fins are further provided in the gasification chamber inner cavity, and the cooling fins are connected to a lower surface of the gasification chamber inner cavity and are arranged close to the heating ele-

ments. Channels for liquid circulation are further provided between a plurality of fins and between the fins and an inner wall of the gasification chamber. The gasification chamber lid is provided above the gasification chamber and seals the gasification chamber inner cavity so that the gasification chamber inner cavity becomes a closed space. Several gas outlet ports are provided on the gasification chamber lid. Due to the arrangement of the cooling fins, when the electric heating elements heat liquid fuel in the gasification chamber inner cavity, the liquid fuel is heated more uniformly, and the gasification process is more stable and controllable, avoiding the occurrence of explosive boiling of the liquid fuel.

**FIG. 5**

Description

TECHNICAL FIELD

[0001] The present invention relates to the field of gasification devices, and relates in particular to a gasification device for a gasification combustion fireplace.

BACKGROUND ART

[0002] An alcohol fireplace is a real-fire fireplace that uses environmentally friendly renewable energy bioethanol as fuel and brings people warm enjoyment. Moreover, it is simple to install and flexible in design, and is thus favored by more and more users. In particular, an alcohol fireplace that burns alcohol fuel after gasification has a more complete and uniform fuel combustion, and a stable and safe flame.

[0003] However, devices for gasifying alcohol fuel currently on the market are generally composed of an electric heating device and a gasification chamber. The electric heating device directly heats a housing of the gasification chamber, and the inner wall of the housing has a simple shape only for accommodating liquid fuel, as in "FIREPLACE FOR GASIFYING AND BURNING LIQUID FUEL" mentioned in Patent Application No. CN201110219779.2. The heating area of the housing of the gasification chamber for liquid fuel is not sufficiently large, and the heating is non-uniform, so that the gasification process of alcohol fuel in the gasification chamber is non-uniform, and the alcohol fuel is easily locally overheated to cause explosive boiling.

[0004] In addition, many gasification chambers currently on the market are integrated with burners, or are arranged very close to the burners and fixedly connected to the burners by using metal channels, so that the heat generated by the flames on the burners is easily returned to the gasification chambers, which affects the gasification rate of the gasification chambers. In this way, not only is it difficult to control the gasification process in the gasification chambers, but the liquid alcohol fuel in the gasification chambers may even be explosively boiled, and the liquid alcohol fuel in the gasification chambers is directly sprayed into the combustion chambers, so that the flames are suddenly increased in size and burn violently, resulting in a safety hazard.

CONTENT OF INVENTION

(I) Technical problem to be solved

[0005] The problem to be solved by the present invention is to provide a gasification device for a gasification combustion fireplace, so as to overcome the defects of instability and easy explosive boiling in the alcohol gasification process of the existing alcohol fuel gasification combustion fireplace.

(II) Technical solution

[0006] In order to solve the technical problem, the present invention provides a gasification device for a gasification combustion fireplace, comprising a gasification chamber, a gasification chamber lid, electric heating elements, a base, and a controller, wherein the gasification chamber has a gasification chamber inner cavity, and the base is provided below the gasification chamber; several electric heating elements are provided, and are completely enclosed between a lower surface of the gasification chamber and the base, and the electric heating elements are electrically connected to the controller; a gasification chamber liquid inlet port is provided below the gasification chamber; several cooling fins are further provided in the gasification chamber inner cavity, and the cooling fins are connected to a lower surface of the gasification chamber inner cavity and are arranged close to the heating elements; channels for liquid circulation are provided between a plurality of fins and between the fins and an inner wall of the gasification chamber; and the gasification chamber lid is provided above the gasification chamber and seals the gasification chamber inner cavity so that the gasification chamber inner cavity becomes a closed space, and several gas outlet ports are provided on the gasification chamber lid.

[0007] Further, the gasification device further comprises a liquid level control chamber, a liquid level detecting device is provided in the liquid level control chamber, and the liquid level detecting device is electrically connected to the controller; and the liquid level detecting device is provided with a safety liquid level detecting probe, a low liquid level detecting probe, a middle liquid level detecting probe, and a high liquid level detecting probe in sequence from bottom to top, the safety liquid level detecting probe is higher than the lowest point of a lower surface of the gasification chamber inner cavity, the low liquid level detecting probe is higher than the electric heating elements, and the high liquid level detecting probe is lower than upper surfaces of the cooling fins. The liquid level control chamber is provided with a liquid level control chamber liquid outlet port communicating with the gasification chamber liquid inlet port through a gasification chamber liquid inlet pipe; the gasification chamber liquid inlet pipe is arranged to not be higher than the liquid level control chamber liquid outlet port and/or the gasification chamber liquid inlet port; the liquid level control chamber is further provided with a liquid level control chamber liquid supply port, and the liquid level control chamber liquid supply port is connected to a liquid supply pipe; and an inner diameter of the gasification chamber liquid inlet pipe is larger than an inner diameter of the liquid supply pipe.

