United States Patent [19]

Nelson

[11] **3,843,311**

[45] **Oct. 22, 1974**

[54] **LANTERN WITH IGNITER**

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[22] Filed: **Feb. 8, 1973**

[21] Appl. No.: **330,813**

[52] **U.S. Cl.** **431/109,** 431/266, 431/264

[51] **Int. Cl.** **F21h 1/00**

[58] **Field of Search** 431/100, 109, 255, 264, 431/266

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[57] **ABSTRACT**

An improvement in a fluid fossil fuel lantern comprising a lantern chamber, a fuel exit into said chamber and a mantle disposed about said fuel exit which improvement comprises a piezoelectric starting element, the ignition portion of which is disposed in said mantle and supported at least in part by a mantle hanger disposed about said fuel exit and carrying said mantle; an improvement in gas-air lanterns employing a piezoelectric igniter unit wherein the resistance wire of the piezoelectric unit is constructed of an alloy of chromium, aluminum, silicon and iron.

10 Claims, 3 Drawing Figures

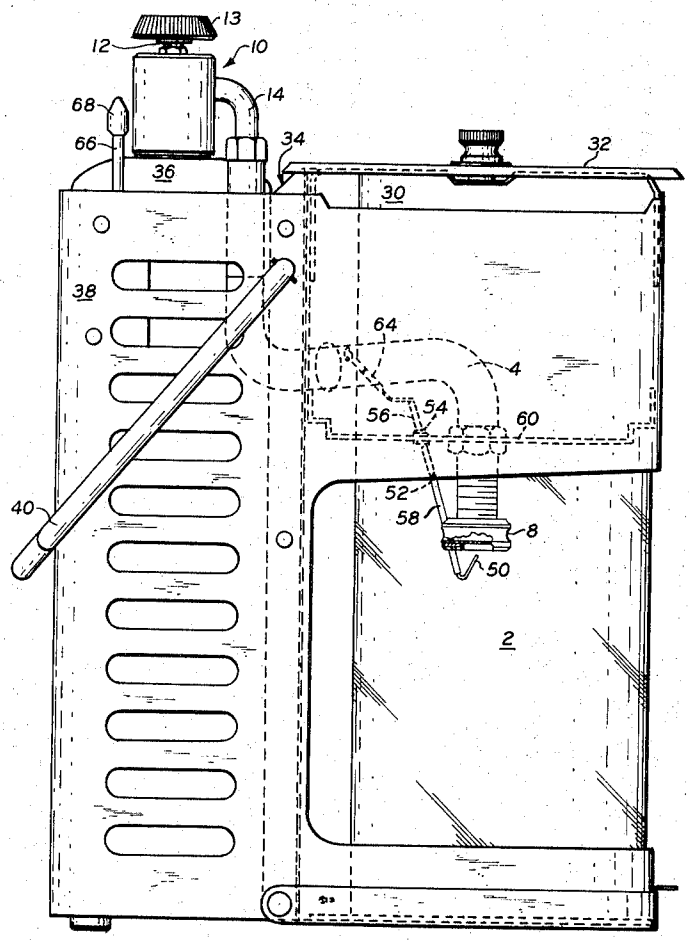


FIG. 1.

