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A. H. HEYROTH

2,095,253

IGNITER FOR FUEL BURNING SYSTEMS

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Fig. 1.

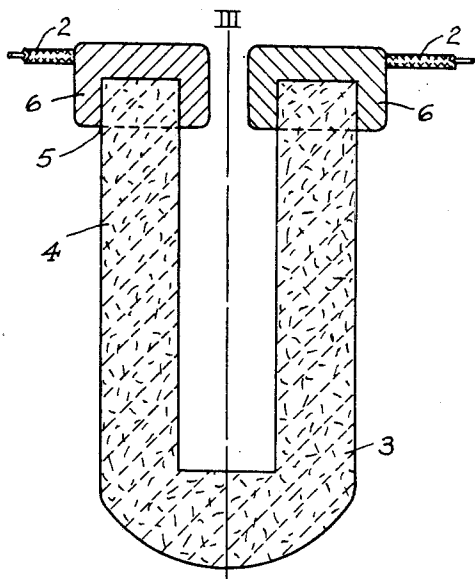


Fig. 3.

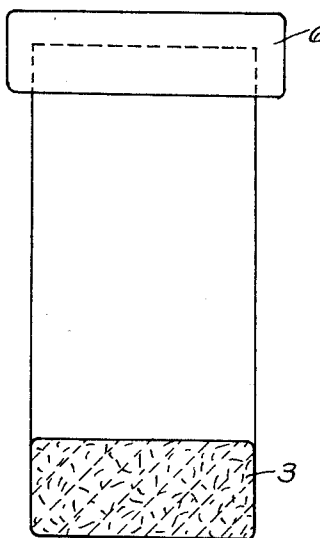


Fig. 2. III

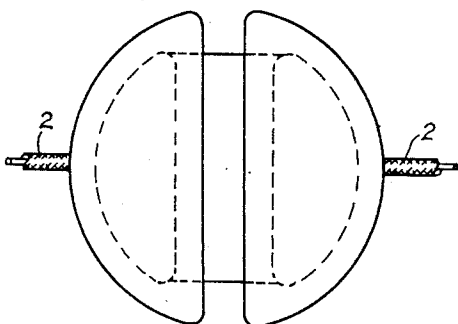


Fig. 4.

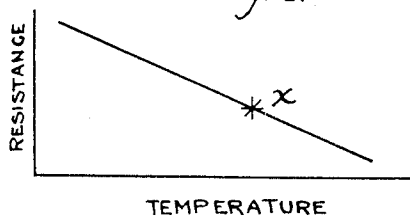
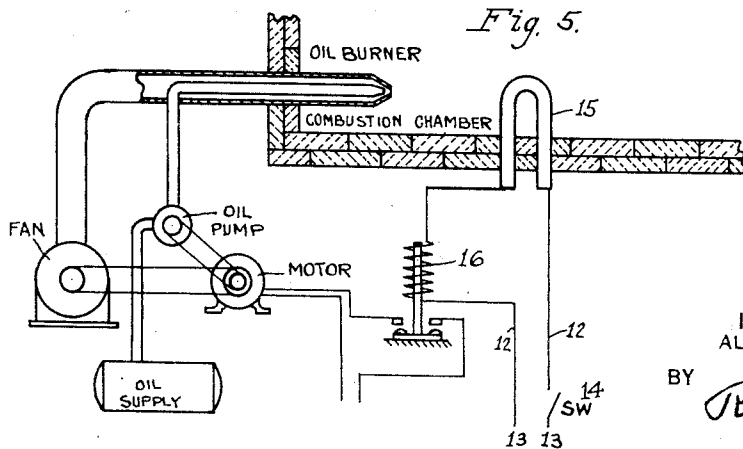


Fig. 5.



INVENTOR
ALBERT H. HEYROTH

BY

Robert Beumer.
ATTORNEY

UNITED STATES PATENT OFFICE

2,095,253

IGNITER FOR FUEL BURNING SYSTEMS

Albert H. Heyroth, Niagara Falls, N. Y., assignor,
by mesne assignments, to The Carborundum
Company, Niagara Falls, N. Y., a corporation
of Delaware

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5 Claims. (Cl. 175—115)

This invention relates to methods of igniting and controlling fuel burning systems.

The object of my invention is to provide an igniter of the "hot point" type that will not be attacked by corrosive fumes or be destroyed by excessive temperatures.

Heretofore, systems for igniting the fuel in oil, gas or pulverized coal burning systems have followed three trends. In one case a pilot light is used which burns continuously. Inasmuch as the control system is not tied up with this light there is some danger from interruption of service. On top of this, considerable quantities of fuel are used to maintain the pilot light. Another system depends upon a high tension electric spark to ignite the fuel. As before, this system lacks dependability. A third system known as the hot point ignition method is probably the best; however, very little success has been had to date. This is due to the fact that the corrosive fumes from the fuel or the excessive flame temperatures soon destroy the metallic resistance used as the hot point. Furthermore, the element soon becomes so heavily coated with carbon as to make it inoperative.

