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BOILER FOR HEATING COMBUSTIBLE FLUIDS

Filed June 13, 1967

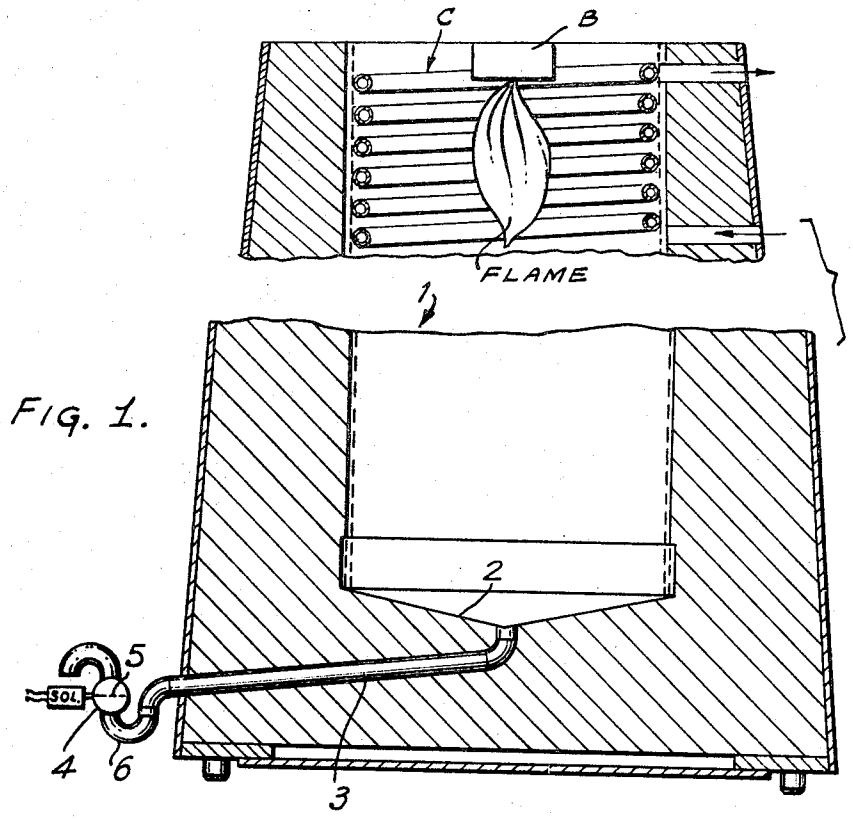

FIG. 1.

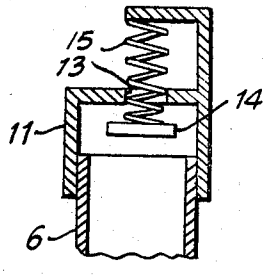

FIG. 2.

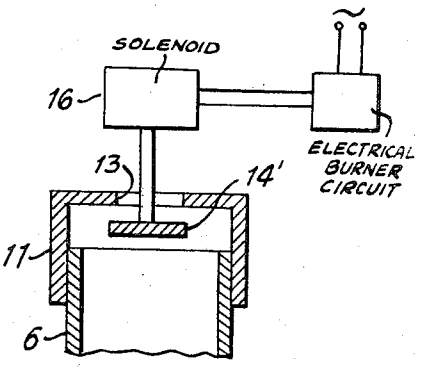

FIG. 3.

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BOILER FOR HEATING COMBUSTIBLE FLUIDS

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U.S. Cl. 431—117 5 Claims
Int. Cl. F23d 5/12; B05b 1/28

ABSTRACT OF THE DISCLOSURE

A boiler for heating combustible fluids comprising a burner and a closed housing with a bottom which slopes downwardly toward a drain pipe provided with closure means which is closed during operation of the burner to prevent escape of gases and which is open when the burner is at rest to permit draining of accumulated fluid.

This invention relates to a boiler for heating combustible fluids, particularly heat transmitting fluids, having a closed boiler housing, coiled pipes for conducting the fluid, and at least one burner heated by gaseous or fluid fuel, with the flame directed toward the interior of the housing.

Boilers of the type referred to are used in increasing numbers in industry for the most diverse heating installations. They are characterized by the fact that the heat carrier used, usually oil, is in a fluid state and hence transmits great quantities of heat. Such boilers operate in general with very high pressure within the housing. The housing must accordingly be essentially closed and may not have any large openings.

It is an object of the invention to provide boilers of this type with safety means whereby the escape of combustible fluid will not constitute a danger. If such escape begins while the boiler is in operation, this can have no appreciable consequences, since it would start at a very small leak point. The oil entering the boiler is constantly burned. Substantial danger can, however, arise if oil should accumulate at the bottom of the housing while the boiler is not in operation. Should the burner then be started, especially if the boiler is hot, with consequent gasification, an explosion may occur under certain conditions.

Any presence of the combustible fluid in the interior of the boiler is, in accordance with the invention, avoided by providing in the bottom of the boiler at least and preferably one drain, each point of the boiler bottom being downwardly inclined toward the drain, the drain being provided with a closure which is closed while the burner is in operation and open when the burner is inoperative.