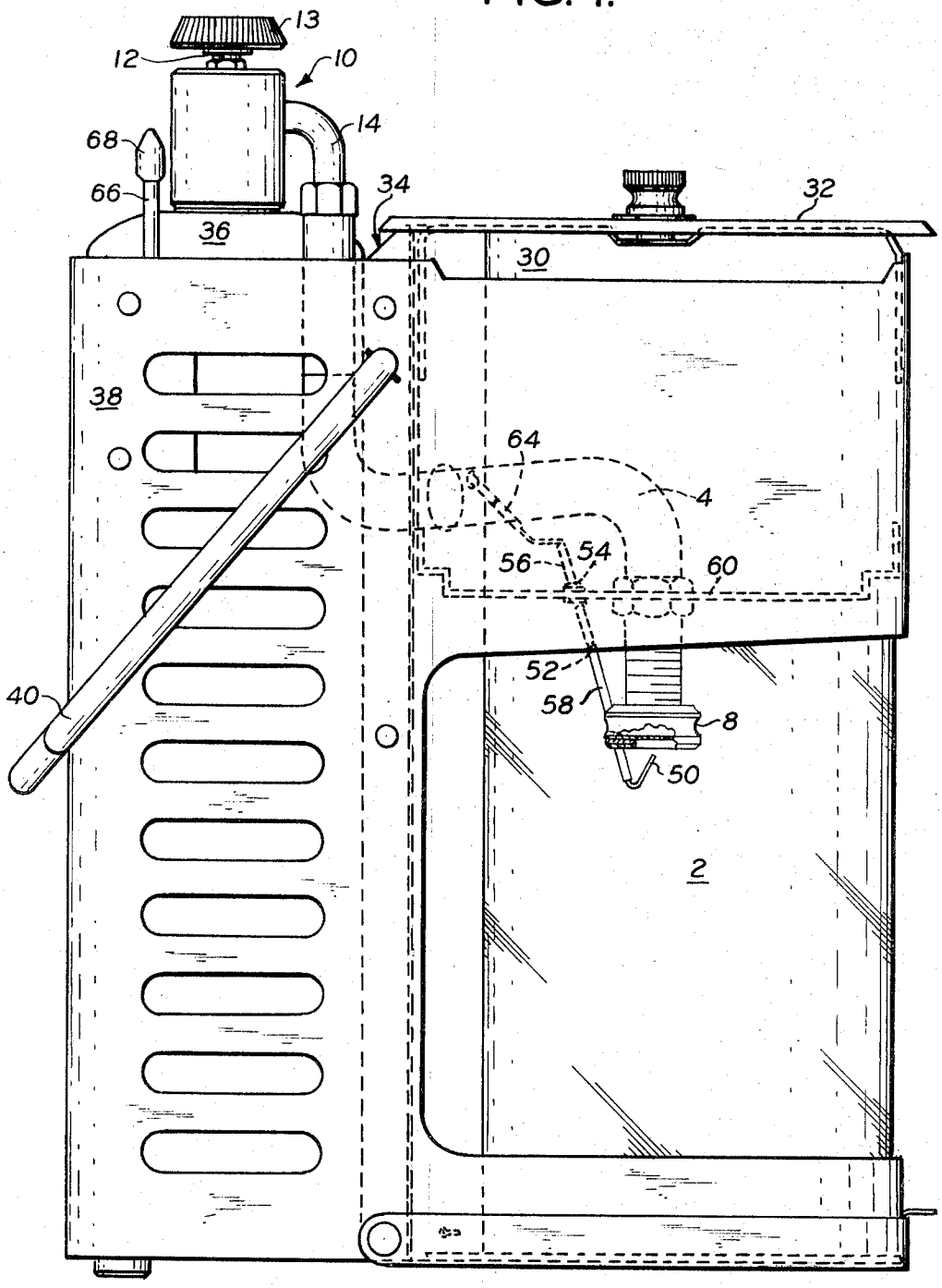


FIG. 2.

