Dec. 4, 1923. 1,476,201

P. C. HAAS

BURNER IGNITER

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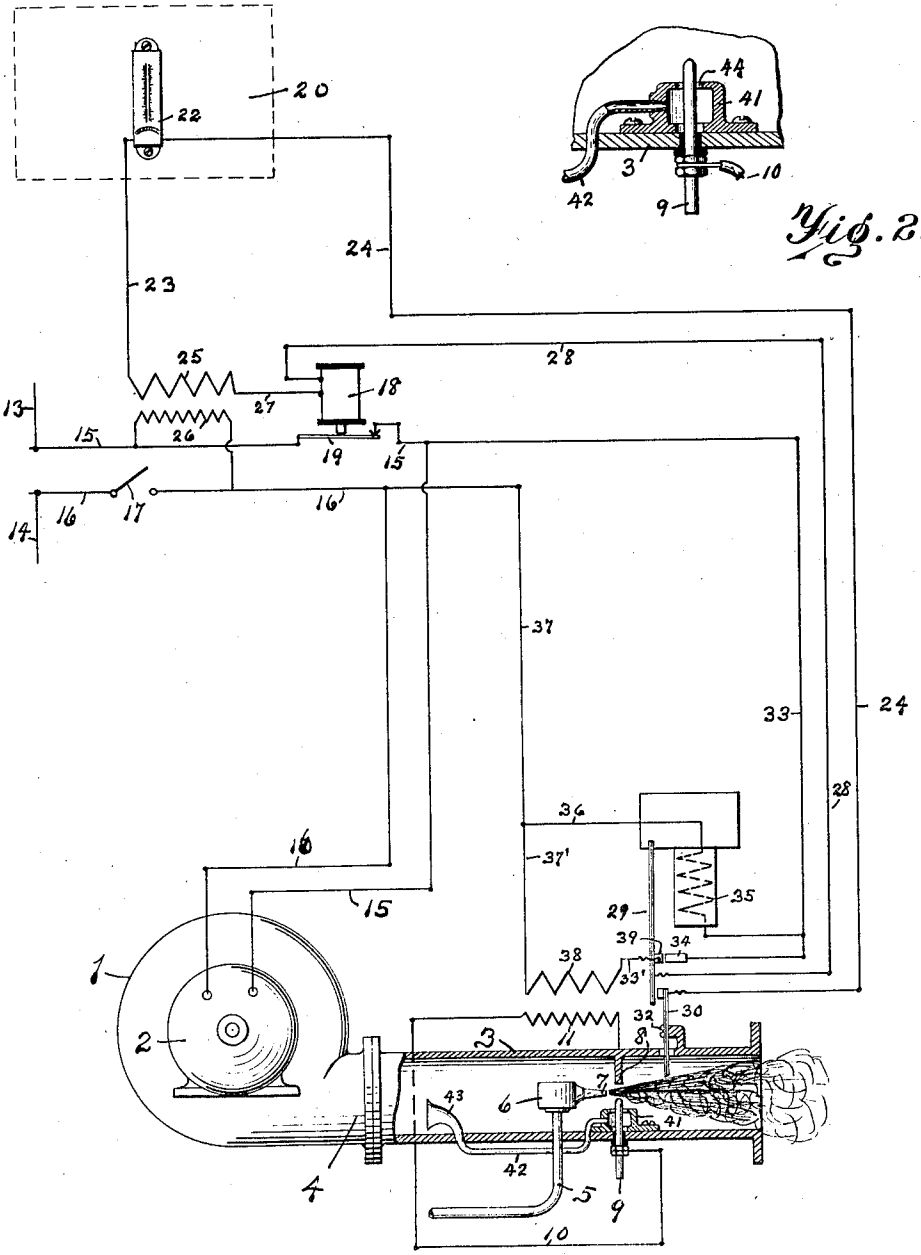


Fig. 1.

Fig. 2.

Inventor

Paul C. Haas.

By Edward N. Pagelsen.

Attorney

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UNITED STATES PATENT OFFICE.

PAUL C. HAAS, OF ANN ARBOR, MICHIGAN, ASSIGNOR OF ONE-HALF TO FRANK M. KELLOGG, OF ANN ARBOR, MICHIGAN.

BURNER IGNITER.

