Jan. 12, 1932. F. W. FINKE, JR 1,841,023

NONEXPLOSIVE BURNER ASSEMBLY FOR OIL BURNERS

Filed March 8, 1928

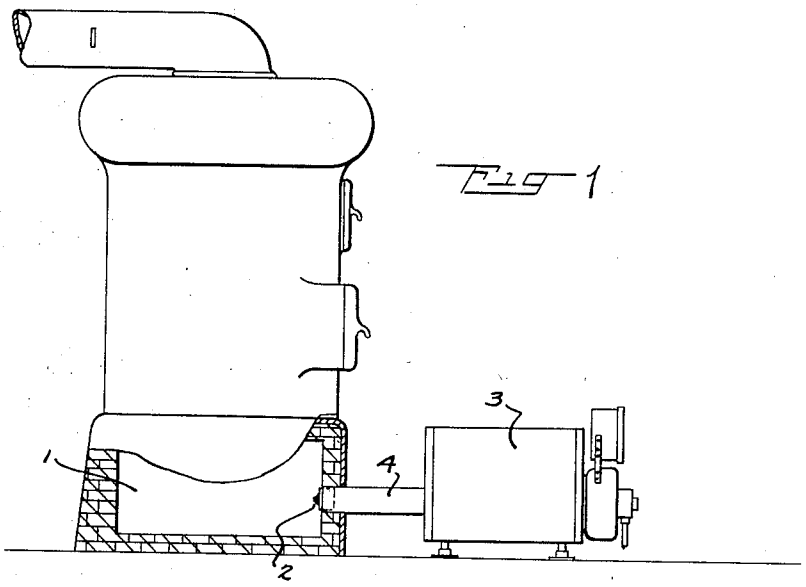


Fig 1

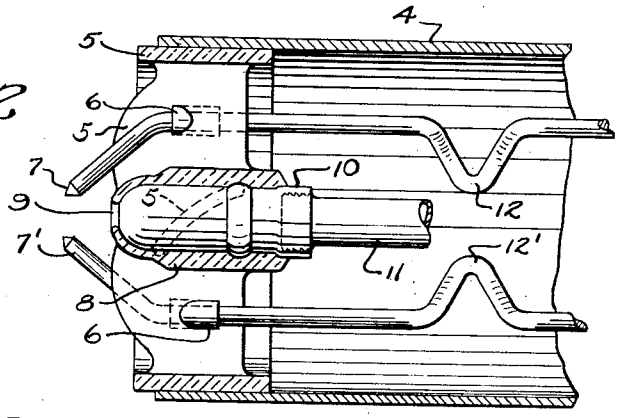


Fig 2

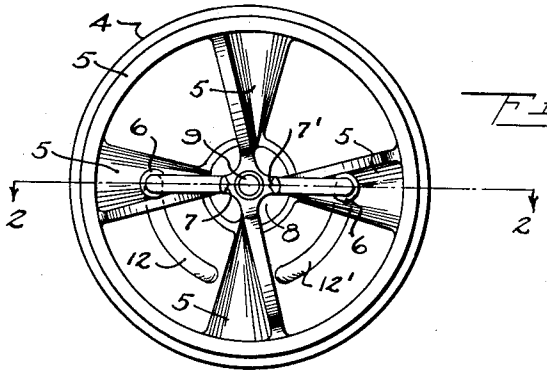


Fig 3

INVENTOR:
Frederick W. Finke Jr.,
BY
His ATTORNEY.

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UNITED STATES PATENT OFFICE

FREDERICK W. FINKE, JR., OF NEW YORK, N. Y.

NONEXPLOSIVE BURNER ASSEMBLY FOR OIL BURNERS

Application filed March 8, 1928. Serial No. 259,939.

This invention relates to oil burners either of the electric or gas-electric ignition type and has for its principal objects the provision of a simple, cheap, effective and withal a safe burner element which will eliminate the possibility of an explosion occurring because of the accumulation due to faulty ignition of unignited oil mists or sprays in the combustion chamber due to faulty ignition.