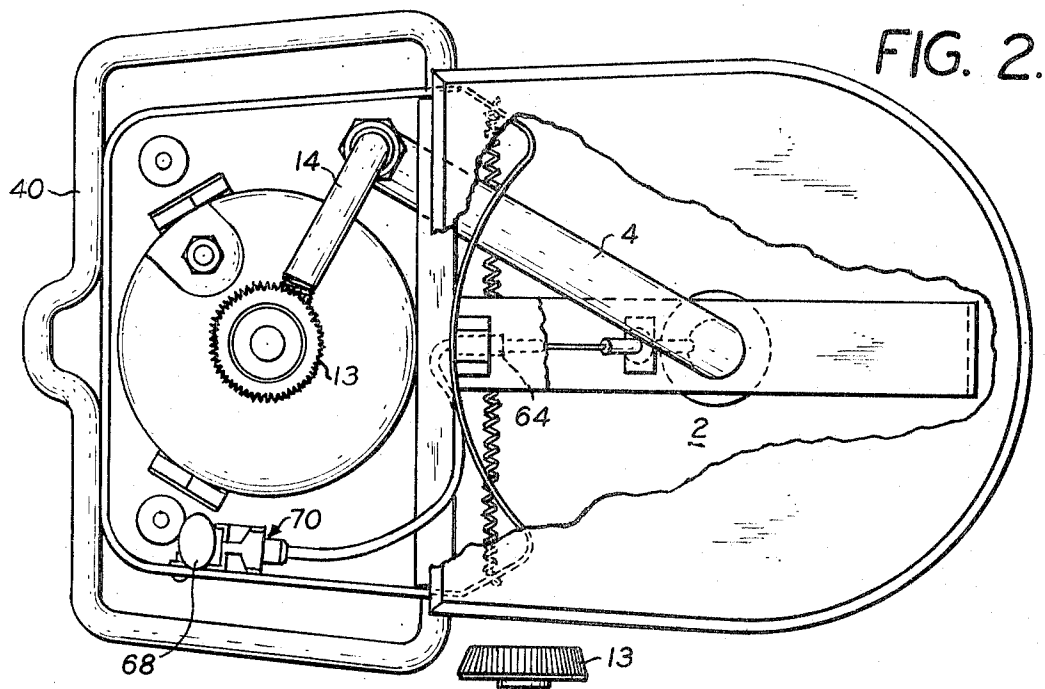
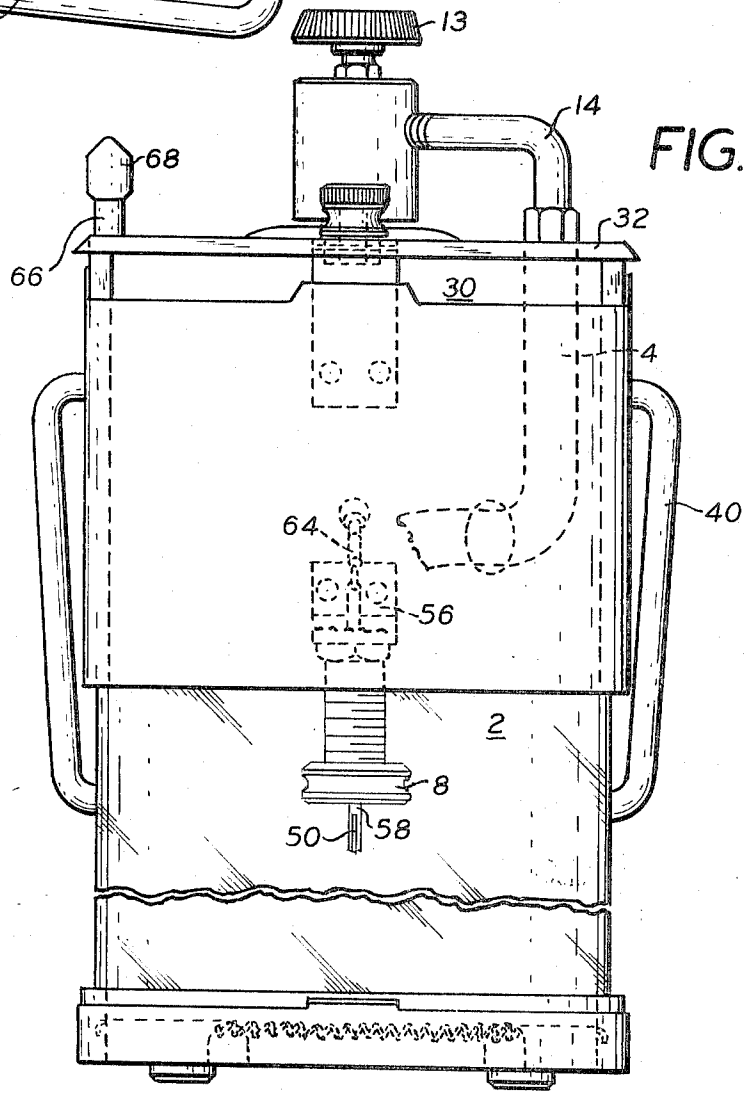


FIG. 3.



