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(54) **COMBUSTION APPARATUS FOR OPERATION WITH A LIQUID FUEL**

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(57) **ABSTRACT**

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A combustion apparatus for operation with a fuel which is liquid at room temperature, in particular with a vegetable oil, wherein the combustion apparatus includes an evaporator device for evaporating the liquid fuel and a nozzle for ejection and for flame ignition of the evaporated fuel. The evaporator device is disposed in fluid communication with a fuel tray for preheating the evaporator device for a start of operation.

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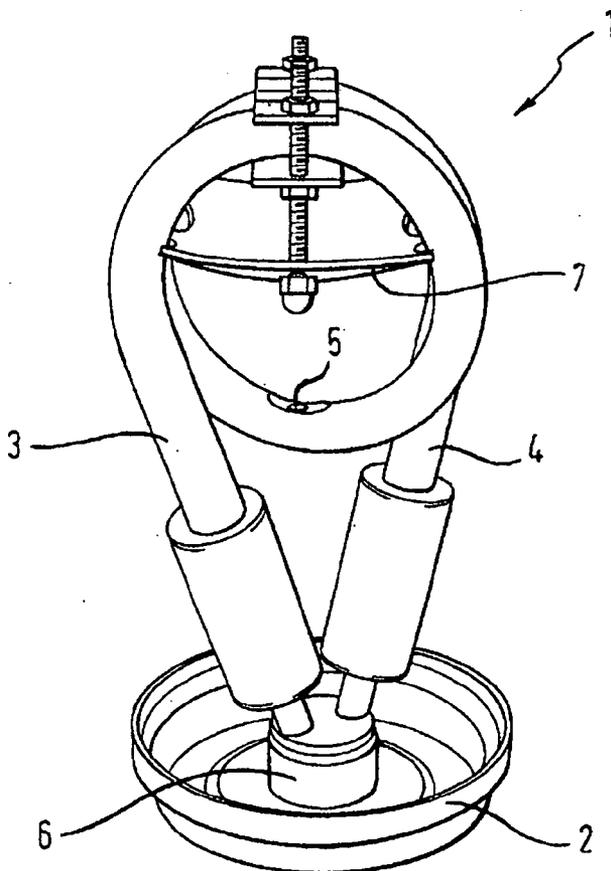