Heretofore it has been customary to provide the burner tip of domestic oil burners with a metallic gas spiral or baffling device, through which the respective electrodes of the ignition system project, but without contacting therewith, being insulated therefrom by an air gap. In the event the electrodes became fouled or oxidized, or because displaced from their adjusted position, the spark or arc would, in lieu of being struck across the gap between the respective terminals of the electrode, often be short circuited at some distance in advance of the electrode terminals with the consequence that the oil escaping from the central nozzle which was disposed adjacent the electrode terminals, would pass into the combustion chamber without being ignited and the subsequent ignition thereof would result from the short-circuited spark or arc igniting portions of such mists which accumulated in proximity to the latter arc with the resultant spreading of the flame to the vapors or mists in the combustion chamber.

My investigations have led to the discovery that such explosions can be entirely prevented by the improved construction hereinafter described in detail wherein an air spiral having a high co-efficient of electrical resistance and capable of withstanding the high temperature encountered in oil burner practice is employed, serves to prevent displacement of the electrodes and insures that no accidental arcing will occur adjacent the combustion chamber when the arc between the terminals fails besides having other advantages hereinafter set forth.

In the accompanying drawings, in which I have illustrated a preferred embodiment of my invention

Figure 1 is an elevation of a domestic steam boiler equipped with an oil burner embodying my improved burner tip;

Fig. 2 is an enlarged detail vertical section of the burner tip of such oil burner; and

Fig. 3 is an end elevation of such burner tip.

Referring to the drawings and the construction shown therein, the reference numeral 1 designates the combustion chamber of a domestic steam boiler into which projects the tip 2 of a gas-electric or electric oil burner 3 having gas-electric or electric ignition. Said oil burner may be of the intermittent sling-feed or the atomized spray type or any other suitable construction.

A thermostat controls both the ignition of the burner and the circuit of the electrically operated oil pump, which is the type preferably employed, so that when the sparking across the electrode terminals fails to ignite the oil vapors delivered into the combustion chamber the thermostat will within a short period of time, about a minute, automatically cut off the ignition and the circuit of the pump motor.

The burner tip comprises a metallic draft tube 4, in which is secured by a friction fit or in any other desired manner, an air spiral 5 having high co-efficient of electrical resistance, the same being preferably formed of fused quartz or boro-silicate glass. Said refractory air spiral 5 is cored or apertured to form sleeves 6, which receive the opposing electrode elements 7, 7′ respectively and is provided with a central integral nozzle 8, having an outlet aperture 9, in which is located a metallic thimble 10 which serves to connect said nozzle to an oil line 11.

Said electrodes 7 and 7′ preferably are bent as indicated by the V-shaped portions so that the distance between the points 12, 12′ will be somewhat less than the normal distance between parallel portions of the electrodes but greater than the normal distance between the terminals thereof. As a consequence, if, because of oxidization or fouling of the terminals of the electrodes, the normal sparking fails to cross the gap therebetween, the sparks will jump the gap between the points 12, 12′ and since this is at a location well removed

from the combustion chamber, such sparking will prevent an explosion of the vapors in the combustion chamber in the interval between the moment the ignition across the electrode terminals fails until the thermostatic or other control operates to break the ignition and oil pump circuit.

The air spiral which is of the usual type comprising blades having convex external faces and concave internal faces, so that the latter faces are presented to the air current travelling through the air conduit and serve to set up a whirling effect therein, is preferably molded in one piece and fitted over the nipple 10 which essentially serves to support the same in position, as well as being snugly fitted within the air conduit 4. However, in those cases where relative adjustment of the air spiral with respect to the nipple 10 is desired, I may construct the air spiral of two pieces, the same being essentially similar to the air spiral shown, except that the same is centrally apertured to permit of a separate nozzle of refractory material projecting through said aperture so as to permit of the same being adjustable with respect to the air spiral and said latter nozzle is fitted over the nipple 10 so as to prevent direct sparking between the terminals of the electrodes and said metal nipple 10. In such an event, I may provide sleeves on said electrodes which are threaded at each end to receive jam or locking nuts which are adapted to bear against outer and inner faces respectively of the spiral through which the electrodes project and effectively anchor the same while at the same time supporting the spiral in the air conduit 4.

