Feb. 26, 1946. J. A. CSEPELY 2,395,614

OIL BURNER

Filed June 3, 1942

Fig.1.

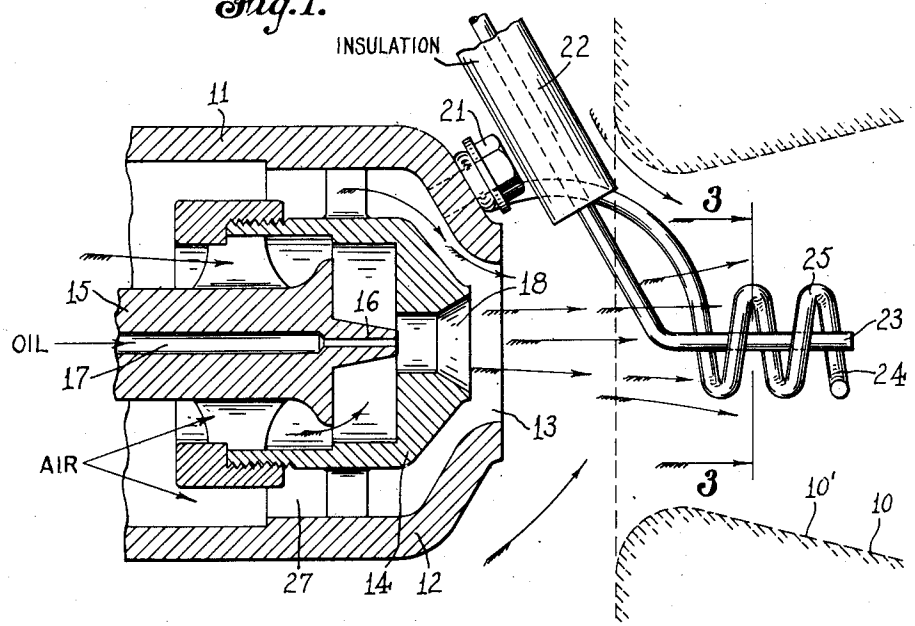



Fig.2.

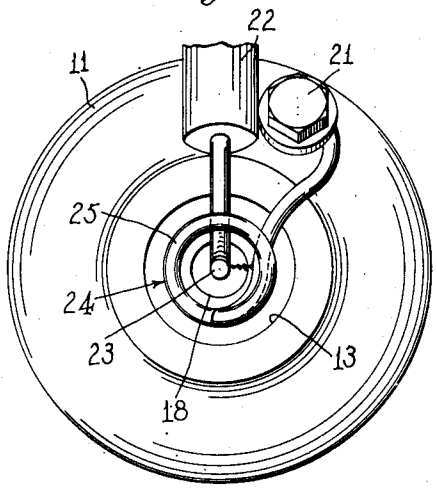
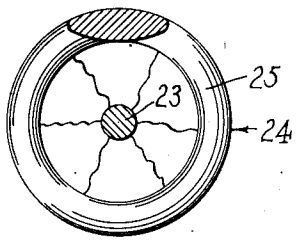



Fig.3.




Inventor

John A. Csepely

By Roscoe M. Barnhart

Attorneys

Patented Feb. 26, 1946 2,395,614

# UNITED STATES PATENT OFFICE

2,395,614

## OIL BURNER

John A. Csepely, New Haven, Conn., assignor to Artemas F. Holden, Northford, Conn.

Application June 3, 1942, Serial No. 445,587

3 Claims. (Cl. 158—28)

In oil burners for domestic and industrial use the ignition of the spray of atomized oil and air is frequently accomplished electrically, for which purpose a spark is produced during the starting period, between electrodes positioned in the path of the combustible mixture. Electrical ignition, at least in certain installations, has very definite advantages over the use of a pilot flame of burning gas. Nevertheless, electrical ignition has had an unsatisfactory aspect in that the ignition of the mixture at the proper time was not made sufficiently sure. Rather often, the fuel fails to ignite, which occasions great inconvenience and, in many cases, possibility of fire or explosion.