[0008] Further, the liquid level control chamber is provided with an overflow port, and the overflow port is higher than the high liquid level detecting probe. The gasification device further comprises an overflow liquid storage chamber; the overflow liquid storage chamber is

provided with an overflow pipe communicating with the overflow port; and the overflow liquid storage chamber is provided at a height lower than that of the overflow port. The overflow liquid storage chamber is provided with a liquid level alarm device therein, and the liquid level alarm device is electrically connected to the controller; The overflow liquid storage chamber is provided with a vent. **[0009]** Further, the gasification device further comprises several temperature detecting devices electrically connected to the controller.

[0010] Further, the gasification device further comprises a liquid return pump, the liquid level control chamber is provided with a liquid level control chamber liquid return port, the liquid return pump is connected to the liquid level control chamber liquid return port through a liquid return pump liquid inlet pipe, and an outlet of the liquid return pump is connected to a fuel storage device of a product through a liquid return pump liquid outlet pipe.

[0011] Further, the gasification chamber is made of aluminum or copper material having high thermal conductivity; and a sealing gasket is provided between the gasification chamber and the gasification chamber lid.

(III) Beneficial effects

[0012] In the gasification device for a gasification combustion fireplace provided by the present invention, by adding the cooling fins to the gasification chamber inner cavity, the gasification process of the liquid fuel is heated more uniformly, which effectively solves the problems in the prior art that the liquid fuel in the gasification chamber is heated and gasified non-uniformly and the explosive boiling phenomenon easily occurs, so that the liquid fuel can be stably supplied to the burner for combustion, and the flame stability is greatly improved. The problems of instability and easy explosive boiling in the alcohol gasification process of the existing alcohol fuel gasification combustion fireplace are overcome.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is an exploded view of a gasification device for a gasification combustion fireplace according to the present invention;

FIG. 2 is a perspective view of a liquid level control chamber of a gasification device for a gasification combustion fireplace according to the present invention in a partially cut-away state;

FIG. 3 is a perspective view of a gasification chamber of a gasification device for a gasification combustion fireplace according to the present invention;

FIG. 4 is a perspective view of a liquid level control chamber of a gasification device for a gasification

combustion fireplace according to the present invention; and

FIG. 5 is a schematic view illustrating a height relationship between a gasification chamber and a liquid level control chamber of a gasification device for a gasification combustion fireplace according to the present invention when they are unfolded and laid flat on a plane.

[0014] The names of the components corresponding to the respective reference numerals in the figures are as follows: 1-gasification chamber; 11-gasification chamber inner cavity; 12-gasification chamber liquid inlet port; 13-cooling fin; 14-channel; 15-gasification chamber liquid inlet pipe; 2-gasification chamber lid; 21-gas outlet port; 22-sealing gasket; 3-electric heating element; 4-base; 5-controller; 6-liquid level control chamber; 61-liquid level detecting device; 611-safety liquid level detecting probe; 612-low liquid level detecting probe; 613-middle liquid level detecting probe; 614-high liquid level detecting probe; 62-level control chamber liquid outlet port; 63-level control chamber liquid supply port; 64-liquid supply pipe; 65-overflow port; 66-level control chamber liquid return port; 7-temperature detecting device; 8-gas outlet pipe; 9-overflow liquid storage chamber; 91-overflow pipe; 92-liquid level alarm device; 93-vent; 10-liquid return pump; 101-liquid return pump liquid inlet pipe; 102-liquid return pump liquid outlet pipe.

DETAILED DESCRIPTION

[0015] Specific implementations of the present invention will be further described in detail below with reference to the accompanying drawings and embodiments. The following embodiments are used to illustrate the present invention, but are not intended to limit the scope of the present invention.

[0016] Referring to FIGS. 1 to 5, the present invention provides a gasification device for a gasification combustion fireplace. The gasification device includes a gasification chamber 1, a gasification chamber lid 2, electric heating elements 3, a base 4, a controller 5, a liquid level control chamber 6, a temperature detecting device 7, and a gas outlet pipe 8.