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To all whom it may concern:

Be it known that I, PAUL C. HAAS, a citizen of the United States, and residing at Ann Arbor, in the county of Washtenaw and State of Michigan, have invented a new and Improved Burner Igniter, of which the following is a specification.

This invention relates to automatically operating means for forcing a jet of atomized fuel into a combustion chamber, and its object is to provide means for igniting the fuel when the atmospheric temperature at a selected place falls below a predetermined degree and for stopping the action of such jet producing means when the temperature at such selected place rises above another predetermined degree. A further object of this invention is to provide electrically operated means for producing the jet and igniting it by an electric spark, the spark being discontinued when no longer needed.

In the accompanying drawing, Fig. 1 is a diagrammatic view of a fuel feeding and igniting device embodying the present invention. Fig. 2 is a section of the mounting for one of the igniting electrodes.

Similar reference characters refer to like parts throughout the several views.

In Fig. 1 are shown conventionally a fan blower 1 and a motor 2 for driving it. One end of the tube 3 connectetd to the discharge end 4 of the blower while the other end constitutes the combustion chamber, although any other desired form of combustion chamber may be employed. A fuel pipe 5 having an atomizer 6 at its upper end conducts fuel to the combustion chamber. Adjacent the nozzle 7 of the atomizer are the electrodes 8 and 9 between which passes the igniting spark. The electrodes 8 may be a portion of the tube 3 if desired. An electric circuit 10 including a secondary winding 11 of an induction coil connects to these electrodes.

The operating alternating current is obtained from the conductors 13 and 14 to which the service wires 15 and 16 connect. A control switch 17 is connected into the service wire 16, which also constitutes one of the feed wires of the motor 2. A relay 18 causes its armature 19 to close the circuits 15 during working conditions which circuit constitutes the other feed wire of the motor 2. The space whose temperature determines the operation of the present invention is indicated by the dotted line 20 and within it is the thermostat 22 of any well known construction, which opens the circuit between the wires 23 and 24 when the atmosphere at that place is above a certain predetermined temperature and closes this circuit when below this or any other predetermined temperature.

Connectetd to the wire 23 is a secondary winding 25 of a transformer whose primary winding 26 connects to the wires 15 and 16 and as its resistance is high, little current passes over this winding 26. The wire 27 connects this winding 25 to the relay 18 and the wire 28 connects the relay to the thermostat 29. The wire 24 connects to a second thermostat 30 mounted at 32 and having one arm extending into the combustion chamber 3.

A wire 33 extends from the feed wire 15 to the contact 34 and a branch wire extends from the wire 33 to a heater 35 adjacent the thermostat 29, the other end of the heater connecting by the wires 36 and 37 to the feed wire 16. The current flows through the heater 35 whenever the main feed circuit is closed. A primary winding 38 of a transformer of which the secondary winding is the coil 11, connects to a contact 39 carried by the thermostat 29 by the wire 33′ and to the wire 37 by the wire 37′. The operation of this device is as follows.

When the heater 35 is cold the contacts 34 and 39 engage and the two thermostats 29 and 30 contact. When the thermostats 29 and 30 become warm, both swing to the left, especially as the lower arm of the thermostat 30 is heated in the combustion chamber.

When the switch 17 is closed an induced current is set up in the relay 18 by reason of the wires 24 and 28 being connected by the two thermostats 29 and 30. This causes the relay to close the circuit 15 to the motor and a blast of fuel at the spark gap between the electrodes 8 and 9 results. The wire 33 also carries current to the primary winding 38, resulting in an induced current jumping the spark gap and it also carries a current to the heater 35. As soon as the thermostat 29 gets sufficiently warm and bends, engagement between the contacts 34 and 39 is broken and the sparks between the electrodes stop.

If the fuel has become ignited, the upper end of the thermostat 30 swings with the lower end of the thermostat 29 and maintains contact. But should there be no ignition for any reason whatever, as when there is no fuel, this contact between the thermostats ceases as soon as the thermostat 29 swings to the left, resulting in a broken circuit to the relay 18, an opening of the circuit 15 to the motor and a stopping of the blower.

If the burner functions properly, it will continue to operate until the temperature around the thermostat 22 exceeds the predetermined degree, when the circuit 23, 24 is opened and the blower stops. As soon as this circuit is again closed, the blower will operate while at the same time sparks between the electrodes 8 and 9 will ignite the fuel.