My invention overcomes these objections. I provide a non-metallic resistance element for the ignition of the fuel, said element having a negative temperature resistance coefficient, which property can be utilized in the control of the oil or gas burning system by means of relays in the same circuit as the ignition element.

Figure 1 is an elevation of a heating element used in one form of my invention;

Figure 2 is a plan view of the heating element indicated in Figure 1;

Figure 3 is a section on the line 3—3 of Figure 1;

Figure 4 is a curve showing the negative temperature resistance characteristic of the material used in the igniter; and

Figure 5 shows an ignition circuit in which my invention is used.

Referring to Figure 1, the points 6 consist of button contacts made from a heat resistant material such as "Ascoloy" to which are attached lead wires 2. The non-metallic resistance element 3, which serves as the fuel igniter, is composed essentially of a body of silicon carbide impregnated with silicon and commonly known as siliconized silicon carbide.

In the manufacture of my ignition element, the following steps are necessary. A silicon carbide mix composed essentially of 120 grit and finer material is first formed into rods of suitable

length. They are then burned by the process which is outlined in the copending application, United States Serial No. 575,665, filed November 17, 1931 (U. S. Patent No. 1,906,853). After this process has been carried out, the rods are cut into the required lengths, slotted into a clothes-pin shape, and then siliconized as described in the copending application, Serial No. 575,578, filed November 17, 1931 (U. S. Patent No. 1,906,963). Upon finishing that operation, the contact buttons are put on. These buttons are pressed so that the leg 4 fits tightly in a hole 5 in the button 6. During the process of welding the lead wires 2 to the buttons 6, these buttons become sufficiently hot so that the elements can be pushed into the holes in the buttons. On cooling, the buttons contract thus making a shrunk fit contact. The leads 2 are welded to the caps.

Referring now to Figure 5, one method of operation of my invention is outlined as follows: Lead wires 12 are attached to a source of power 13 as in Figure 5. In series with the lead wires is a relay set to operate when current reaches a given value determined by the resistance value x and the voltage applied at 13. On starting the system, closing the switch 14 starts the current flowing through heating element 15 and through coil 16 of the relay. As the temperature in the element 15 increases, the resistance decreases until a point x is reached as indicated in Figure 2. At this point the element is at a sufficiently high temperature to ignite the fuel which is then turned on by the relay 16 which is set to operate when the current in the circuit is at a value determined by the resistance x , which in turn sets into motion the mechanism for starting the flow of fuel. The nature of the mechanism is of little importance in the consideration of my invention as compared to the nature of the ignition element and its electrical characteristics that make possible the use of such mechanisms. Such mechanisms will suggest themselves in many forms to one skilled in the art.

The safety features of this form of igniter and control can be well-appreciated. Thus, the hot point must be at fuel ignition temperature before the fuel can be turned on, eliminating the great danger from this type of fuel burners. Excessive temperatures and corrosive fumes do not destroy this type of ignition element. Their use therefore increases the life of the installation; moreover, these ignition elements do not become coated with carbon from the fuel, which coating would tend to make them inoperative.

I claim:

1. An igniter element for oil burners and the like formed of silicon carbide which has been subjected to the passage of an electric current to make it highly conducting at operating temperatures and siliconized throughout to give it a continuously negative temperature resistance coefficient and a dense structure which is resistant to oxidation and to carbon deposition.
2. A resistor element for fuel ignition comprising silicon carbide which has been impregnated with silicon by heating up a shaped silicon carbide body in contact with silicon to the critical temperature at which liquid silicon is rapidly absorbed into the body of silicon carbide, said element being characterized by a relatively low electrical resistance at room temperatures, a pronounced negative temperature coefficient, and relatively large resistance to carbon deposition.
3. A dense resistor element for fuel ignition in a combustion chamber comprising a U-shaped element having a framework of silicon carbide and the pores within the framework filled up with silicon by impregnation at the critical temperature at which silicon carbide absorbs silicon with great rapidity, and metal contact buttons shrunk on the ends of the U-shaped element, the element being mounted so that the bend of the U projects into the path of the fuel to be ignited, said element being characterized by a relatively low electrical resistance at room temperatures, a pronounced negative temperature coefficient and relatively large resistance to carbon deposition.
4. An igniter for use in fuel burning systems where metallic igniters tend to become less efficient through carbon deposition, said igniter comprising a silicon carbide resistor which has been impregnated with silicon to give it a dense body, a pronounced negative temperature coefficient of electrical resistance, and an impervious surface which is unfavorable to carbon deposition.
5. An igniter for use in fuel burning systems where difficulties are experienced with metallic igniters on account of carbon deposition, said igniter comprising a silicon carbide resistor whose electrical conductivity has been increased by passing an electrical current therethrough at very high temperatures and which element has been subsequently impregnated with silicon to increase the electrical conductivity at low temperatures and to give said element a pronounced negative temperature coefficient of electrical resistance and an impervious surface which is unfavorable to carbon deposition.

ALBERT H. HEYROTH.