

Description

Object of the invention

[0001] This invention refers to a device to provide hot water for caravans, with considerable advantages over existing systems for similar purposes.

[0002] The device is designed, on the one hand, to comply with current legislation on gas heaters installed in dwellings and at the same time to produce hot water "instantaneously".

[0003] Current European Community legislation forbids the installation of instantaneous gas heaters in bedroom, bathroom and restroom areas. Since caravans are "mobile homes" and of a small size, the bedroom and the kitchen are in the same room, so that the installation of these heaters is not legal.

[0004] To solve this problem, gas heaters with accumulation of water are installed. They heat a 10 or 14-litre tank and have very limited heating power, lower than 4,000 Kcal/h, which is the legal limit. But these existing heaters involve at least two important problems: First, they only supply a small amount of hot water (10 or 14 litres), and secondly, it takes some time for the water accumulated in the tank to be heated, so that if it is used for more than one person to shower, the waiting time is considerable and their utility is limited.

[0005] One objective of this invention is to manufacture an instantaneous gas water heater, with no limitations, that complies with the legislation on installation in caravans.

Background of the invention

[0006] There are different types of water heaters for caravans, auto-caravans or similar vehicles.

[0007] There are several types of electric heaters for accumulated water, but they are all characterised in that they have a small water tank, for approximately 5 litres, that is connected to the camp site mains at 220 V. These kind of heaters have two important disadvantages: they are not self-supporting (that is, the caravan has to be parked on a camp site or similar site that has a 220 V electric connection) and they also heat very little water for a shower (approximately 5 litres) and require a further 15 minutes approximately to heat the water again.

[0008] There are also, although they are less common, instantaneous electric heaters, which have another problem in that this type of heaters requires a great deal of power (approximately 5,000 W) which is not usually available on camp sites.

[0009] There are also propane or butane gas water heaters for caravans on the market, but they heat accumulated water and are not instantaneous. They have the advantage over electric heaters that they are self-supporting and do not require to be connected to the 220V electric installation of a camp site or similar to be used.

[0010] Since European Community standards are in-

creasingly strict, it is forbidden to use instantaneous gas water heaters of over 4,000 Kcal/h (all the heaters that exist on the market are much more powerful) in bedroom or bathroom areas.

[0011] Because of the small size of caravans or mobile homes, the kitchen, the bedroom and the living room are in the same room, so that this type of heater cannot legally be installed. For this reason, to solve this problem, install heaters that are not instantaneous, but heat accumulated water, and with a limited power rating (under 4,000 Kcal/h).

[0012] This type of heater has an important problem in that, like all heaters that handle accumulated water, it takes some time for the water to be heated for use. They are also usually very small (around 10 litres), so there is only water enough for one person to take a shower before waiting for the water to be heated again.

Description of the invention

[0013] The device in this invention contains a commercial 5 l/min instantaneous gas water heater, so it has the great advantage that hot water is available immediately, without having to wait, and if it is connected to a large caravan water tank (normally, between forty and sixty litres), there is enough water for four or five people to take a shower without waiting. The important novelty is that this commercial heater is integrated in a metal container with a door, prepared to be fitted into one of outer sides of the caravan so that, since it is not inside the caravan but in an outdoor independent area, it complies with current legislation on the installation of heaters in bedrooms and bathrooms. The important characteristics of this metal container is that it has a combustion air and cooling inlet at the bottom with a windbreak and a combustion gas and cooling outlet at the top with another windbreak. Another very important characteristic is that the metal container, besides being made fire-proof by asbestos panels covered with aluminium reflectant surfaces to dissipate the heat, has an air chamber at the back with natural circulation produced by the different densities of cold and hot air, which cools both the back and the top of the container, preventing them from being heated. The container is hermetically sealed from the inside of the caravan and it also has a regulatory gas spigot and an upper gas outlet, air inlets and gas outlets sized to comply with current legislation.

[0014] However, it has been seen that the device that has just been described can present problems depending on the position of the caravan and the intensity of the wind, since the wind can prevent the combustion gases from escaping in certain cases. The reason is that because of the need to adapt the container to the bodywork of the caravan, the exhaust gas escapes by natural cooling, using a vertical conduit approximately 20 cm in length and a minimum interior diameter of 9 cm. One variation of the invention replaced the vertical tube

that is the natural draught by a turbine type gas extractor that forcibly expels the combustion gases. This extractor is started automatically when the temperature of the gases produced by the heater exceeds a certain value, and the gas is extracted by means of the natural draught when the level is lower. This guarantees the correct exhaust of the combustion gases regardless of the position of the caravan and the force of the wind. It also allows the size of the device to be reduced, since it no longer needs a large vertical pipe for the gas exhaust, making it more attractive and reducing the volume that it occupies on the caravan.