As is evident from the foregoing construction, and particularly by virtue of the fact that the air spiral projects slightly beyond the end of the air conduit 4 and the nozzle 8 projects beyond and completely covers the metal of the thimble or nipple 10, no sparks can pass between the electrodes and the air conduit 4 or the nipple 10 when no spark is struck across the electrode terminals 7, 7′ and since the terminals are nearer at the points 12, 12′ than at any other point, except their terminals, any sparking occurring elsewhere than at the terminals will occur between these two points, 12, 12′ which, as stated, being well removed from the combustion chamber into which the vapors are delivered, avoids the danger of a serious explosion occurring upon the failure of the ignition.

Since the electrodes in my construction are positively supported by the air spiral in lieu of the same projecting freely through the intervening spaces between the blades, as is common in present practice, there is no likelihood of the predetermined adjustment of the same being affected or altered either during the assembly of the burner or because of accidental or intentional tampering therewith on the part of the owner or other parties, and as a consequence, the likelihood of any sparking occurring other than between the electrode terminals because of mal-adjustment or displacement of the electrodes from the predetermined position which is best suited for effective ignition, is eliminated.

Various modifications of the construction herein described may be made without departing from the scope of the invention, as set forth in the appended claims.

What I claim and desire to obtain by United States Letters Patent is:

1. In a safety burner element for oil burners, the combination comprising an air conduit, a pair of electrodes having their terminals in proximity to each other, an oil supply conduit of metal adapted to deliver oil at a point immediately adjacent the terminals of said electrodes having an outlet orifice immediately adjacent the terminals of said electrodes, baffling means disposed in said air conduit and adjacent said electrode terminals for deflecting air passing through said conduit immediately prior to the discharge of the air therefrom, said baffling means having a high co-efficient of electrical resistance, being interposed so as to cross the rectilineal paths between the extreme tip of either of said terminals and said air conduit and also serving as a support for said electrodes.

2. In an oil burner, the combination comprising an air supply conduit of metal, an oil supply conduit, a pair of electrodes having their terminals disposed adjacent the discharge end of the oil supply conduit and beyond the outer end of said air supply conduit, and refractory air baffling means interposed in the outlet end of said air supply conduit and intersecting the rectilineal paths extending from either of the tips of said terminals to said air supply conduit, said baffling means serving as a support for said electrodes.

3. In a safety burner assembly for oil burners, the combination comprising an air conduit, an oil supply conduit of metal, a pair of electrodes having their terminals disposed adjacent the end of said oil supply conduit and beyond the end of said air supply conduit, a refractory envelope of electrically non-conducting material, enveloping the discharge terminal of said oil supply conduit and an air baffling device composed of refractory electrically non-conducting material supporting said electrodes adjacent their outer ends and interposed across the outer end of said air conduit so as to intersect the rectilineal paths between either of the tips of said terminals and said air conduit.

4. In a burner assembly for oil burners, the combination comprising an air supply conduit of metal, an air spiral of refractory electrically non-conducting material located in the end of said air conduit and projecting

partially therefrom, said air spiral being provided with conduits for the reception of electrode members, a pair of electrodes extending through said conduits and terminating in proximity to each other, an oil supply pipe of metal and refractory electrically non-conducting means enveloping the discharge end of said oil supply pipe and projecting in proximity to the terminals of said electrodes and means for causing sparking between said electrodes when the same are live at a predetermined point distant from the terminals thereof when the resistance of the terminals is excessive.

Signed at New York, in the county and State of New York this 6th day of March, 1928.

FREDERICK W. FINKE, JR.