Fig. 1

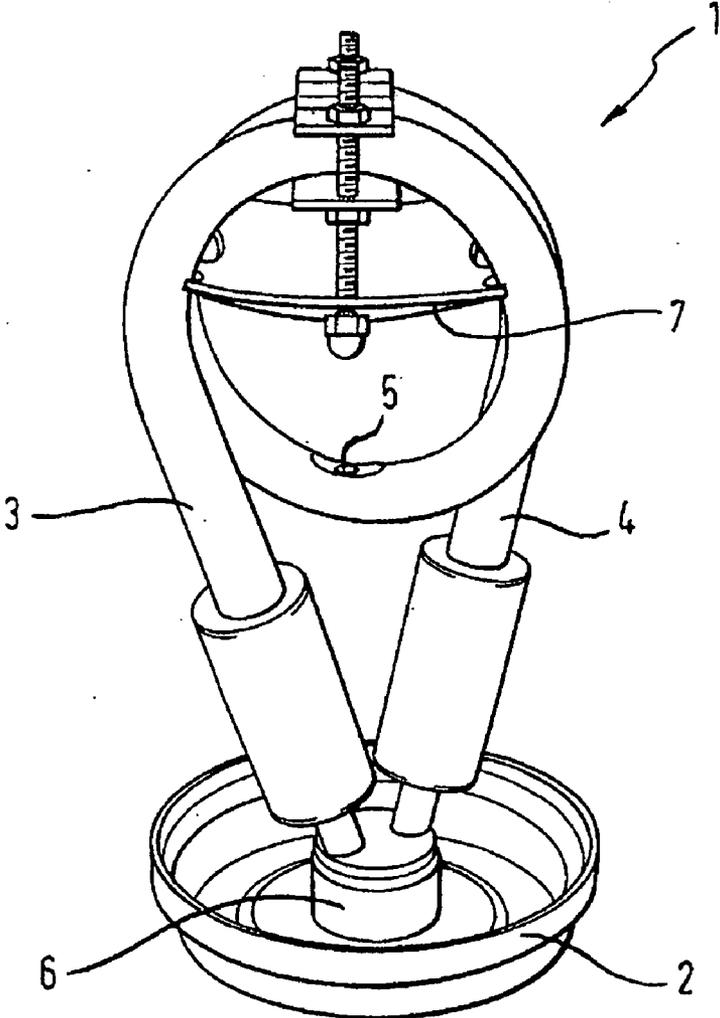


Fig. 2

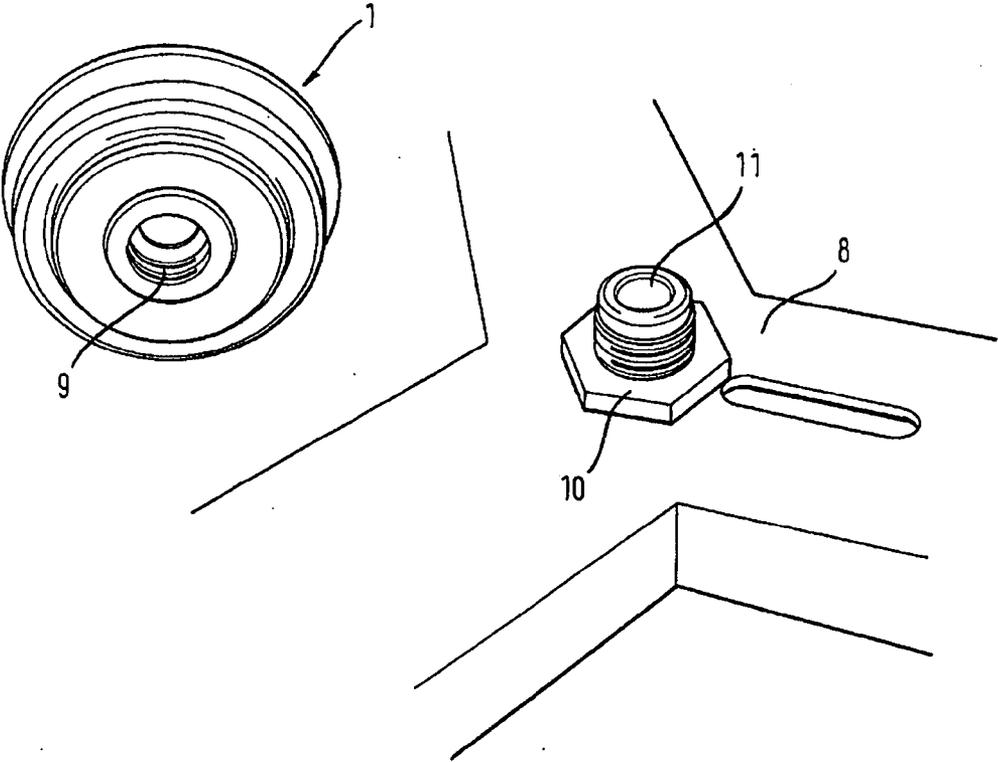
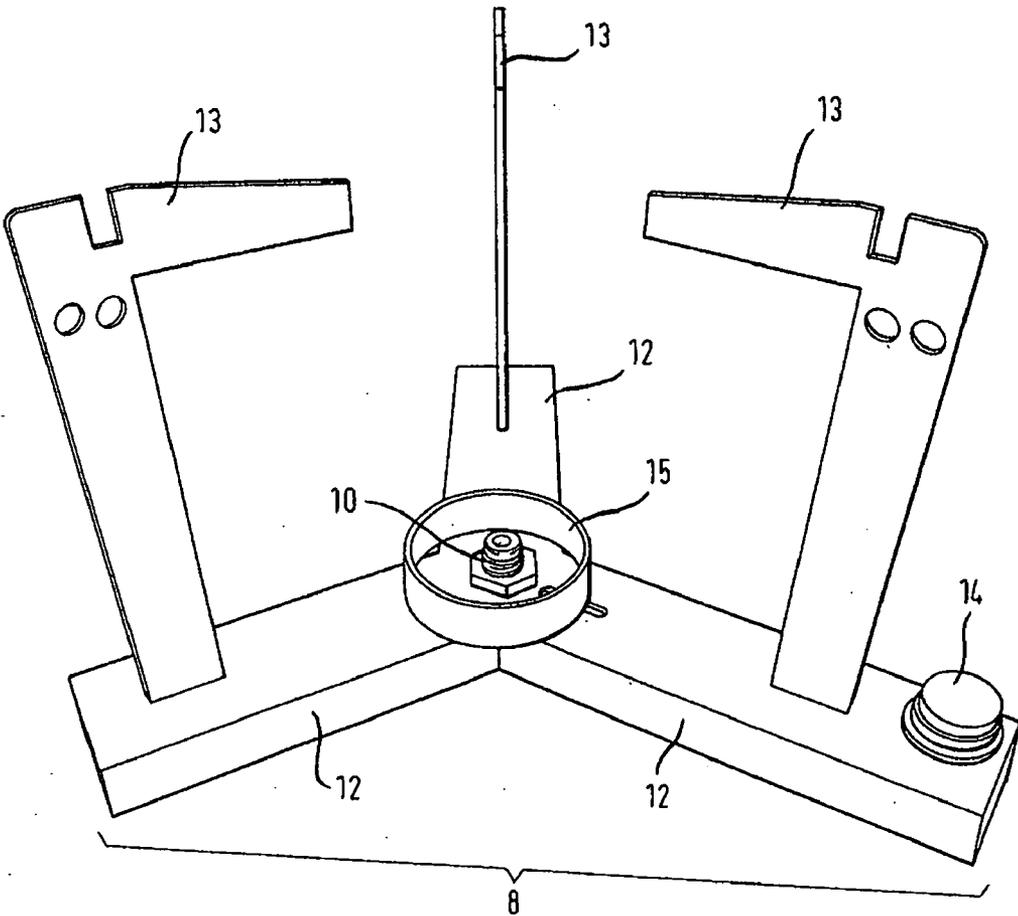