Where the electrode 9 is mounted below a blast of fuel, as shown in the drawing, soot and lamp black are liable to gather around it and short circuit the current. To prevent this, a chamber 41 may be placed within the combustion chamber around the electrode 9, as shown in Fig. 2, and a pipe 42 led therefrom to a funnel positioned to receive a portion of the air passing from the blower and this air passing up through the opening 44 will prevent soot and other objectionable material from lodging around the electrode.

This invention has been illustrated diagrammatically and any desired type and construction of the various parts indicated may be employed without departing from the spirit of my invention as set forth in the following claims.

I claim:—

1. In a liquid-fuel burner, the combination of a blower and an electric motor therefor, a feed circuit to the motor a relay to close said circuit, a transformer having one winding connected to the feed circuit and a second winding connected to the relay circuit, a second transformer adapted to produce ignition sparks to ignite the fuel, a thermostat to control the circuit to the second transformer, and an electric heater for said thermostat connected to the feed circuit to cause the thermostat to cut out said igniting transformer.

2. In a liquid-fuel burner the combination of electrically operated means to produce a spray of liquid fuel, a main feed circuit therefor, an electric transformer to produce sparks to ignite the spray, a feed circuit for the transformer, an electric heater connected to the main feed circuit, and a thermostat adjacent said heater and affected thereby to open the circuit to said ignition transformer when heated.

3. In a liquid-fuel burner the combination of electrically operated means to produce a spray of liquid fuel, a main feed circuit therefor, an electric transformer to produce sparks to ignite the spray, a feed circuit for the transformer, an electric heater connected to the main feed circuit, and a thermostat adjacent said heater and affected thereby to open the circuit to said ignition transformer when heated, a relay to control the main feed circuit, a second transformer connected into the main feed circuit, a secondary circuit connecting to the second transformer and to the relay, and a thermostat connected into the relay circuit and adapted to open and close the relay circuit and thereby the main circuit.

4. In a liquid-fuel burner, the combination of electrically operated means to produce a spray of liquid fuel, a main feed circuit therefor, an electric transformer to produce sparks to ignite the spray, a feed circuit for the transformer, an electric heater connected to the main feed circuit, and a thermostat adjacent said heater and affected thereby to open the circuit to said ignition transformer when heated, a relay to control the main feed circuit, a second transformer connected into the main feed circuit, a secondary circuit connecting to the second transformer and to the relay, and a thermostat connected into the relay circuit and adapted to open and close the relay circuit and thereby the main circuit, and a third thermostat affected by the combustion of the fuel and adapted to keep the relay circuit closed while the fuel spray is burning.

5. In a fuel burner, the combination of electrically operated means for producing a spray of liquid fuel, a circuit controlling the operation thereof, a pair of thermostats in contact with each other during combustion of the fuel and adapted to separate when there is no combustion, a normally energized relay to keep the said circuit closed, and a second circuit normally closed by the engagement of the thermostats to supply current to said relay.

6. In a fuel burner, the combination of electrically operated means for producing a spray of liquid fuel, a circuit controlling the operation thereof, a pair of thermostats in contact with each other during combustion of the fuel and adapted to separate when there is no combustion, a normally energized relay to keep the said circuit closed, and a third thermostat affected by the temperature of the adjacent atmosphere adapted to open and close the circuit to said relay.

7. In a liquid-fuel burner, the combination of electrically operated means for producing a spray of liquid fuel, a combustion chamber therefor, a main feed circuit for said spray producer, a relay adapted to be energized to close the main feed circuit, a transformer connecting the main feed circuit and a secondary circuit for the relay, a thermostat controlled by the surrounding

atmosphere to open and close the relay circuit, a heater supplied by the main circuit, an electric igniter for the fuel spray, a transformer connecting to the main circuit to supply induced current to the igniter, a second thermostat adapted to open the primary circuit to the ignition transformer, an electric heater connected to the main feed circuit and adapted to cause the second thermostat to open the circuit to the ignition transformer and a third thermostat mounted on the combustion chamber and adapted to be caused by the heat therein to engage the second thermostat while that is bending because of the heat received from said electric heater, the relay circuit being connected to the second and third thermostats so that it will be broken when the second thermostat alone is heated.

PAUL C. HAAS.