LANTERN WITH IGNITER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention is directed to fluid fossil fuel lanterns. More particularly, this invention is directed to portable lanterns which operate on a mixture of an LPG gas and air which lanterns have a piezoelectric starting unit which functions as an igniter, the tip of the resistance wire from the piezoelectric unit disposed within the mantle of the lantern. This invention is also directed to improvements in this field especially in the use of certain types of resistance wires in these lanterns.

2. Discussion of the Prior Art

Portable lanterns fueled by a mixture of LPG gas and air have been known for some time. These are generally of the portable type and comprise a lantern chamber, a wall of which can be defined by a reflector. Positioned in proximate relationship to this lantern chamber is a source of compressed LPG gas. The gas exits from a gas cylinder and passes toward the lantern chamber through a suitable tube. Upstream of the lantern chamber is a mixing valve or other mixing means which allows air to enter into the stream. The mixture of LPG gas and air passes downward within a mixing tube disposed partially within the lantern chamber itself. When the gas-air mixture exits it is disposed within a mantle generally of a nylon type material which mantle is held on a mantle hanger which envelops the end or tip of the mixing tube.

Generally, it is necessary to open up the lantern chamber during ignition and to hold a match or other suitable starting material proximate the mantle. The gas is then turned on and the gas is ignited at the mantle causing the desired glow. Quite obviously, this can be precarious and, in any event, a rather cumbersome ignition operation. Thus, it has become desirable to provide an ignition mechanism which can be remotely actuated which will ignite the mixture of gas and air as it exits from the mixing tube and passes into the mantle.

It was proposed to utilize piezoelectric igniters in conjunction with a resistance wire in such lanterns as such igniters could be actuated at a point remote from the mantle. This would produce the desired spark at the end of the resistance wire. At an early stage it was proposed to dispose the tip of the resistance wire of the piezoelectric igniter within the mantle itself.

It was originally proposed to pass the resistance wire of the piezoelectric unit and appropriate insulators through the mixing tube and to dispose the end of the wire within the mantle near the gas exit. While such a method is technically feasible, it is an extremely difficult and expensive operation as it is necessary to take special precautions to insure that the point of high gas pressure where the resistance wire enters the mixing tube is sealed to prevent gas escape. Additionally, it must be electrically insulated.

On the other hand, it was found that to by-pass the sealing problem the electrodes could be disposed outside of the mantle. However, due to mantle type, size and "burn" geometry and the fact that the proper air-gas ratio for ignition exists only in a vew and varying areas, it was found that it was extremely impractical to dispose the tip of the piezoelectric unit igniter outside of the mantle. Although it is possible to construct such a remotely ignitable portable lantern with the arc producing actuator disposed exteriorly of the mantle, it was found that the same would require constant adjustment by the user — an undesirable and impractical consideration.

The previously described approach was considered because it was desirable to provide a construction in which the escape of gases through any opening in the tube was eliminated. By disposing the resistance wire entirely outside of the mantle no problem of sealing the entrance to the mixing tube is encountered.

SUMMARY OF THE INVENTION

Against the aforementioned background, there was provided by the present invention an improvement in a fluid fossil fuel lantern comprising a lantern chamber, a fuel exit into said chamber, and a mantle disposed about said fuel exit which improvement comprises a piezoelectric starting element, the ignition portion of which is disposed in said mantle and supported in part by said mantle hanger disposed about said fuel exit and carrying said mantle.

According to the present invention, there is provided a LPG fueled lantern of the type described above wherein the piezoelectric resistance wire of the element tapers away from the source of fuel as it exits from the fuel line to the mantle. The piezoelectric unit resistance wire is mounted non-rigidly in the mantle hanger and the tip of the resistance wire of the piezoelectric unit is disposed in the region of the gas-air exit into the mantle. The piezoelectric element comprises a resistance wire whose ultimate tip is circular and is located 0.100 inches from the screen and within a 0.100 inch diameter circle whose center is the center of the hanger for the mantle. The tip of the resistance wire is in angularly facing relationship with the fuel exit. It is formed of a wire preferably made of an alloy of chromium, aluminum, silicon and iron with minor amounts of other materials such as carbon.

The resistance wire generally has a high temperature ceramic coating or tube to insulate electrically the resistance wire. It is surprising that the piezoelectric igniter can continue igniting after, say, several thousand ignitions bearing in mind that during use of the lantern at least the tip of the resistance wire of the piezoelectric igniter is subjected to temperatures in excess of 3,000° F.