Fig. 3



COMBUSTION APPARATUS FOR OPERATION WITH A LIQUID FUEL

[0001] The present invention relates to a combustion apparatus for operation with a fuel that is liquid at room temperature as claimed in the preamble of claim 1.

[0002] The publication DE 101 61 154 A1 proposes a burner for a cooker that is operated with liquid fuel. Said burner can preferably be operated with a vegetable oil. To produce a flame, the liquid fuel is introduced into a container of the burner. Pressure is used to pump the fuel by way of a supply tube from the inside of the container to an oil inlet opening of an evaporator. There the liquid fuel changes to its gaseous phase. The fuel gas heated by way of the evaporator flows out of a nozzle of the evaporator as a stream of fuel and is ignited. The resulting flame causes heat to be transferred to a vessel held over it. In order to operate the burner with vegetable oil as the fuel, it is necessary beforehand to heat the vegetable oil to a temperature at which it changes to the gaseous state and can therefore be easily ignited. Before a combustion process it is therefore necessary to heat the evaporator of the burner to the corresponding temperature. The publication DE 101 61 154 A1 proposes an open flame below the evaporator for this purpose.

[0003] The object of the present invention is to find a simple and safe way of preheating an evaporator system that can be operated with a liquid fuel.

[0004] The object is achieved by a combustion apparatus with the features of claim 1. Developments of the combustion apparatuses are set out in the subclaims.

[0005] The fuel tray serves to hold and burn a material that can be easily ignited, it being possible for the fuel tray to have an opening at its base and it being possible to attach an evaporator system in/at the opening to evaporate a fuel that is liquid at room temperature and to supply fuel to the evaporator system through the opening. In particular the evaporator can be configured to evaporate a vegetable oil.

[0006] The inventive vessel system ensures adequate preheating of the evaporator within 30 seconds for example. The fact that the fuel tray is firmly secured to the evaporator means that there is no risk of the fuel tray tipping over with the open flame. The invention also allows the fuel tray with the flame to be attached in a simple manner to the evaporator so that the evaporator is heated evenly. The fuel tray can optimally have a central through opening for the evaporator tube.

[0007] The fuel tray and evaporator system can be configured in one piece. The fuel tray can also have a heat-insulating coating. This prevents burning injuries if the heated fuel tray is touched.

[0008] The fuel tray can also have a discharge component to drain the easily ignitable material. This is advantageous, if the user has already introduced the easily ignitable material into the fuel tray but then does not want to start the combustion process. Likewise oil residues from the fuel tray can be caught in the fuel tray when the evaporator is disassembled and then be drained off by way of the discharge component.

[0009] The combustion apparatus can also have a tripod as the burner base.

[0010] The burner base can also have a protective cylinder to protect a threaded coupling below the fuel tray from contamination. In this instance the fuel tray can rest on the protective cylinder, thereby increasing its stability.

[0011] It shall preferably be possible to attach a pot holder to the burner base or configure it in one piece with the burner base. This allows simple and safe use of a pot during the cooking process.

[0012] A supply system can advantageously be arranged in a hollow space in the burner base to supply fuel from a container system to an evaporation system. This is ensured for example by a supply line space for the oil supply line to the evaporator tube inside the burner base. This reduces the risk of damage to the oil supply line due to the heat resulting during operation of the burner. Similarly the burner base can have an operating system to control the oil supply to the combustion apparatus.

[0013] The present invention is described in more detail below with reference to the accompanying drawings, in which:

[0014] FIG. 1 shows an evaporator with a fuel tray;

[0015] FIG. 2 shows a threaded section for screwing an evaporator with a fuel tray onto a burner base; and

[0016] FIG. 3 shows a burner base.