My experiments indicate that these troubles and difficulties are due in some measure to the fact that, although a spark forms between the electrodes, it is blown out by the jet of air used for feeding in and atomizing the oil. Usually in starting the burner the practice is to close the electrical circuit for the formation of the spark, open the air supply so that a stream or jet of air is formed, and then open the oil supply, the idea being that the oil stream should not start at a time when particles of raw oil can be spurted on to the electrodes, because this would coat the electrodes and kill the spark. The trouble is, however, that the pressure air often kills the spark, so that while the cleanliness of the electrodes is somewhat preserved, and a combustible mixture of air and oil formed, the mixture fails to ignite.

One of the objects of my invention is to overcome the above-mentioned difficulties.

Another object is to provide an improved igniting oil burners in which the tendency of the pressure air to blow out the spark is overcome, and more particularly by providing for the formation of an igniting spark or arc, which, instead of being disrupted, can have a bodily movement and thereby be maintained for a longer period.

To these and other ends, the invention consists in the novel procedure and features and apparatus to be hereinafter described and pointed out in the claims.

In the accompanying drawing:

Fig. 1 is a sectional somewhat diagrammatic view showing one form of apparatus which may be employed;

Fig. 2 is a partial end view of the apparatus; and

Fig. 3 is a section on line 3—3 of Fig. 1.

In the example shown, which in a somewhat diagrammatic manner illustrates the principal parts of an industrial oil burner of the low-pressure type, 10 is a burner tile in the front wall of the furnace, provided with an interior cone-shaped opening 10' increasing in diameter toward the interior of the furnace. 11 is a burner casing or element having provisions for creating a regulable spray of fuel such as oil particles mixed with air. The casing 11 has an outer shell-like part 12 provided with a mouth 13 spaced outwardly from the mouth of the burner tile. Supported centrally within the part 12 is a part 14, and supported centrally within part 14 is a part 15. Part 15 has a nozzle 16 and leading to it a bore 17 for incoming oil. The nozzle is arranged to deliver oil into the mouth 18 of the part 14. Compressed air is supplied to the mouth 18 along with the oil, such air passing, usually with a whirling effect, around the exterior of part 15, as indicated by the arrows. The mouth 18 is positioned within the mouth 13 of the burner casing. A space 27 is provided between part 12 and part 14 so that further compressed air can pass forwardly around part 14 to mouth 18 so as to be mixed with the oil and air being delivered from the mouth of nozzle 18 and assist in the atomizing of the oil. A certain amount of atmospheric air will also be entrained and drawn into the burner tile around the nozzle of the burner.

For electrical ignition of the combustible mixture, a pair of electrodes is provided, and in the case illustrated there is an electrode 24 which is grounded, and a cooperating electrode 23 which has a mounting of insulation. In the example shown the electrode 24 is connected with the burner casing by a bolt 21 whereby it is grounded, but this is merely by way of example. The electrode 23 has an insulating sleeve 22 surrounding a portion thereof and providing a mounting whereby this electrode is insulated electrically from the other parts of the apparatus. The method of mounting is unimportant, and the insulating sleeve 22 is only partially shown. The mountings of both electrodes are preferably disposed exteriorly of the burner tile, as shown, but the electrodes have arc-supporting portions disposed, generally speaking, adjacent the mouth of the tile, and generally in line with the burner nozzle. The electrode 23 is a central electrode in the form of a rod, and the electrode 24 has a coil portion 25 surrounding the active portion of the electrode 23. The coil portion 25 presents a spiral or helix substantially concentric with the active portion of electrode 23. The arrangement is such that an arc may be created at any of a large number of points between the inner perimeter of the spiral and the opposing portion on the external surface of the plain electrode. There is prefer-

ably a minimum spacing between the electrodes adjacent the mouth of the tile so as to establish an initial fat arc in the manner shown in Fig. 2, this arc being established between the central electrode and an opposing and relatively near portion of the cooperating outer electrode.