[0017] Referring to FIGS. 1 and 3, a gasification chamber 1 has a container structure including an inner cavity 11 and made of a material having a high thermal conductivity such as aluminum or copper, and the base 4 is provided below the gasification chamber 1. In this embodiment, the number of electric heating elements 3 is two, the two electric heating elements 3 are provided between a lower surface of the gasification chamber 1 and the base 4, and the lower surface of the gasification chamber 1 and the base 4 completely enclose the electric heating elements 3. The gasification chamber 1 is further provided with a gasification chamber liquid inlet port 12 communicating with a lower surface of the gasification

chamber inner cavity 11. Several cooling fins 13 are further provided in the gasification chamber inner cavity 11, and the cooling fins 13 are connected to the lower surface of the gasification chamber inner cavity 11 and are arranged close to the heating elements 3. Channels 14 for liquid circulation are provided between a plurality of fins 13 and between the fins 13 and an inner wall of the gasification chamber inner cavity 11. The gasification chamber lid 2 is provided above the gasification chamber 1, a sealing gasket 22 is provided between the gasification chamber lid 2 and the gasification chamber 1, and the gasification chamber lid 2 and the sealing gasket 22 seal the gasification chamber inner cavity 11 so that the gasification chamber inner cavity becomes a closed space. In this embodiment, the gasification chamber lid 2 is further provided with two gas outlet ports 21. The gas outlet ports 21 are connected to a gas outlet pipe 8, the other end of the gas outlet pipe 8 is connected to a burner of a product, and the gas outlet pipe 8 is made of a non-metal pipe having low thermal conductivity. The electric heating elements 3 are connected to the controller 5. The controller 5 can control the operation of the electric heating elements 3, and common heating rods may be adopted as the electric heating elements 3.

[0018] Referring to FIGS. 1 and 2, the temperature detecting device 7 is provided inside the gasification chamber inner cavity 11 and mounted on the gasification chamber lid 2. The temperature detecting device 7 is connected to the controller 5, and a common temperature detecting probe may be adopted as the temperature detecting device 7.

[0019] Referring to FIGS. 1, 2, and 5, the liquid level control chamber 6 is provided with a liquid level detecting device 61 connected to the controller 5. The liquid level detecting device 61 is provided with four liquid level detecting probes, i.e., a safety liquid level detecting probe 611, a low liquid level detecting probe 612, a middle liquid level detecting probe 613, and a high liquid level detecting probe 614 in sequence from bottom to top. The safety liquid level detecting probe 611 is higher than the lowest point of the lower surface of the gasification chamber inner cavity 11, the low liquid level detecting probe 612 is higher than the electric heating elements 3, and the high liquid level detecting probe 614 is lower than upper surfaces of the cooling fins 13. The liquid level control chamber 6 is provided with a liquid level control chamber liquid outlet port 62. The liquid level control chamber liquid outlet port 62 and the gasification chamber liquid inlet port 12 are connected through a gasification chamber liquid inlet pipe 15. The gasification chamber liquid inlet pipe 15 is arranged so as not to be higher than the liquid level control chamber liquid outlet port 62 and/or the gasification chamber liquid inlet port 12, that is, the gasification chamber 1 and the liquid level control chamber 6 form a set of communicating vessels, and the liquid level of the gasification chamber inner cavity changes synchronously with the liquid level in the liquid level control chamber 6. The liquid level control chamber 6

is further provided with a liquid level control chamber liquid supply port 63. The liquid level control chamber liquid supply port 63 is connected to a liquid supply pipe 64 for supplying liquid fuel to the gasification device of the present embodiment, and the inner diameter of the gasification chamber liquid inlet pipe 15 is much larger than the inner diameter of the liquid supply pipe 64.

[0020] Referring to FIGS. 1, 2, and 4, the gasification device further comprises an overflow liquid storage chamber 9. An overflow pipe 91 is provided on the overflow liquid storage chamber 9, an overflow port 65 is provided on the liquid level control chamber 6, the overflow liquid storage chamber 9 is connected to the overflow port 65 through the overflow pipe 91, and the overflow liquid storage chamber 9 is provided below the overflow port 65. A liquid level alarm device 92 is provided below a side surface of the overflow liquid storage chamber 9, and the liquid level alarm device 92 is connected to the controller 5. The liquid level alarm device 92 is known in the art, and will not be described again. A vent 93 is further provided at the top of the overflow liquid storage chamber 9.

