Jan. 17, 1928. 1,656,486

E. S. HUNTINGTON ET AL

OIL BURNER

Filed Feb. 11 1927

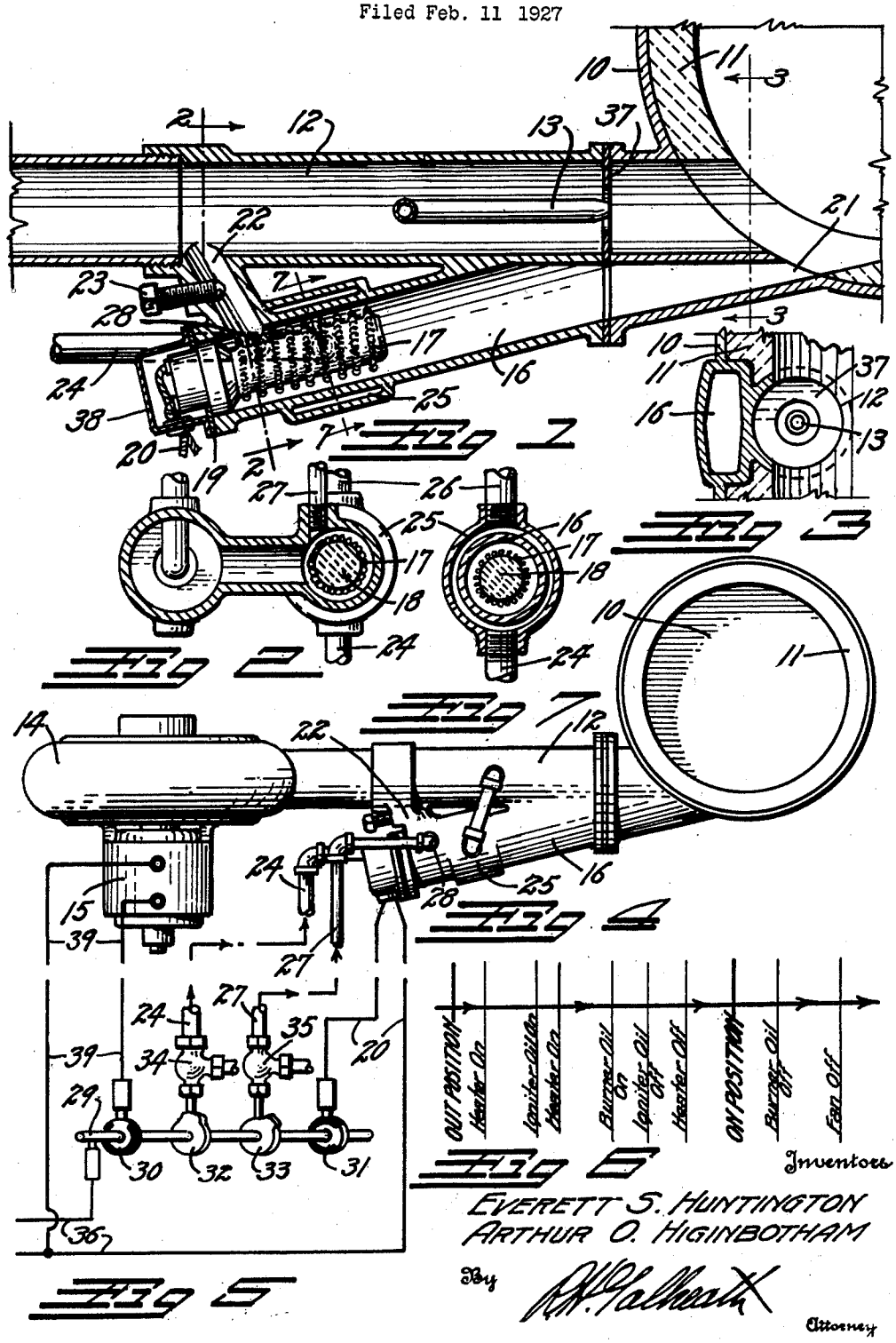

Fig 1
Fig 3
Fig 2
Fig 7
Fig 4
Fig 6
Fig 5

Inventors
EVERETT S. HUNTINGTON
ARTHUR O. HIGINBOTHAM
By
Attorney

Patented Jan. 17, 1928. 1,656,486

UNITED STATES PATENT OFFICE.

EVERETT S. HUNTINGTON AND ARTHUR O. HIGINBOTHAM, OF DENVER, COLORADO, ASSIGNORS TO GENERAL UTILITIES COMPANY, OF DENVER, COLORADO, A CORPORATION OF COLORADO.

OIL BURNER.

Application filed February 11, 1927. Serial No. 167,397.