Brief description of the drawings

[0015] In addition to the previous description, attached is a set of drawings with their corresponding explanations.

[0016] Figure 1 shows a view of the device that is the object of the invention from the outside of the caravan.

[0017] Figure 2 shows a view of the side section of the device that is the object of the invention.

[0018] Figure 3 shows a front view of the device that is the object of the invention.

[0019] Figure 4 shows a side section view of the device that is the object of the invention with a driven exhaust.

[0020] Figure 5 shows a front view of the device that is the object of the invention with a driven exhaust.

[0021] In these figures, the numerical references correspond to the following parts and components:

- 1.- Heater
- 2.- Gas exhaust
- 3.- Upper windbreak
- 4.- Lower windbreak
- 5.- Gas spigot
- 6.- Upper insulation
- 7.- Back insulation
- 8.- Cooling conduit
- 9.- Cool air outlet
- 10.- Hot and cold water pipes
- 11.- Flap
- 12.- Extractor

Description of a preferred embodiment

[0022] As can be seen in figures 1, 2 and 3, the device consists of a metal cabinet/container with heat insulation on the base (7), walls and ceiling (6), which houses an instantaneous gas heater (1) with a cool air conduit (8) at the back that operated by means of the circulation of air and the effect of different densities, with an orifice and grille on the bottom as an air inlet and a lower windbreak (4) and another orifice and grille on the top to evacuate one the one hand the cool air (9) and on the other the combustion gases (2). This orifice also has an upper windbreak (3) to avoid the effect of the wind.

[0023] The container/cabinet has a metal door without a lock for access to the heater (1) and on the front is installed the regulatory gas spigot (5). The hot and cold water pipes (10) come through the top of the cabinet.

[0024] The entire assembly presents a flap (11) around the entire edge so that the equipment can be fitted into one of the outer sides of the caravan, isolated from the inside of the caravan and with access for handling also outdoors, and it does not stand out from the vehicle in order to comply with the regulations regarding mobile vehicles or units in this respect.

[0025] The device that is the object of the invention works as follows: The air necessary for combustion enters through the edges of the lower windbreak (4) and is divided into two flow streams; one goes through the heater (1) providing the flow required for combustion and is expelled as burnt gas through the gas outlet (2), whereas the second flow goes through the cooling conduit (8) where it cools the heater (1) itself and is finally expelled through the cool air outlet (9), mixing with the hot gases from the combustion gas outlet (2) and cooling them, making use of the turbulence created by the upper windbreak (3). The hot and cold water pipes (10) are connected to the heater (1) from beneath, as can be seen in figure 2.

[0026] In figures 4 and 5 we show the version with a driven draught, in which an extractor (12) is connected at the combustion gas outlet (2). Since the extractor (12) that drives the draught must operate at 220 V, 50 Hz so that its motor does not require a brush collector and sparks are therefore not generated, as would be the case for a 12 V direct current motor, since this is the voltage available in the caravan from the battery of the two car, a current converter has been incorporated into the extractor (12) which transforms the 12 V dc to 220 V, 50 Hz.

Claims

1. Gas hot water device for caravans, **characterised in that** it consists of a container in the shape of a cabinet independent from the inside of the caravan but accessible from outside through a door, which contains an instantaneous gas water heater (1), where this container is in the shape of a cabinet equipped with a flap (11) around the edge to fit it into the outside of the caravan.
2. Gas hot water device for caravans, in accordance with claim 1, **characterised in that** the container in the shape of a cabinet is equipped with combustion air inlet and outlet orifices protected by a lower windbreak (4) and an upper windbreak (3), respectively, inside which the air is divided into two flow streams, one which supplies the combustion air to the heater (1) and which is expelled through a gas outlet (2) and another which, going through a cool-

ing conduit (8) on the back of the heater (1), cools both the heater and the burnt gases, when the flow from the cool air outlet (9) is mixed with the flow from the combustion gas outlet (2).

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3. Gas hot water device for caravans, in accordance with claim 2, **characterised in that** at the combustion gas outlet (2) there is an extractor (12) fitted in such a way that when the outlet temperature of the combustion gases exceeds a certain value, said ex- 10
tractor (12) goes into operation, whereas when this temperature is not exceeded, the extractor is automatically switched off and the exhaust combustion gases are expelled by a natural draught.