[0021] Referring to FIGS. 1 and 2, the gasification device further includes a liquid return pump 10. The liquid level control chamber 6 is provided with a liquid level control chamber liquid return port 66, the liquid return pump 10 is connected to the liquid level control chamber liquid return port 66 through a liquid return pump liquid inlet pipe 101, and an outlet of the liquid return pump 10 is connected to a fuel storage device of the product through a liquid return pump liquid outlet pipe 102.

[0022] The operating principle of this embodiment is as follows:

In operation, the liquid level control chamber 6 is supplied with liquid at a constant average rate through the liquid supply pipe 64, and when the liquid level in the liquid level control chamber 6 is above a safety level, the controller 5 controls the electric heating elements 3 to start heating. Since the gasification chamber inner cavity 11 communicates with the liquid level control chamber 6, and the inner diameter of the gasification chamber liquid inlet pipe 15 is much larger than the inner diameter of the liquid supply pipe 64, the liquid level in the gasification chamber inner cavity 11 is always the same as the liquid level in the liquid level control chamber 6. The liquid fuel in the gasification chamber inner cavity 11 is gasified under the heating action of the electric heating elements 3. The controller 5 adjusts the heating power of the electric heating elements 3 in real time according to the change of the liquid level detected by the liquid level detecting device 61, so that the liquid level in the liquid level control chamber 6 is always between the high liquid level detecting probe 614 and the low liquid level detecting probe 612. Since the gasification chamber 1 in this embodiment is made of material having high thermal conductivity such as aluminum or copper, and the cooling fins 13 are provided in the gasification chamber inner cavity 11, the liquid fuel in the gasification chamber inner cavity

11 is heated more uniformly, and the gasification process is more stable and controllable. Moreover, the average rate at which the liquid is supplied through the liquid supply pipe 64 is constant, so the average rate at which the gaseous fuel is supplied to the outside through the gas outlet pipe 8 is also constant, making the flame combustion more stable. By providing the temperature detecting device 7, it is possible to ensure that the temperature in the gasification chamber inner cavity 11 is always within a controllable range to avoid the explosive boiling of the liquid fuel. The gas outlet pipe 8, which is not made of metal, can also prevent the heat of the burner from being transferred to the gasification chamber 1, so that the heating control of the gasification chamber 1 is more precise and stable.

[0023] When the operation is finished, the liquid fuel remaining in the liquid level control chamber 6 and the gasification chamber 1 can be pumped back to a fuel storage container by the liquid return pump 10, so that the liquid fuel is prevented from being stored in the gasification chamber 1 and the liquid level control chamber 6 for a long time when the product is not in operation.

[0024] When the liquid level detecting device 61 malfunctions and the liquid overflows from the overflow port 65 of the liquid level control chamber 6, the overflowed liquid fuel can flow to the overflow liquid storage chamber 9 through the overflow pipe 91 for storage, and the liquid level alarm device 92 can timely feedback a signal to the controller 5 to provide an alarm and stop the liquid supply of the liquid supply pipe 64 and the heating operation of the electric heating elements 3. The liquid return pump 10 executes an end program. In addition, by providing the vent 93, the pressure in the overflow liquid storage chamber 9 is balanced with the outside, so that the pressure does not increase due to the continuous inflow of the liquid fuel. Since the overflow port 65 communicates with the overflow liquid storage chamber 9, the overflow port 65 may serve as a breathing port of the liquid level control chamber 6. Therefore, the pressure in the liquid level control chamber 6 does not increase due to continuous inflow of the liquid, thereby ensuring smooth operation of the entire device.

[0025] In the gasification device for a gasification combustion fireplace provided in this embodiment, by adding the cooling fins to the gasification chamber inner cavity, the gasification process of the liquid fuel is heated more uniformly, effectively solving the problems in the prior art that the liquid fuel in the gasification chamber is heated and gasified non-uniformly and the explosive boiling phenomenon easily occurs, so that the liquid fuel can be stably supplied to the burner for combustion, and the flame stability is greatly improved. The problems of instability and easy explosive boiling in the alcohol gasification process of the existing alcohol fuel gasification combustion fireplace are overcome.

[0026] The preferred implementations of the present invention are merely described above. It should be noted that, for those of ordinary skill in the art, several improve-

ments and modifications can also be made without departing from the technical principles of the present invention, and these improvements and modifications should also be regarded as the scope of protection of the present invention.