[0017] The inventive burner in FIG. 1 has an evaporator 1 with an ignition tray or fuel tray 2. The evaporator 1 here is configured in one piece with the ignition tray 2 from a non-combustible and heat-resistant material. In the example in FIG. 1 the evaporator 1 consists of two tubular sections 3 and 4, configured in the form of a double loop. The tubular sections 3 and 4 pass into each other at their ends. The evaporator 1 has a nozzle 5 at this point. The other ends of the tubular sections 3 and 4 are connected to a supply tube 6. The evaporator 1 also comprises a baffle device 7. The tube sections 3, 4 are connected to a connector pedestal or supply tube 6. The connector pedestal 6 or supply tube 6 is arranged in the center of the ignition tray 2.

[0018] The fuel tray 2 is required to start operation of the combustion apparatus or vegetable oil cooker. To start operation of the vegetable oil cooker, a flammable liquid, for example kerosene, petrol, diesel oil or vegetable oil ester is ignited in the ignition tray 2. This preheats the supply tube 6 and the two tubular sections 3 and 4 of the evaporator. The liquid vegetable oil in the supply tube 6 and the tubular sections 3, 4 is evaporated and flows in gaseous form out of the nozzle 5. The gas leaving the nozzle 5 is then ignited manually.

[0019] To increase the time the gas leaving the nozzle 5 remains above the nozzle 5, a baffle device 7 is provided. This causes the stream of gas to eddy and mix with the ambient air to form a combustible air/gas mixture. The combustion process described here operates continuously. The combustion process only comes to a halt if the vegetable oil supply is interrupted.

[0020] FIG. 2 shows the underside of the evaporator 1 and part of the burner base 8. It can be seen that the evaporator 1 has an attachment opening or connector 9 on its underside. A matching threaded section 10 is attached in the center of the burner base 8. By screwing the threaded section 10 in the attachment opening 9 it is possible to attach the evaporator 1 to the burner base 8. The threaded section 10 has a supply opening 11, by way of which it is possible to apply pressure to introduce the vegetable oil into the inside of the supply tube 6 of the evaporator 1.

[0021] FIG. 3 shows the complete burner base. It has a tripod 12. The mass of the tripod 12 is distributed in such a manner that the burner does not tip over when deflected slightly from its center of gravity. A further device for

improving safety during operation of the burner is a pot support **13**, which is connected to the tripod **12** in one piece. The pot support allows a pot to be placed over the flame of the burner in a simple manner. The burner base **8** also has an operating knob **14** to actuate a regulating valve. The regulating valve, which is used to control the supply of vegetable oil, is located in an internal hollow space in the tripod **12** together with an oil supply line.

[0022] The burner base **8** also has a protective cylinder **15**, which serves to protect the threaded section **10** from contamination. It is possible to attach the protective cylinder **15** to the tripod **12** by screwing the evaporator **1** and ignition tray **2** tightly onto the threaded section **10**.

1-13. (canceled)

14. A combustion apparatus for operation with a fuel that is liquid at room temperature, in particular with a vegetable oil, the combustion apparatus comprising an evaporator device for evaporating the liquid fuel; a nozzle in fluid communication with the evaporator device for expelling and igniting the evaporated fuel; and a fuel tray in fluid communication with the evaporator device for preheating the evaporator device to start operation.

15. The combustion apparatus according to claim **14** wherein the evaporator device is disposed at least partially within the fuel tray.

16. The combustion apparatus according to claim **14** wherein the evaporator device is formed with at least one evaporator tube.

17. The combustion apparatus according to claim **15** wherein the fuel tray extends in at least a partially surrounding relationship with the evaporator device.

18. The combustion apparatus according to claim **15** wherein the fuel tray includes a base portion and the evaporator device is attached to the base portion of the fuel tray.

19. The combustion apparatus according to claim **15** wherein the evaporator device is disposed generally in the center of the fuel tray.

20. The combustion apparatus according to claim **15** wherein the fuel tray is formed with a connector pedestal and the evaporator device is connected to the connector pedestal.

21. The combustion apparatus according to claim **20** wherein the fuel tray includes a base portion and the connector pedestal is disposed in the base portion of the fuel tray.

22. The combustion apparatus according to claim **20** wherein the connector pedestal includes a connector for connection to a fuel supply line.

23. The combustion apparatus according to claim **22** and further comprising a protective plate disposed below the fuel tray for protecting the connector from contamination.

24. The combustion apparatus according to claim **23** wherein the protective plate is disposed between the fuel tray and a burner base.

25. The combustion apparatus according to claim **23** wherein the protective plate is disposed adjacent a substantially closed assembly space below the fuel tray.

26. The combustion apparatus according to claim **25** wherein the connector of the connector pedestal is disposed within the assembly space below the fuel tray.

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