This invention relates to a device for igniting the flame in an oil burner. In the present invention an electrical resistance heating element is employed for the primary ignition. The use of an electrical resistance unit for the ignition of an oil burner flame has not been heretofore practical owing to the fact that the heat of the flame after ignition soon burns out the element. Attempts have been made to provide mechanical means for withdrawing the element from the heated area after ignition but these devices have proven complicated, short-lived and inefficient.

The principal object of this invention is to provide means for keeping the heating element cool during the operation of the burner so that after ignition has been once accomplished there is no further depreciation in the element during the operation of the burner.

Another object of the invention is to provide an auxiliary oil burner which will act as an igniter for the main burner.

Still another object of the invention is to provide means for pre-heating the oil supply to the burner, which will automatically operate before the ignition takes place, so as to facilitate the igniton of heavy oils especially during cold weather.

A further object of the invention is to prevent an accumulation of oil and its residue on the igniting element.

A still further object is to prevent the accumulation of oil in either the auxiliary or the main burner after the burners have been shut off.

While the device has been illustrated as applied to a burner which is carried tangentially on a circular fire pot, it is desired to be understood that the invention is independent of the burner and its application to a fire pot and is not limited to any particular type of burner or fire pot.

In the drawing:

Fig. 1 is a horizontal section through the burner and igniter portions of the invention.

Fig. 2 is a cross section taken on the line 2—2, Fig. 1.

Fig. 3 is a similar cross section taken on the line 3—3, Fig. 1.

Fig. 4 is a plan view of the ignition device applied to a burner and fire pot.

Fig. 5 is a diagram illustrating the connections with a program cam shaft employed with the device.

Fig. 6 is a chart illustrating the sequence of operation of the program cams.

Fig. 7 is a cross section, through the igniter, taken on the line 7—7, Fig. 1.

In the drawings the usual parts of an oil burner are indicated by numeral as follows: Fire pot 10, fire clay lining 11, main air passage which will be hereinafter designated the main burner 12, main burner nozzle 13, Venturi restriction 37, fan 14, and fan motor 15.

Along side of and at an angle to the main burner 12 an auxiliary burner 16 is placed, which opens to the fire pot 10 so as to project a flame across the opening of the main burner 12. In the auxiliary burner 16 an electrical heating element 17 of the resistance type, is placed comprising a coil of resistance wire wound on a core 18 of suitable refractory, fire-resting material. The heating element is mounted in a contact receptacle carried in a plate 19 which is secured across the open extremity of the auxiliary burner 16. The contact receptacle is closed by a box 38 through which current is supplied to the element by electrical conductors 20.

Air is supplied to the auxiliary burner 16 from the main burner 12 through a by-pass 22 which is controlled by a bolt 23 threaded through its side which acts as a valve to adjust the mixture in the auxiliary burner.

Fuel oil is supplied to the main burner nozzle 13 from a fuel line 24 through a pre-heating jacket 25 surrounding the auxiliary burner 16 adjacent the heating element 17.

The oil enters the bottom of the jacket as shown in Fig. 7, and exits through a supply pipe 26 at the top thereof communicating directly with the main burner nozzle 13. An igniter fuel line 27 opens to the auxiliary burner 16 immediately in front of the by-pass 22 and above the heating element 17, as indicated in broken line at 28, Fig. 1.

The control of the fuel oil to the burners, and the control of the electrical current to the fan motor 15 and the heating element 17, is accomplished through any of the usual thermostat controlled, program devices at present on the market. These devices are on the market in various forms and are so well known in the art that detailed descrip-

tion is deemed unnecessary. It is sufficient to say that these devices operate a cam or program shaft.

In diagram, Fig. 5, a typical cam shaft of one of these devices is indicated at 29. The cam shaft 29 carries commutators 30 and 31 which control the electrical current supply to the fan motor 15 and the heating element 17 resspectively, the current being received from suitable feed mains 36. The shaft 29 also carries cams 32 and 33 which control the supply of fuel oil to the main burner 13 and the auxiliary fuel pipe 27 through the medium of valves 34 and 35 respectively. The sequence of operation of the commutators and cams on the shaft 29 is illustrated in the chart of Fig. 6.