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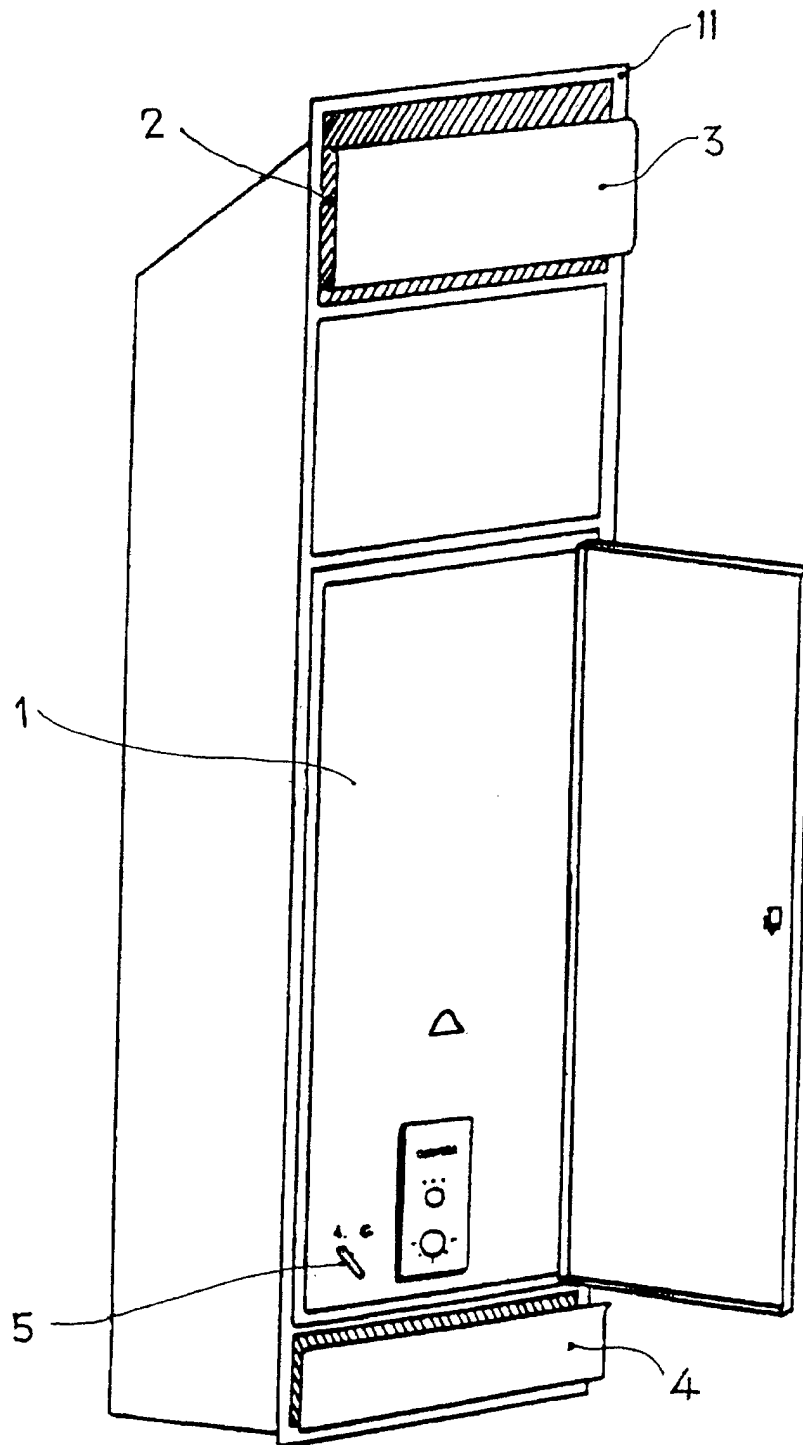