Claims

1. A gasification device for a gasification combustion fireplace, said device being **characterized by**: comprising a gasification chamber (1), a gasification chamber lid (2), electric heating elements (3), a base (4), and a controller (5), wherein the gasification chamber (1) has a gasification chamber inner cavity (11), and the base (4) is provided below the gasification chamber (1); several electric heating elements (3) are provided, and are completely enclosed between a lower surface of the gasification chamber (1) and the base (4), and the electric heating elements (3) are electrically connected to the controller (5); a gasification chamber liquid inlet port (12) is provided below the gasification chamber (1); several cooling fins (13) are further provided in the gasification chamber inner cavity (11), and the cooling fins (13) are connected to a lower surface of the gasification chamber inner cavity (11) and are arranged close to the heating elements (3); channels (14) for liquid circulation are provided between a plurality of fins (13) and between the fins (13) and an inner wall of the gasification chamber (1); and the gasification chamber lid (2) is provided above the gasification chamber (1) and seals the gasification chamber inner cavity (11) so that the gasification chamber inner cavity becomes a closed space, and several gas outlet ports (21) are provided on the gasification chamber lid (2).
2. The gasification device for a gasification combustion fireplace according to claim 1, wherein: the gasification device further comprises a liquid level control chamber (6), a liquid level detecting device (61) is provided in the liquid level control chamber (6), and the liquid level detecting device (61) is electrically connected to the controller (5); and the liquid level detecting device (61) is provided with a safety liquid level detecting probe (611), a low liquid level detecting probe (612), a middle liquid level detecting probe (613), and a high liquid level detecting probe (614) in sequence from bottom to top, the safety liquid level detecting probe (611) is higher than the lowest point of a lower surface of the gasification chamber inner cavity (11), the low liquid level detecting probe (612) is higher than the electric heating elements (3), and the high liquid level detecting probe (614) is lower than upper surfaces of the cooling fins (13).
3. The gasification device for a gasification combustion

fireplace according to claim 2, wherein: the liquid level control chamber (6) is provided with a liquid level control chamber liquid outlet port (62) communicating with the gasification chamber liquid inlet port (12) through a gasification chamber liquid inlet pipe (15); the gasification chamber liquid inlet pipe (15) is arranged to not be higher than the liquid level control chamber liquid outlet port (62) and/or the gasification chamber liquid inlet port (12); the liquid level control chamber (6) is further provided with a liquid level control chamber liquid supply port (63), and the liquid level control chamber liquid supply port (63) is connected to a liquid supply pipe (64); and an inner diameter of the gasification chamber liquid inlet pipe (15) is larger than an inner diameter of the liquid supply pipe (64).

4. The gasification device for a gasification combustion fireplace according to claim 2, wherein: the liquid level control chamber (6) is provided with an overflow port (65), and the overflow port (65) is higher than the high liquid level detecting probe (614). 20
5. The gasification device for a gasification combustion fireplace according to claim 4, wherein: the gasification device further comprises an overflow liquid storage chamber (9); the overflow liquid storage chamber (9) is provided with an overflow pipe (91) communicating with the overflow port (65); and the overflow liquid storage chamber (9) is provided at a height lower than that of the overflow port (65). 25 30
6. The gasification device for a gasification combustion fireplace according to claim 5, wherein: the overflow liquid storage chamber (9) is provided with a liquid level alarm device (92) therein, and the liquid level alarm device (92) is electrically connected to the controller (5). 35
7. The gasification device for a gasification combustion fireplace according to claim 6, wherein: the overflow liquid storage chamber (9) is provided with a vent (93). 40
8. The gasification device for a gasification combustion fireplace according to claim 1, wherein: the gasification device further comprises several temperature detecting devices (7) which are electrically connected to the controller (5). 45 50
9. The gasification device for a gasification combustion fireplace according to claim 2, wherein: the gasification device further comprises a liquid return pump (10), the liquid level control chamber (6) is provided with a liquid level control chamber liquid return port (66), the liquid return pump (10) is connected to the liquid level control chamber liquid return port (66) through a liquid return pump liquid inlet pipe (101), 55

and an outlet of the liquid return pump (10) is connected to a fuel storage device of a product through a liquid return pump liquid outlet pipe (102).