Let us assume that it is desired to start the burner, the cam shaft 29 being in the "out position" of Fig. 6. The program device begins to rotate the cam shaft 29. The commutator 31 first places the heating element in series with the feed mains 36. This heats the heating element to a substantially incandescent temperature which in turn heats the auxiliary burner 16 and its surrounding jacket 25. After sufficient time has elapsed for the proper temperature to have been reached in the auxiliary burner, the cam 33 opens the valve 35 and allows fuel oil to flow through the pipe 27 directly onto the incandescent element, resulting in immediate ignition of the oil. An instant later the commutator 30 closes the circuit from the feed mains 36 to the fan motor 15, causing the fan 14 to blow a blast of air through the main burner 12 and by-pass 22 onto the element 17. This blast picks up the flaming oil and blows it into the fire pot 10 across the opening of the main burner. The blast of air traveling through the auxiliary burner 16 maintains the flaming oil some distance ahead of the heating element so that the element itself is not within the combustion zone. The cam 32 now moves to a position to open the valve 34 and admit fuel oil through the pipe 24 and the heated jacket 25 to the main burner nozzle 13. The blast of air in the main burner blows this oil in atomized condition into the flame projected from the auxiliary burner 16, causing the oil to become immediately ignited.

The moving cam shaft 29 now closes the oil supply to the auxiliary burner through the valve 35 and breaks the current supply to the heating element 17 through the commutator 31. The current to the heating element 17 is not shut off, however, until after the oil ceases flowing through the pipe 27 so that any excess oil on the element or in the auxiliary burner is gasified and burned away so as to leave no residue in the auxiliary burner.

The cam shaft has now reached the position indicated in Fig. 5 and by the "on position" of the chart of Fig. 6. The shaft will stop in this position until suitable thermostats or other control means again cause it to rotate. Further rotation closes the valve 34, shutting off the supply of oil to the main burner 13, and, after the air blast has had sufficient time to clean out and burn any residual oil in the passage and burner, opens the circuit to the motor 15, through the commutator 30, allowing the fan to come to rest. When the cam shaft 29 has again reached the "out position" it will cease to rotate until another ignition of the burner is desired.

It is desired to call attention to the fact that a continual blast of air is played upon the heating element from the by-pass 22 during the operation of the main burner. This blast keeps the element cool and prolongs its life. During the operation of the main burner air is fed by the auxiliary burner into the hottest part of the main burner flame. This air has been heated by its passage through the hot auxiliary burner so that it is in proper condition to increase the combustion of the fuel material at the main burner.

With the usual types of burners it is practically impossible in cold weather, especially when using heavy viscous oils, to sufficiently atomize the oil at the burner for ignition. In the present device, however, this oil has been heated to a sufficiently high temperature in the pre-heating jacket 25 before reaching the burner, to allow it to be immediately atomized regardless of its original viscosity or temperature.

Should it be found desirable, the oil to the auxiliary burner could be brought through a jacket similar to the main burner's jacket. This oil, however, enters the auxiliary burner through the hot metal above the heating element which serves as a pre-heater and additional pre-heating has not been found necessary.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims without departing from the spirit of the invention.

Having thus described the invention, what we claim and desire to secure by Letters Patent is:—

1. An igniter for oil burners having a main air passage and a main burner arranged therein comprising an auxiliary air passage arranged along side of and at an angle to said main air passage so as to discharge across the orifice of the latter; a by-pass communicating between said main air passage and said auxiliary air passage; an electrical resistance heating element arranged in said auxiliary passage adjacent said by-pass; a main oil supply line to said main burner; an auxiliary oil supply line to

said auxiliary passage, said main fuel supply line being arranged to pass adjacent said resistance element so as to abstract heat from the latter.

2. An ignition device for oil burners comprising an auxiliary air passage arranged adjacent said burner so as to discharge at an angle to the latter; an electrical heating element of the resistance type carried in said auxiliary passage; a main fuel supply to said burner; an auxiliary fuel supply to said auxiliary passage; automatic valves arranged to control each fuel supply independently; a fan adapted to project air through said burner and said auxiliary air passage; and a cam shaft adapted to control said valves, said fan and said heating element at predetermined intervals.

3. In an oil burner having a main burner air passage; an auxiliary air passage joining said main air passage adjacent its discharge and lying at a divergent angle to said main passage in the form of a V; a by-pass passage communicating between the spaced apart portions of said main and auxiliary passages; and an electrical resistance heating element extending longitudinally inward from the extremity of said auxiliary passage so as to lie across the opening of said by-pass passage.

4. In an oil burner having a main burner air passage; an auxiliary air passage joining said main air passage adjacent its discharge and lying at a divergent angle to said main passage in the form of a V; a by-pass passage communicating between the spaced apart portions of said main and auxiliary passages; an electrical resistance heating element extending inwardly along the axis and from the extremity of said auxiliary passage across the discharge opening of said by-pass passage in said auxiliary passage; and a cap closing the extremity of said by-pass passage arranged to support said element therein.

In testimony whereof, we affix our signatures.

EVERETT S. HUNTINGTON.
ARTHUR O. HIGINBOTHAM.