FIG. 1

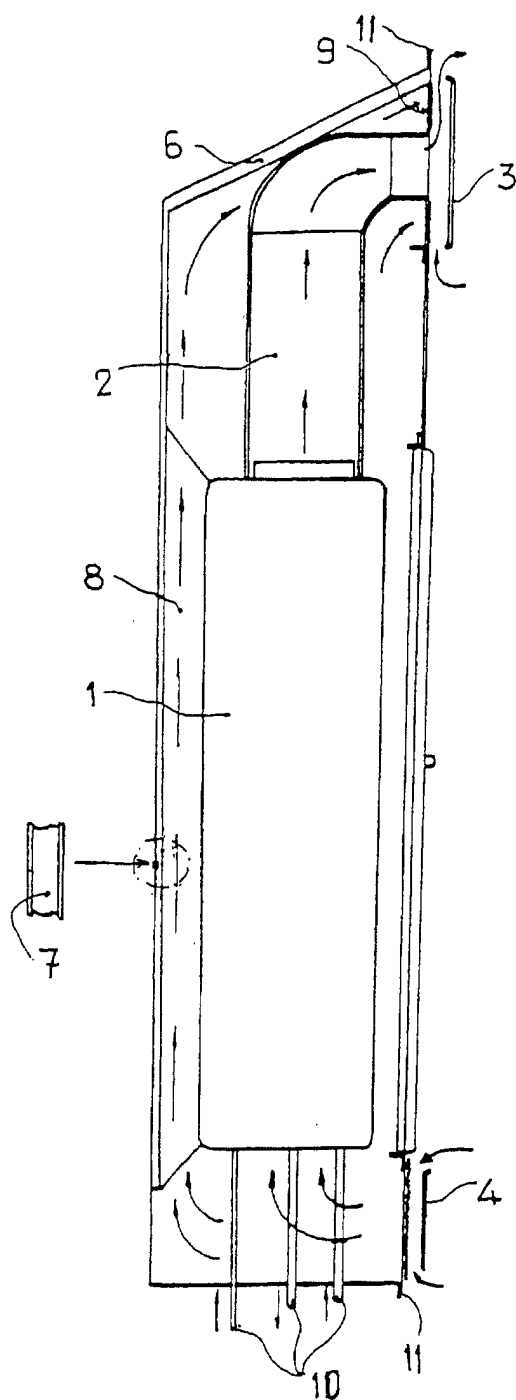


FIG. 2

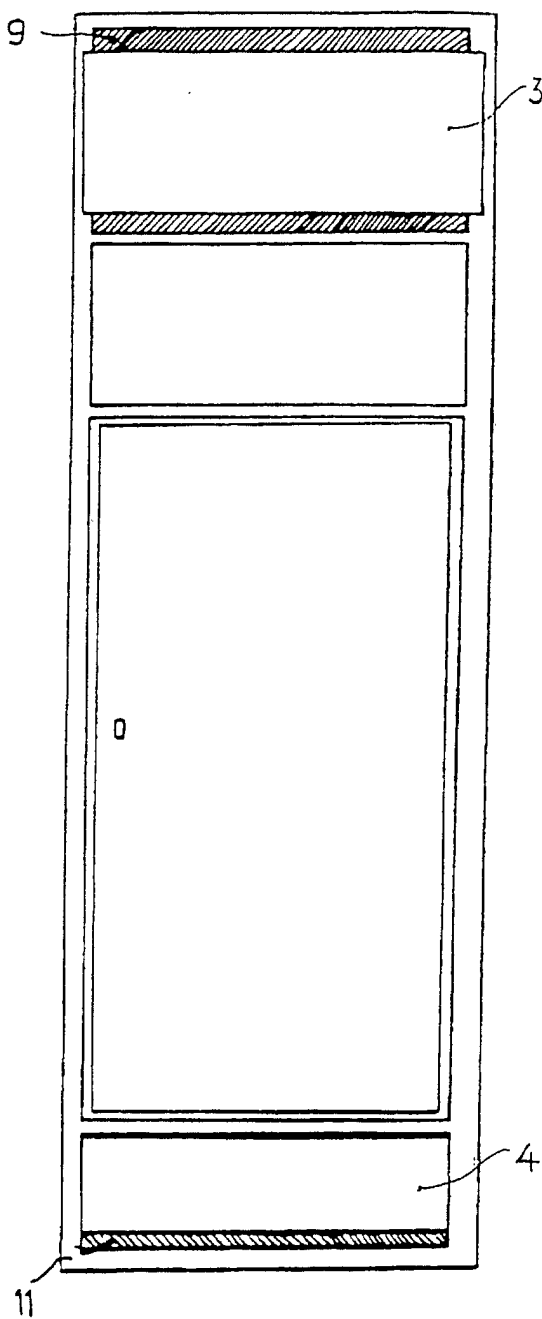