- 5 10. The gasification device for a gasification combustion fireplace according to claim 1, wherein: the gasification chamber (1) is made of aluminum or copper material having high thermal conductivity; and a sealing gasket (22) is provided between the gasification chamber (1) and the gasification chamber lid (2). 10 15

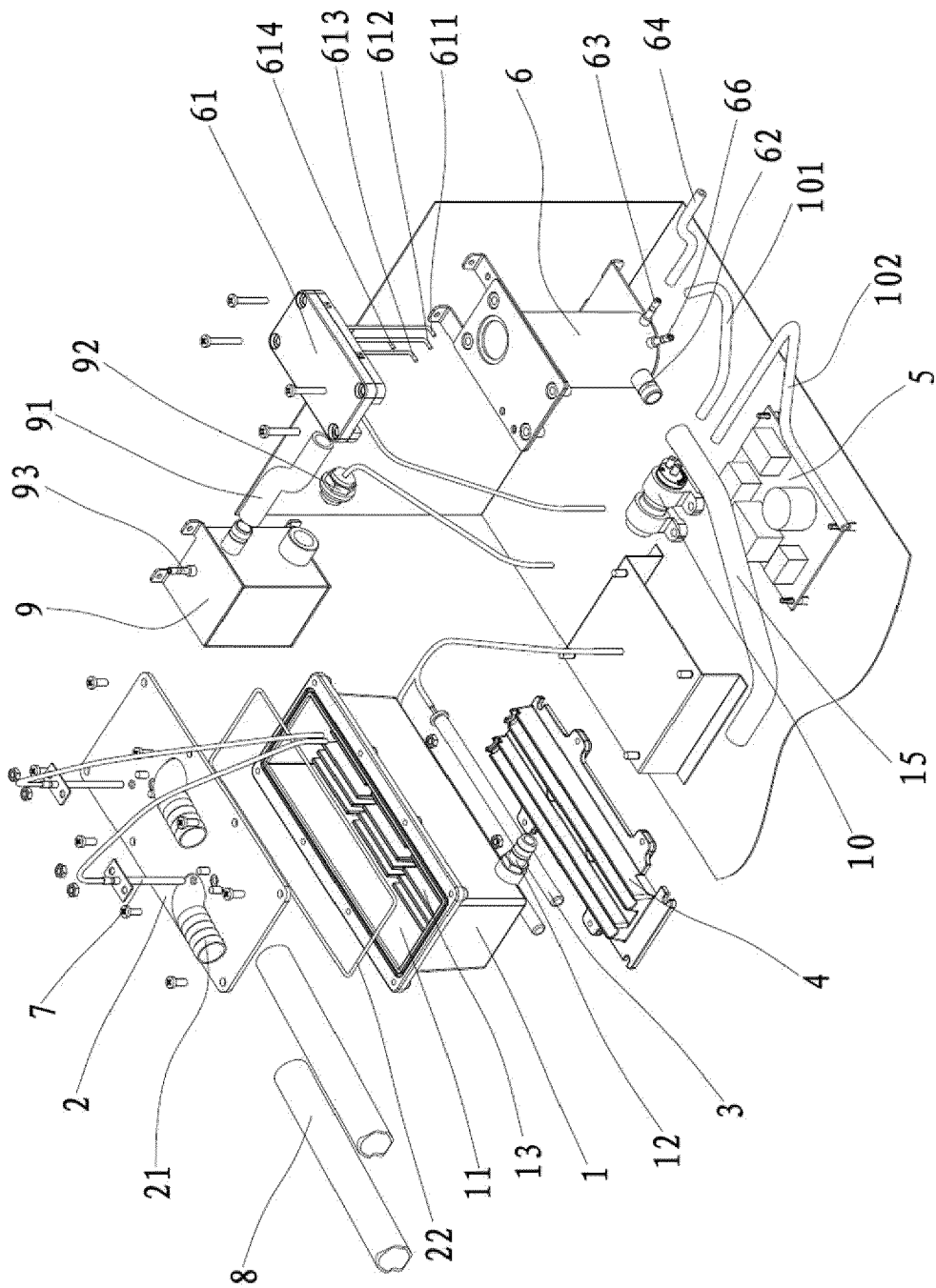


FIG. 1

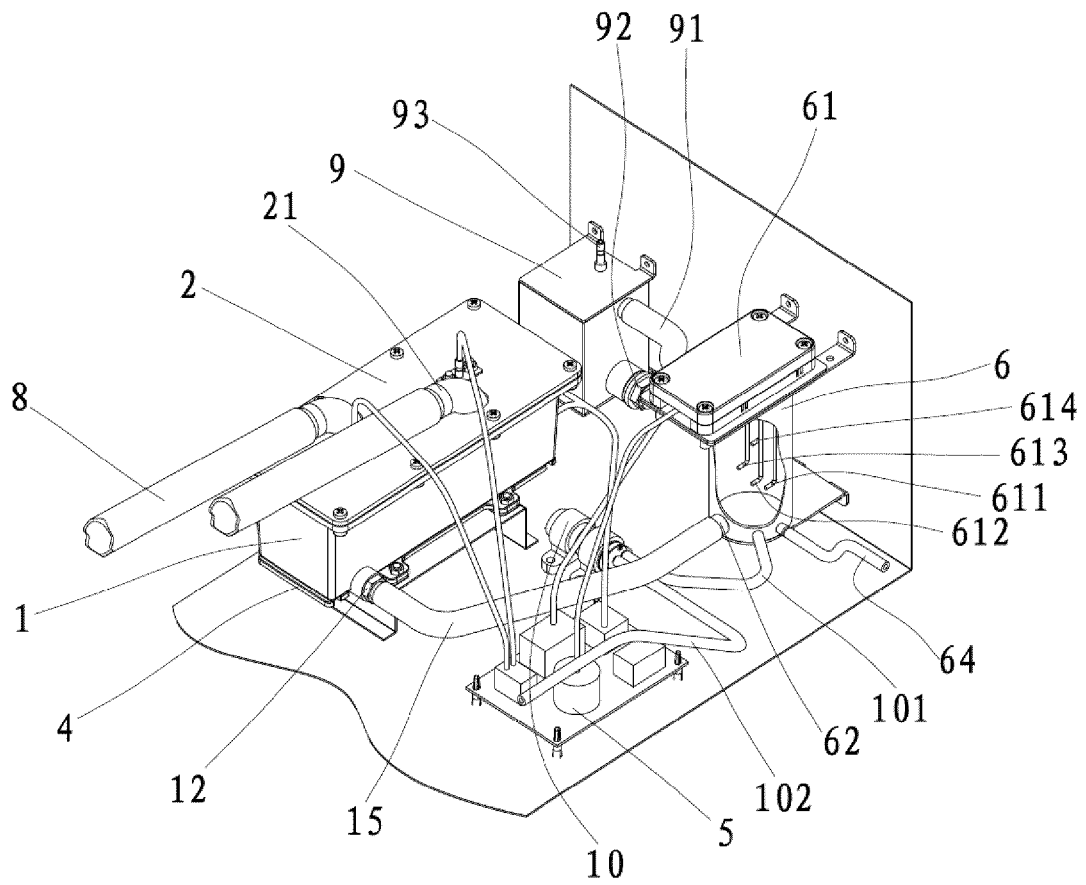


FIG. 2

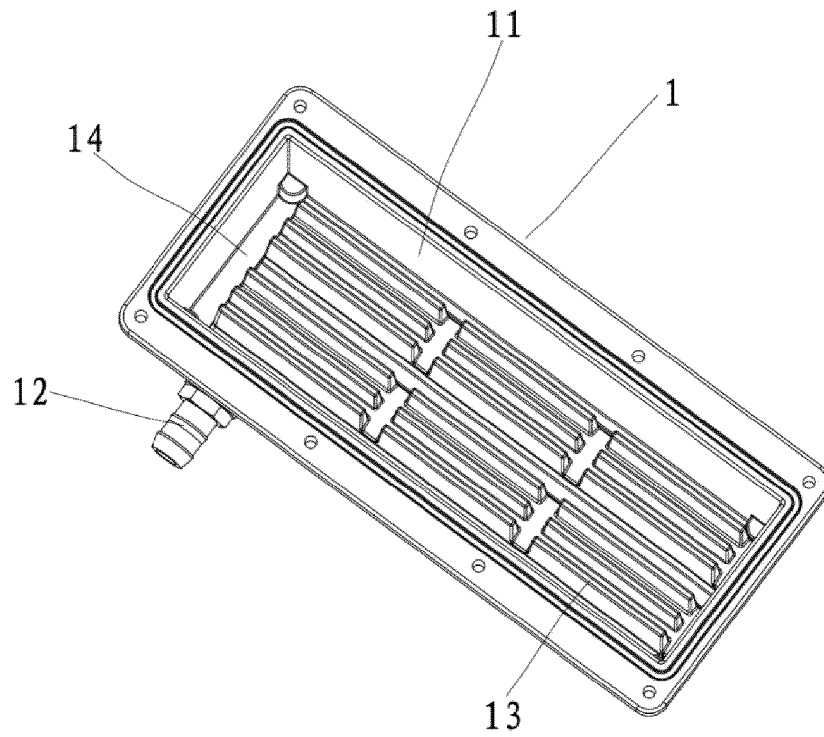


FIG. 3

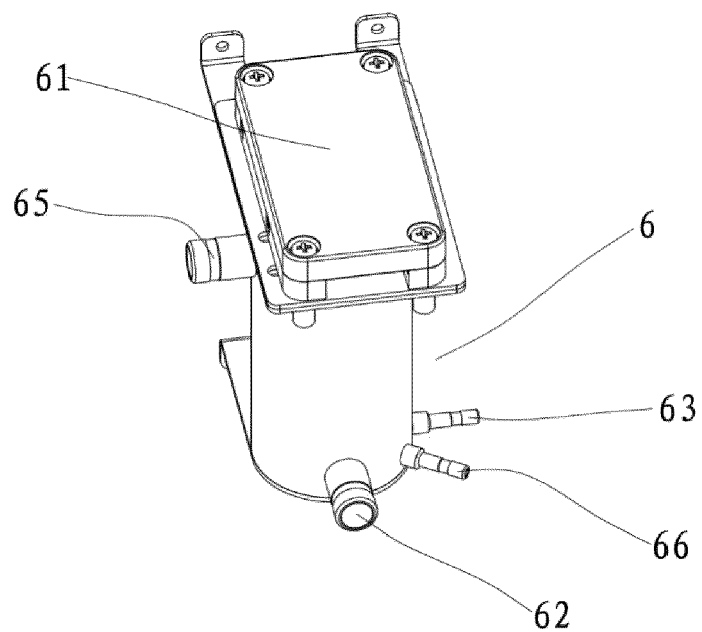