Indeed, in accordance with the present invention, there is provided an improved LPG lantern, improved with respect to the positioning of the piezoelectric unit and to the materials associated therewith. Specifically, it has been found that ceramic covering which covers the resistance wire of the piezoelectric igniter should be split about its circumference to define at least two distinct tubes, the separation between the tubes being between 0.000 and 0.010 inch. At this point, the gap should be at least 0.30 inches from the mixing tube to alleviate the problem of arcing toward the mixing tube, all as will be explained more particularly below.

BRIEF DESCRIPTION OF DRAWINGS

The invention can be more fully realized and appreciated when reference is made to the accompanying drawings in which:

FIG. 1 is a side elevation of the lantern of the invention equipped with the piezoelectric igniter;

FIG. 2 is a plan view of the lantern of FIG. 1, partially broken away; and

FIG. 3 is a frontal elevation taken when viewing the lantern of FIG. 1 from the right.

DESCRIPTION OF SPECIFIC EMBODIMENTS

A preferred form of the lantern of the invention is illustrated in the accompanying figures. Gas passes from a cylinder **36** disposed by the lamp chamber **2** through a valve **10** equipped with a needle valve **12.** The gas passes out of the valve **10** into a line **14.** Thereafter it enters a mixing chamber or mixing valve (not shown) wherein it is mixed with air. The air-gas mixture then passes through the mixing tube **4** and exits beneath the mantle hanger **8.**

The lantern of the present invention preferably comprises a generally large cut-out portion **30** located at the top of the lantern chamber which serves as an efficient method for exiting of ignited gases. It further helps in the dissipation of heat. Overlying this cut-out portion **30** is a single solid baffle member **32** joined to the top portion of chamber **2** at **34** to provide a flow restriction which prevents flow of exiting gas against the cylinder **36** shown in FIG. **1.** The cylinder is designated **36** in the embodiment shown and is, of course, connected to the valve **10.** The cylinder sits within a casing **38.** A handle is positioned on a portion of the casing **38** which handle **40** can pivot so as to be disposed over the lantern body itself.

A piezoelectric wire is disposed within the lantern chamber such that its terminal end is in the above-mentioned angularly facing relationship with the point of gas-air egress. The piezoelectric unit comprises a resistance wire **50** which has a circular cross-section at the point where it faces the air-gas exit. This resistance wire is preferably composed of a nickel, chromium, aluminum and iron high temperature alloy, as discussed above. The lower portion of the resistance wire immediately downstream of the exposed end is housed within a ceramic tube which resists temperatures of up to 2,800° F. It is held within the mantle hanger as shown in FIGS. **1** and **2.** It runs generally away from the gas tube **4** so that the creation of an electric spark between the resistance wire and the gas tube **4** is obviated. It will be seen that the downwardly descending angularly disposed tube covering of the resistance wire has a separation approximately midway through its downward travel. This separation **52** is between 0.000 and 0.010 inch in length. It is provided solely to prevent damage during shipment and to prevent cracking due to thermal stresses if a single continuous ceramic tube is employed. The other end of the ceramic tube containing resistance wire is held by two speed nuts **54** which are assembled finger tight. The upper portion **56** of that wire housed in the tube away from the lower portion **58** extends above the bracket **60** which also holds the mixing tube **4** through the use of appropriate nuts.

Above portion **56** the covered wire is once again exposed but is held snug against the upper portion **56** of the ceramic tube by a bend **57.** The covered wire proceeds upwards and terminates in a high temperature connector **64** which electrically connects the resistance wire to a high temperature silicon coated wire **65** which wire leads to a housing of the piezoelectric element **70.** The wire of the piezoelectric unit continues upwardly as shown in FIG. **2** and terminates at its upper end **66** wherein the piezoelectric mechanicm itself is disposed. Element **68** is a resilient member which when depressed causes the piezoelectric effect, namely, it causes the electrons to flow to provide the desired spark to effect ignition. The upper end **66** with the terminal bulbous portion **68** are disposed on top of the lantern as shown in FIGS. **2** and **3.** The mechanism of the piezoelectric system is housed in the element **70.** The piezoelectric unit can be any of a wide variety of available piezoelectric igniters. The specific construction of a piezoelectric igniter is not the subject of the present invention.