In starting the burner the first step is to close the circuit in which the electrodes are included, so that an arc such as just mentioned is formed. As usual in burner practice, the circuit will be held closed for a predetermined period in order to give ample time for the ignition of the combustible mixture which will be established. The next step is to start the flow of pressure air. After the pressure air has been turned on, there will be a spreading out and dispersion or diffusion of the arc as a result of the action of air, a number of weaker and thinner arcs being established at different points along the length of the electrodes. These arcs, disposed at different points along the length of the electrodes and along the length of the air path, are very effective in igniting the combustible mixture when the next step is reached, that is to say, when the oil supply is opened and the oil particles become mixed with the air. A number of weaker arcs, such as mentioned above, are represented by jagged lines in Fig. 3, and it will be seen that they can be created in a number of different radial locations. The possibility exists of arcs being established at any of a large number of points lengthwise and radially of the central electrode, the arcs radiating from an axis which is substantially coincident with that of the round cone-shaped jet or fuel stream. These arcs radiate into the fuel stream for promoting better ignition.

The flow of pressure air is initiated in any usual or preferred manner. Air is forced, usually with a whirling effect, through the air passages within the member 14, and pressure air also passes through the passage or passages between the part 14 and the burner casing. This latter air moves at an angle across the air being ejected from the mouth 18. The result is to set up a round cone-shaped jet of air moving into the hollow tile against and around the electrodes, with entrained air forming a part of the air stream.

It will be apparent that there is disclosed a structure in which a rod electrode is disposed substantially in the axis of the jet and within the interior of the mouth portion of the burner tile, there being a second electrode in the form of a coil surrounding said rod electrode within the mouth portion, said electrodes having portions within the mouth portion providing for an initial arc subject to the air jet and having other portions farther from the entrance of said mouth portion providing for a plurality of weaker arcs radiating into the jet. The nozzle means is spaced outwardly from the mouth portion of the tile and the supporting means for the electrodes comprises conductive members joined to the electrodes and extended laterally in the space between the nozzle means and the tile.

It will be understood that while I have described herein a particular structure of oil burner spraying or atomizing device, this is merely by way of example, and the same applies equally to the showing of the burner tile and of the mounting provided for the electrodes. It will be understood, of course, that suitable adjustments in respect to the oil supply and the air supply are usually provided, but these it is unnecessary to describe, and the common practice in the art in these and other respects may be followed. Suitable adjustment may, if desired, be provided between the electrodes and the opening in the burner tile. It may be mentioned, however, as a subsidiary advantage of the present invention, that close adjustment of the active portions of the electrodes with respect to the burner tile and burner nozzle, in a generally lengthwise direction, is not so important as in the prior electrical ignition devices having only point-to-point presentation of the electrodes.

Various changes in the details of the procedure and in the apparatus used for carrying out my new method can be made without digressing from the general principles of the invention or the scope of the claims.

What I claim is:

1. In an oil burner, the combination of a hollow burner element, nozzle means for directing a round cone-shaped jet of air axially within said element, means for supplying particles of oil to said jet after the latter has been established whereby said jet is rendered combustible, and electrical igniting means for the combustible mixture comprising a central rod electrode disposed substantially in the axis of the jet and an electrode in the form of a coil having a number of turns surrounding said first electrode, said electrodes having portions disposed to provide support for an initial arc subject to the air jet and having other portions disposed farther along in the jet providing for the support of a plurality of weaker arcs radiating into the jet.

2. In an oil burner, the combination of a hollow burner tile having a mouth portion, nozzle means for directing a jet of air axially into the tile, means for supplying particles of oil to said jet after the jet has been established, a rod electrode disposed substantially in the axis of the jet and within the interior of the mouth portion, a second electrode in the form of a coil surrounding said rod electrode within the mouth portion, said electrodes having portions within the mouth portion providing for an initial arc subject to the air jet and having other portions farther from the entrance of said mouth portion providing for a plurality of weaker arcs radiating into the jet, and means for supporting said electrodes.

3. An oil burner structure as set forth in claim 2 in which the nozzle means is spaced outwardly from said mouth portion and in which the supporting means for the electrodes comprises conductive members joined to the electrodes and extended laterally in the space between the nozzle means and the tile.

JOHN A. CSEPELY.