FIG. 4

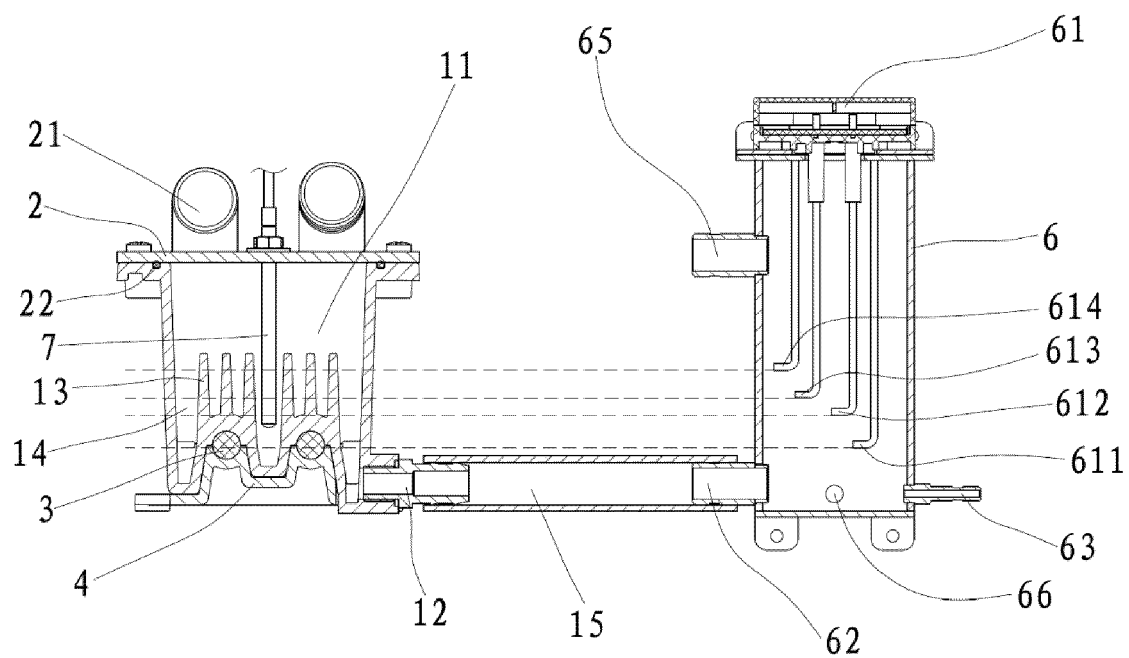


FIG. 5



EUROPEAN SEARCH REPORT

Application Number

EP 24 18 5016

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		6 December 2024	Theis, Gilbert
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