FIG. 3

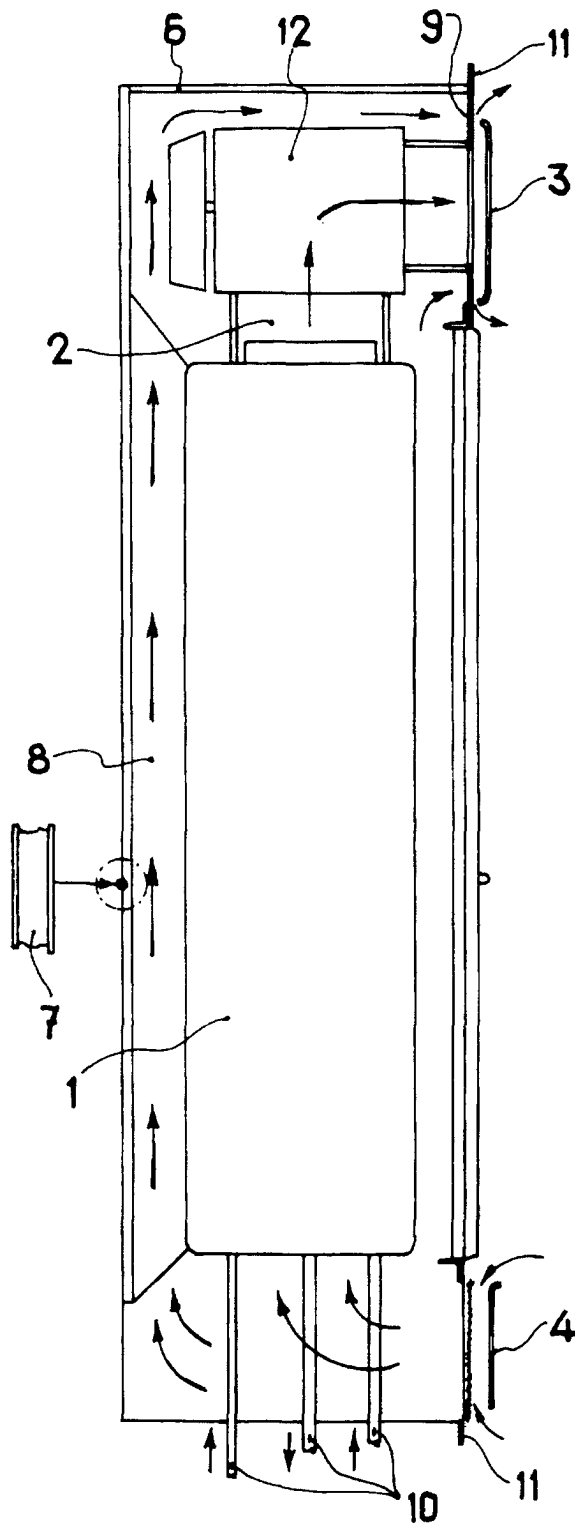


FIG. 4

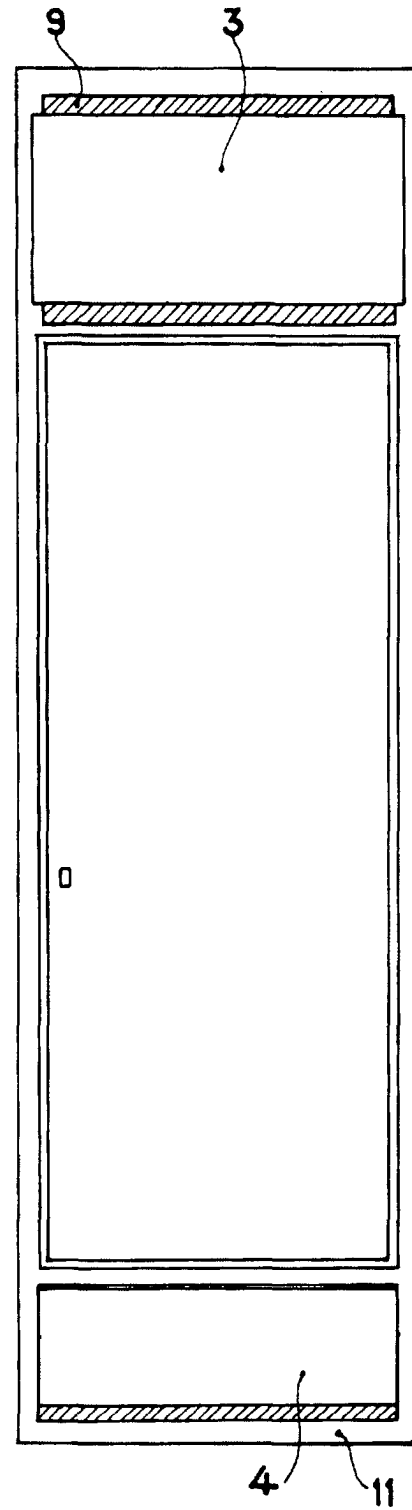


FIG. 5