In the preferred embodiment of the invention, the boiler has the shape of a body of rotation, preferably that of a truncated cone, wherein the bottom of the boiler preferably is in the shape of a shallow cone. The drain is disposed in the center of this cone and is carried outwardly toward a closure device.

Oil escaping into the housing of the boiler is carried off through the drain and is thereby rendered harmless. A warning system may further be provided which will react to the escape of oil from the drain. Such a system can, for example, comprise a small container having disposed therein a light floating body which, upon escape of oil into the container, will be lifted and actuate an electrical contact.

In one embodiment of the invention, the closure means for the drain comprises a solenoid which is connected in

the electrical circuit of the burner and maintains the closure means closed when the burner is in operation. The solenoid may, for example, be controlled by the so-called "flame watcher" with which oil burners are usually provided. As long as such a flame watcher, which is responsive to light phenomena, observes the burner flame, it maintains the drain closure means closed.

In accordance with another, preferred embodiment, the closure means comprises a valve member which is held closed by overpressure in the interior of the boiler. In this arrangement the valve may, for example, be so constructed that an extension is provided at the end of the drain pipe, which extension is closed at its free end by a plate having a central opening. Within the chamber thus formed there may be provided a plate maintained, preferably from without, by a light spring and which, upon occurrence of excess pressure in the drain pipe, that is to say while the burner is operating, is pressed against the opening by the excess pressure, against the resistance of the spring, to maintain the opening closed. Such a device may, for example, be further improved by coupling the plate with a contact maker which indicates the open and closed condition of the valve means.

The invention will now be described, with reference to the accompanying drawing, wherein:

FIG. 1 is a diagrammatic sectional view of a boiler shown in elevation,

FIG. 2 is a sectional view of one embodiment of the closure means in FIG. 1, and

FIG. 3 is a sectional view of a second embodiment of the closure means.

In FIG. 1 is seen a boiler housing **1** having a lower conical portion **1***a*.

A coil system for a fluid to be heated is shown at C and a burner B is located at the top of the boiler with its flame directed downwardly. As may be seen by reference to the drawing, the bottom **2** of the boiler housing is in the form of a downwardly inclined shallow cone. At the deepest point of the boiler bottom there is a drain pipe **3**, which is provided at its outer end with a closure means comprising a shut-off valve **4** and a U-shaped pipe **6** which is filled with oil up to the level indicated at **5**. The U-shaped pipe **6** is so dimensioned that the normally occurring boiler pressure of, for example, 30 mm. W.S. is insufficient to force the fluid accumulated in the pipe outwardly. Accordingly, flue gases cannot escape from the U-shaped pipe while the burner is running.

Since the U-shaped pipe **6** is, at its highest point, well below the lowest point of the boiler bottom, draining of the fluid from the interior of the boiler is assured, in accordance wtih the principle of gravity.

As may be seen in the drawing, the free leg of the U is bent downwardly. The downwardly curving portion is detachable, to allow for filling to the desired level. Normally, the fluid level should reach the level of point **5**, at the separation line of the upwardly bent portion.

FIG. 2 shows an embodiment of the closure means with the downwardly curving portion of pipe **6** detached. The closure means comprises a valve means which is held closed by the overpressure in the interior of the boiler. In this arrangement, an extension **11** is formed at the end of the U-shaped pipe **6**, said extension having a plate **12** at its free end with a central opening **13**. A valve plate **14** is acted on by spring **15** such that upon operation of the boiler, an overpressure is developed which acts on valve plate **14** to displace the same against the action of spring **15** to close opening **13** and hence close the outlet of pipe **3**. Thus escape of fluid gas is prevented.

In FIG. 3 is shown an arrangement which is similar to that in FIG. 2 with the exception that valve plate **14'** is positively displaced by the action of solenoid **16** (rather than overpressure in the boiler). The solenoid is con-

nected to the electrical burner circuit so as to be operable with the burner, whereby the closure means is closed when the burner operates and open when the burner is inoperative.

What I claim is:

1. A boiler for heating combustible fluids comprising a closed boiler housing defining a combustion chamber, a coiled pipe system in said chamber for conducting combustible fluid, and a burner having a flame directed inwardly of the housing into said chamber, said housing having a surface of conical shape at the bottom of said chamber which narrows downwardly, a drain pipe connected to said conical surface at the lowest point thereof, and closure means for said drain pipe for preventing escape of flue gases when the burner is in operation, while permitting the draining of accumulated fluid when the burner is not operating.

2. A boiler as defined in claim 1, wherein the closure means is in closed position when the burner is in operation and in open position when the burner is not operating.

3. A boiler as defined in claim 2 comprising a solenoid

operative with said burner to close the closure means during operation of the burner.

4. A boiler as defined in claim 2, wherein the closure means comprises a valve member which is closed by the pressure in the combustion chamber during operation of the burner.

5. A boiler as defined in claim 1, wherein the closure means comprises a U-shaped pipe connected to said drain pipe at the outlet end thereof, said U-shaped pipe containing a liquid, the level of which lies below the lowest point of the bottom of the chamber.

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