The operation of the lantern is quite simple. The needle valve **12** is opened by turning the knob **13** which allows the gas to pass out of the cylinder **36** and to pass through line **14** and mix with air. The mixture continues to exit just below the mantle hanger **8.** Thereafter, the piezoelectric bulbous portion **68** is squeezed, causing the electrons to flow through the resistance wire thereby generating a spark from the tip of the resistance wire **50** to the screen (not shown). This spark will ignite the gas mixture causing a brilliant, lustrous glow within the lantern chamber. The lantern can then be adjusted by adjusting the gas flow. When it is desired to shut the lantern off, all that need be done is to turn the needle valve to the OFF position.

The mantle hanger itself should be heat-resistant to withstand temperatures of the ignited gas which are upwards of 3,000° F. For these reasons the mantle hanger is constructed of steel coated with chemical nickel plate to resist prevailing temperatures. It has been found desirable to electrolessly deposit nickel plate on the mantle hanger in the region of the wire contained in the ceramic tube to avoid the adverse effects of scaling which might otherwise compress the ceramic tube in the entrance hole of the mantle hanger. The tubes passing therethrough can be made of a ceramic material having a high concentration of aluminum with oxides of silicon and calcium.

The screen (not shown) provided over the discharge end of the mantle hanger to avoid flashback is spot-welded to the mantle hanger itself to insure a good electrical path to ground. This avoids complications which arise from other constructions wherein the screen becomes loose from repeated use of the lantern.

From the above, it should be realized that maximum advantage is taken of the region of the mantle hanger pursuant to the invention. Specifically, by inserting the resistance wire in the ceramic tube through the mantle hanger there is a minimum escape of the combustible gas-air mixture owing to the fact that this is a region of low pressure. Thus, all of the objects can be conveniently accomplished by a construction in accordance with the above disclosure. Indeed such construction is reliable in terms of operations and inexpensive in terms of assembly.

What is claimed is:

1. In a fluid fossil-fuel lantern comprising a lantern chamber, a fuel-air exit into said chamber, a mantle hanger surrounding the fuel exit and a mantle disposed about the fuel exit, the improvement which comprises a piezoelectric starting element having a resistance wire ignition portion, said ignition portion being inserted through the mantle hanger in a region of low pressure, the tip of the resistance wire being positioned in the region of the fuel-air exit into the mantle.

2. An improvement according to claim 1 wherein the resistance wire of the piezoelectric element tapers away from the source of fuel and the fuel comprises a mixture of a hydrocarbon and air.

3. An improvement according to claim 2 wherein the tip of the piezoelectric element is circular and located 0.100 inch from the screen of the mantle hanger and within a 0.100 inch diameter circle whose center is the center of the mantle hanger.

4. An improvement according to claim 2 wherein the piezoelectric element is non-rigidly mounted in said mantle hanger and is supported additionally by a bracket disposed above said mantle hanger.

5. An improvement according to claim 2 wherein the piezoelectric element comprises a resistance wire having a tubular ceramic covering which covering has, at at least one point in its travel, a separation.

6. An improvement according to claim 2 wherein the mantle hanger contains an exterior coating of an electrolessly deposited nickel plate.

7. An improvement according to claim 6 wherein the piezoelectric element is held by said mantle hanger and a metal fastener disposed above said mantle hanger.

8. An improvement according to claim 1 wherein said resistance wire is constructed of an alloy of chromium, aluminum, silicon and iron.

9. A fluid fossil fuel lantern according to claim 8 wherein the alloy has a composition within the following range:

chromium	13	to	25
aluminum	3	to	6
silicon	0	to	1
carbon	less	than	1
iron with usual impurities		balance	

10. Fluid fossil-fuel lantern comprising a lantern chamber and mantle, a fuel-air exit into said mantle and a piezoelectric starting element having a resistance wire ignition portion, the tip of the resistance wire angularly facing towards said fuel-air exit and then tapering away from said exit.

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